Maine Department of Transportation
Highway Program

GEOTECHNICAL SERIES 100 REPORT
Highway Reconstruction
US Route 1
Warren, Maine

Prepared by:
Karen Gross
Geotechnical Design Engineer

Knox County Soils Report No. 2013-136

WIN 17889.00
STP-1788(900)X
December 12, 2013

MaineDOT

Highway Program

Brad Foley, Program Manager
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Memorandum

To: Ernie Martin
From: Karen Gross
Date: 12/10/2013
Subject: Final Soils Report
PIN 17889.00
Warren, Route 1

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MaineDOT proposes to reconstruct a section of U.S. Route 1 in the town of Warren. The project begins approximately 0.24 mile south of Sandy Shores Road and extends 1.52 miles northerly to the intersection of Route 1 and Route 97. This section of Route 1 is on the National Highway System (NHS) and is classified as a rural principal arterial. The proposed scope of work includes reconstructing the existing roadway to improve safety, enhance capacity, and to improve surface and subsurface drainage. The proposed pavement structure treatment is to remove the existing concrete pavement and reconstruct a new pavement structure using aggregate and Hot Mix Asphalt (HMA). Travel lanes will be 12' in width and shoulders will be 8" wide and paved. This report will focus on the existing conditions and recommendations for reconstruction.

EXISTING INFORMATION

As-built Plans

As-built plans from the 1929 and 1931 indicate that Route 1 was originally constructed with two 10′ wide travel lanes and 3' wide gravel shoulders. The pavement structure was constructed with a continuously reinforced concrete pavement, 7" (+/-) thick, with 8" to 12" of gravel base beneath it. Individual concrete slabs were 10' wide by 40' long and were doweled together longitudinally. The shoulders were constructed with gravel shoulder material versus gravel base, making the pavement structure a "bathtub" section.

As-built plans from the 1950's were also located for a section of Route 1 in the area of the Route 97 intersection. In relation to this project, it is approximately from 700' south of the Rt. 97 intersection extending to the end of the project (approximate design station 170+25 to 181+50). It appears that this section was rebuilt, and the pavement structure consisted of 5" of bituminous concrete over 18" to 24" of gravel base. Travel lanes were widened to 11' and shoulders to 6'. The same thickness of gravel base was place under the shoulders and they were paved with 5" of bituminous concrete base course mix. The estimate does not included concrete pavement removal, but it could have been included in the Earth Excavation quantity.

Pavement Assessment

The existing roadway consists of two 12-foot travel lanes and variable width gravel shoulders. Pavement management records indicate that HMA overlays were placed in 1994, 2001, and 2006. Those overlays were ¾" or less. Reflective cracking from the underlying concrete pavement is visible at this time primarily at the location of the concrete pavement longitudinal and transverse joints. Pavement distresses are currently considered to be moderate in severity.

Pavement management data indicates that rutting is occurring in both wheel paths, with the ruts in the right wheel path deeper (0.4") than those in the left wheel path (0.1"). Since the original pavement was constructed with 10' lanes, the existing pavement was most probably widened with asphalt only and placed over the existing shoulder material. Rutting in the right wheel path can be the result of lack of support beneath a too thin asphalt layer, a wet, poor quality and too thin shoulder aggregate, or a combination of both.

The pavement management data including the IRI and the PCR also gives us information on the existing ride quality and the overall condition of the pavement.

The IRI is a measure of ride quality and the lower the number, the better the feel of the ride. A new pavement typically has IRI values of 40 to 50 inches/mile. The IRI values for this section of Route 1 range from 112 to 136. These IRI values indicate that the ride quality is fair to mediocre.

The Pavement Condition Rating (PCR) is a numerical measure of all the distresses (cracking and rutting) including extent and severity. The PCR scale ranges from 0 (poor) to 5 (excellent). The current PCR values for this section of Route 1 range from 3.21 to 3.62. PCR values between 3 and 4 indicate that the roadway is in fair to good condition. The pavement management index summary is attached at the end of this memo for your reference.

Ditching is non-existent or shallow along most of the project. There also appears to be severe erosion of the gravel shoulders in some locations. In addition to saturating the gravel beneath the concrete pavement and subgrade, water running in the gravel shoulder can cause undermining of the gravel beneath the concrete pavement edge.

SUBSURFACE INVESTIGATIONS AND ASSESSMENT

Subsurface investigations were conducted by GEI Consultants as a part of previous unconstructed project (PIN 7869.00, Geotechnical Report 2003-41C, available upon request), with additional preliminary borings and probes to bedrock conducted by MaineDOT. The GEI investigations included a 21 hollow stem auger borings with a split spoon sampler, 2 cased wash borings, and 8 rock cores. The GEI borings logs were originally recorded using metric units and the NVGD29 survey datum, but have been converted to US Customary units and the NAVD88 survey datum currently used by MaineDOT. The MaineDOT borings included 5 solid stem auger borings, 7 solid stem

auger probes to locate the top of bedrock, and 31 rod soundings also to locate the top of bedrock off the roadway.

Boring and Lab Testing Information

The following summarizes the materials properties and thicknesses as found in the borings and from the lab testing data. A complete summary can be found at the end of this report.

Existing HMA

The subsurface information indicates that the existing asphalt (HMA) ranges from 3" inches to 8" in thickness, with 6" the most common thickness.

Existing Concrete Pavement

The existing concrete pavement was encountered in all roadway borings except those at stations 169+58 and 181+86. Concrete thicknesses ranged from 4" to 12.5".

Existing Base/Subbase

The subsurface information indicates that the existing granular base beneath the concrete pavement ranges from 6" to 36" in thickness. Lab testing data indicates that the existing granular material does not meet the MaineDOT specifications for aggregate base or subbase. A 15" layer of reclaimed asphalt was encountered beneath the HMA layer at station 169+58.

Subgrade Soils

The subgrade soils along the designed alignment consist primarily of marine CLAY-SILT, glacial till, bedrock, and fill material. The subgrade soils are considered moderately to highly frost susceptible.

The following table summarizes the pavement materials as found in the borings.

Existing Pavement Structure Summary

Boring No.	Design Station	Offset (ft)	HMA (in)	Concrete (in)	Subbase (in)	Subgrade Type
FWD 290	103+33	7.9 R	6.0	7.0	20.5	sandy SILT
FWD 890	123+00	7.9 R	6.0	7.0	21.7	silty SAND
FWD 1490	142+72	7.9 R	6.0	8.5	10.6	sandy SILT
HB-WARR-315	144+93	12.5 R	8.0	4.0	36.0	CLAY-SILT
HB-WARR-316	149+86	8.5 L	6.0	12.5	8.0	silty SAND
HB-WARR-318	159+39	9.2 R	6.0	12.5	6.0	silty SAND
FWD 2090	162+39	7.9 R	5.5	7.5	14.5	sandy SILT
HB-WARR-320	169+58	8.9 R	3.0		reclaim-15"	silty SAND
HB-WARR-323	181+86	20.7 R	3.0		4.0	CLAY-SILT
FWD 2690	182+09	8.5 R	6.0	7.0	22.8	sandy SILT

Groundwater

Shallow groundwater or wet subsurface soils were encountered along the entire project length. These water levels can be due to a high groundwater table or a perched water

table where the underlying soils consist of CLAY-SILT and bedrock. Wet soils directly under the pavement are mostly likely due to water being trapped in the “bathtub” pavement section.

GEI installed four groundwater observation wells adjacent to the roadway at stations 114+43,123+26, 141+24, and 181+86 to determine stabilized groundwater levels. Groundwater levels will fluctuate seasonally and with precipitation, so the groundwater levels encountered in the wells and borings may be different during construction. The following is a summary of all the stabilized and unstabilized groundwater levels encountered in the borings.

Groundwater Summary

Boring No.	Design Station	Offset (ft)	Depth to water BGS (ft)
HB-WARR-301	105+93	37.7 R	8.2
*HB-WARR-303A***	*114+43*	*41.6 L*	*1.3*
HB-WARR-303B	115+31	40.9 L	6.9
HB-WARR-304	115+65	39.4 L	9.8
HB-WARR-306	118+70	21.3 L	3.6
HB-WARR-307	120+37	31.6 R	3.28
*HB-WARR-308***	*123+26*	*29.1 L*	*0.98*
HB-WARR-309	128+19	24.2 L	1.6
HB-WARR-311	132+99	37.5 L	1.7
HB-WARR-312	133+83	18.0 R	2.4
HB-WARR-313	137+74	29.7 L	7.2
*HB-WARR-314***	*141+24*	*38.7 L*	*0.75*
HB-WARR-315	144+93	13.0 R	2.4
HB-WARR-316	149+87	10.6 L	6.9
HB-WARR-318	159+39	8.9 R	1.8
Probe	177+20	17.0 Rt.	4.0
*HB-WARR-323***	*181+86*	*20.7 R*	*3.2*

** depth from observation wells

GEOLOGY

The Soil Conservation Survey (SCS) of Lincoln and Knox Counties and the Maine Surficial Geology map for the Thomaston quadrangle indicate that the surficial soils consist primarily of marine clay, silt, and sand deposits.

The SCS contains information on physical and engineering properties of the soils that are useful for design decisions and construction activities. This information includes the expected soil classification, seasonal depth to the high groundwater table, depth to bedrock, and potential frost action. The following table summarizes the SCS information that will pertain to this project. The design stations have been interpolated from the SCS maps and measured in Google Earth, so they are considered very approximate.

SCS Physical and Engineering Properties Summary

Design Station	Soil Type	Groundwater Depth (bgs)	Bedrock Depth (bgs)	Frost Action
103+00 to 106+00	CLAY-SILT	1’ to 3’		high
106+00 to 122+30	Silty SAND	----------	10” to 40”	moderate
122+30 to 124+75	CLAY-SILT	0’ to 1.5’		high
124+75 to 134+90	Silty SAND	----------		moderate
134+90 to 138+55	Silty SAND	----------	0” to 40”	moderate
138+55 to 150+65	CLAY-SILT	0’ to 1.5’		high
150+65 to 156+50	Silty SAND	----------	0” to 40”	moderate
156+50 to 173+00	CLAY-SILT	0’ to 1.5’		high
173+00 to 183+50	CLAY-SILT	1’ to 3’		high

The Surficial Geology map indicates that the natural soils on the entire project consist of Presumpscot Formation, a glaciomarine CLAY-SILT deposit (Presumpscot Formation). This map also indicates that shallow bedrock exists from design station 115+65 to 135+65 and 143+65 to 155+65. These stations were interpolated from measurements taken directly off the surficial geology map using Sandy Shores Road as a reference point, then were correlated with design stations, so the boundaries are considered very approximate.

FROST PENETRATION/FROST SUSCEPTIBLE SOILS

Subgrade soils on this section of Route 1 will be moderately to highly frost susceptible. The three factors that must be present for frost action to occur are frost susceptible soils, an adequate water supply (infiltration, groundwater, capillary rise), and sustained temperatures below freezing for an extended period of time. All these factors are present at this project location, therefore detrimental effects of frost are expected unless mitigated. Frost action will predominately produce frost heaves at bedrock/frost susceptible soils interfaces and high groundwater locations, but weakening of the subgrade soils is also expected during the thawing period. The anticipated depth of frost penetration beneath a snow free pavement is approximately 40”.

SHALLOW BEDROCK

Shallow refusal was encountered in borings, auger probes, and rod soundings for a significant length of this project. Exposed bedrock is prevalent, with outcrops located at stations 117+50 to 119+25, 129+50 to 134+50 on the right side of the roadway, and stations 123+00, 133+50 to 134+50, 159+00 to160+00, and 175+50 on the left side. More exposed bedrock most likely exists, but is hidden by vegetation. Bedrock at this project location was identified by GEI as fine to medium grained schist and coarse-grained granite. The following table is a summary of bedrock encountered in the subsurface investigations. Please see the information attached at the end of this report for locations that were drilled/probed and bedrock was not encountered.

Refusal Summary

Boring #	Station	Offset (ft)	Refusal Depth (ft)
HB-WARR-304	115+65	39 L	24.4
	117+00	20 L	5.1
HB-WARR-305	117+16	32 R	0.0
	117+80	20 L	4.5
	118+50	20 L	3.1
HB-WARR-306	118+70	22 L	4.14
	119+00	20 L	1.5
	119+50	20 L	7.0
HB-WARR-309	128+19	24 L	4.5
HB-WARR-310	130+69	35 R	1.5
	132+00	35 R	4.5
HB-WARR-311	132+99	37 L	3.5
	133+50	35 R	4.6
HB-WARR-312	133+83	18 R	4
	136+00	35 R	4.0
HB-WARR-314	141+24	39 L	7.5
	151+25	20 L	6.8
	152+00	35 R	4.8
	152+50	35 R	4.9
	153+00	35 R.	5.8
	153+50	35 R	3.8
HB-WARR-318	159+39	9 R	6.3
	159+95	20 R	5.2
	160+40	20 R	3.1
	176+25	20 R	2.2
	176+50	18 R	4.0
	176+50	20 L	5.0
	176+50	20 R	4.5
	176+75	19 R	5.5
	177+20	17 R	8.3
	177+25	20 R	4.0
	177+50	20 R	2.9
	178+00	30 R	6.1
	178+15	20 R	3.0

Drainage improvements and road widening will require cuts off the edge of and under the roadway at many locations. Bedrock will be encountered in some of these cuts. The bedrock is considered hard and therefore blasting will most likely be required to remove it. The following table lists the information on the bedrock properties that were obtained from drilling and inspecting the rock cores (GEI investigations).

Rock Core Summary

Boring #	Station	Offset (ft)	Description	RQD	Rock Mass Quality	Joint Spacing
HB-WARR-305	117+16	32 R	coarse grained granite	45%	poor	3" - 15"
HB-WARR-306	118+70	22 L	f-m grained schist	44%	poor	1" - 20"
HB-WARR-309	128+19	24 L	f-m grained schist	10%	very poor	3" - 5"
HB-WARR-310	130+69	35 R	f-m grained schist	33%	poor	2" - 12"
HB-WARR-311	132+99	37 L	f-m grained schist	83%	good	≈ 20"
HB-WARR-312	133+83	18 R	f-m grained schist	95%	excellent	≈ 24"
HB-WARR-314	141+24	39 L	coarse grained granite	87%	good	≈ 20"
HB-WARR-318	159+39	9 R	f-m grained schist	88%	good	≈ 8"

RECOMMENDATIONS

The following recommendations are based on the information obtained in the subsurface investigations, the GEI report, and pertain specifically to the scope and vertical/horizontal alignments for the proposed reconstruction of Route 1.

1. The scope of work includes removing the existing continuously reinforced concrete pavement. With the existing subgrade soil types and a potential high groundwater table, the subgrade soils and gravel base beneath the concrete pavement may not support construction traffic when the concrete pavement is removed. “Pumping” of the subgrade soils may occur when traffic loads are applied. Making drainage improvements prior to the removal of the concrete pavement is recommended to ensure the existing soils beneath the concrete pavement are drained. If this is not practical, non-woven geotextiles can be used to improve mobility over the soft spots or these sections may be undercut and backfilled with subbase aggregate.

2. Concrete pavement that is removed may be crushed and reused as subbase aggregate as per the requirements of Special Provision 304, Aggregate Base and Subbase (Recycled Concrete Aggregate).

3. The existing HMA removed from this project may be used as per Supplemental Specification 203, Excavation and Embankment, Section 203.041.

4. Shallow and exposed bedrock is prevalent within the project limits. New drainage ditches, subsurface drainage systems, and roadway widening will require bedrock removal in cut areas. The bedrock is considered hard and will most probably require blasting for removal. Bedrock removal is expected but not limited to cuts at stations 117+00 to 119+50, 123+00, 128+00 to 135+00, 152+00 to 153+50, 159+100 to 161+00, and 174+50 to 178.00.

5. The subgrade soils are considered moderately to highly frost susceptible. To mitigate differential frost heaving issues at the bedrock/frost susceptible soil interface, shattering the bedrock subgrade as per Special Provision, Section 203, Shatter Rock Subgrade, or constructing 20:1 transitions with non-frost susceptible soils is recommended.

6. Constructing transitions with non-frost susceptible soils at all new cross culvert locations are recommended to reduce differential heaving between cross culvert backfill materials and the existing frost susceptible soils.

7. Cut slopes may require surface stabilization if vegetation is not established prior to winter shutdown, during heavy rainfall periods, or if groundwater seeps are encountered in cut slopes. Plain rip rap or turf reinforcement mat may be necessary to stabilize the slope surface. If groundwater seeps are encountered, rip rap is recommended.

8. The recommended pavement structure total thickness is 30”. This pavement structure thickness will reduce the depth of frost penetration into the frost susceptible soils and thus reduce the magnitude of potential frost heaving.

9. The appropriate subgrade resilient modulus value to use for the pavement design is 4000 psi. This value is based on existing subgrade soil gradations and geology information correlated to the Maine DOT Soil Support and the Soil Resilient Modulus for DARWin charts.

10. Longitudinal ditches or underdrain are proposed for the entire project length. Both will help lower the groundwater table. French drains or weepers may be necessary if natural springs or excessively high groundwater levels are encountered under the roadway during construction.

11. Existing roadway aggregate may not be reused as aggregate in the new pavement structure, but may be reused as embankment fill.

12. Excavated soils are suitable to be reused as fill (unless deemed unsuitable by the Resident), but may require moisture conditioning before placed and compacted.

<u>Attachments:</u>
As-Built Typicals
As-Built Station Conversion
Pavement Management Data
Summary Sheets (Boring and Bedrock)
Boring Logs
GEI Laboratory Testing Information
GEOPLANS
Soil Survey Maps and Reports for Knox and Lincoln Counties
Maine Surficial Geology Map
Design Freezing Index/Frost Depth Chart
Pavement Design Information
Special Provisions

Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
7	Maine	117-B		1	21

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE
STATE HIGHWAY "D"
THOMASTON & WARREN
KNOX COUNTY
FEDERAL AID PROJECT NO. 117-B

TOTAL LENGTH 2.000 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

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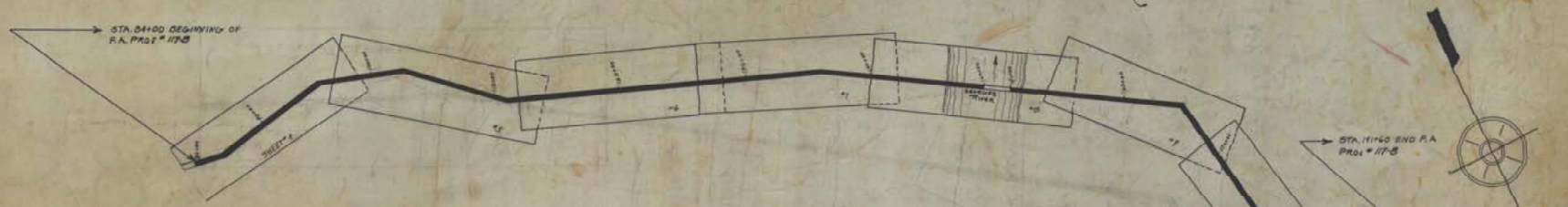
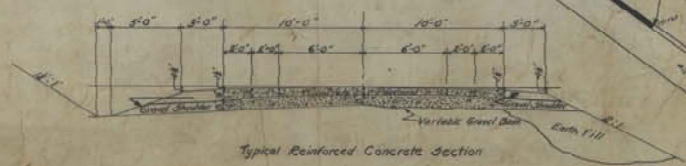
Sheet No. 4-11	Plan and Profile	Sta.
Sheet No. 12-21	Cross-Sections	Sta.
Sheet No.	Bridges	Sta.
Sheet No.	Special Details	



A PORTION OF KNOX COUNTY



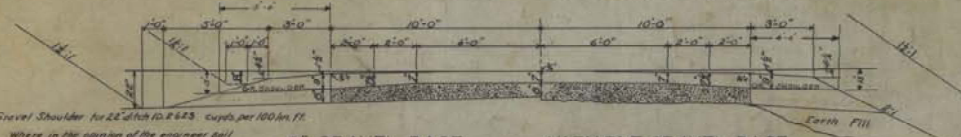
Typical Reinforced Concrete Section

Note: All work contemplated under this contract lies covered by and in conformity with the specifications adopted. Errors are marked on the plan.

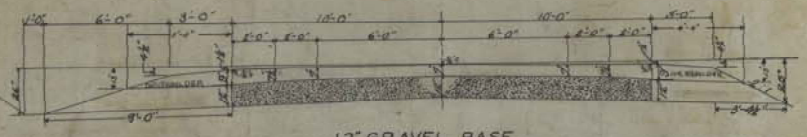
Approved:
Maine State Highway Commission
Chief Engineer

Approved:
U. S. Bureau of Public Roads
District Engineer
Chief Engineer
Director

STANDARD SECTIONS CONCRETE PAVEMENT

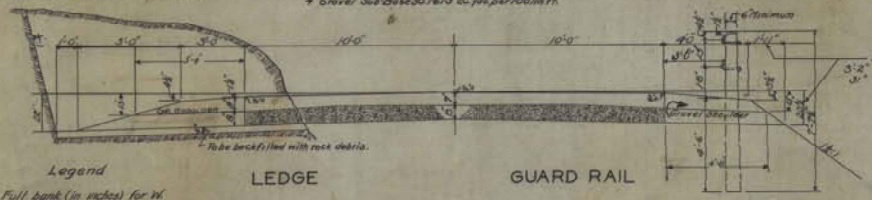


8" GRAVEL BASE VARIABLE GRAVEL BASE



12" GRAVEL BASE

STONE BASE

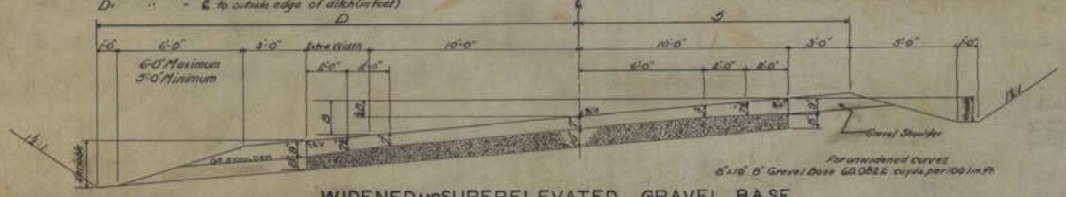


Legend

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)

LEDGE GUARD RAIL

Gravel Shoulders 10.0123 cu yds per 100 lin ft

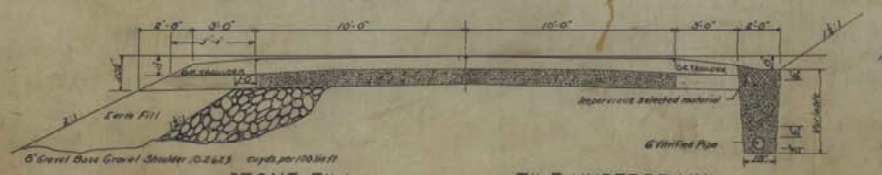


WIDENED AND SUPERELEVATED GRAVEL BASE

For inside ditch on widened or unwidened superelevated curves.
Depth of ditch in inches below center grade equals thickness of surface at ℄ plus $\frac{B}{4}$ x B.

Curves of 2° or more to be superelevated.
"D" equals Degree of Curve x 8" with a minimum of a 6" superelevation. Maximum superelevation equals 1 foot per width of pavement.
All curves to have full superelevation at approximately 50 sta. to the curve from PC to PT with a 130 runoff.
Curves of 8° or more to be widened according to formula $\frac{B}{4}$ x 2 where D equals Degree of Curve.

For outside ditch on superelevated curves
Depth of ditch in inches below center grade equals thickness of surface at ℄ plus 8"; minus $\frac{B}{4}$ x B.



STONE FILL TILE UNDERDRAIN

COBBLE GUTTER

ESTIMATED QUANTITIES

ITEM	DESCRIPTION	QUANTITIES	REMARKS
12-A	EARTH EXCAVATION	3200 C.Y.	
12-B	ROCK EXCAVATION	470 C.Y.	
12-C	TREES REMOVED	3 EACH	
13	EXC. FOR STRUCTURES	150 C.Y.	
17-A	COMMON BORROW	6600 C.Y.	
23	GRAVEL BASE COURSE	7000 C.Y.	
31	CEMENT CONCRETE PAVEMENT	4558 C.Y.	
32-A	REINF. FOR PAVEMENT	241,600 LBS	
33-A	CLASS "A" CONCRETE	110 C.Y.	
33-B	" B "	30 C.Y.	
36	STEEL FOR CONCRETE STRUCT.	800 LBS	
40-A	12" C.M.P.	260 L.F.	
40-B	15" C.M.P.	60 L.F.	
42-C	18" CONCRETE PIPE	72 L.F.	
42-D	24" " "	88 L.F.	
45	PLAIN RIPRAP	700 C.Y.	
50-A	WIRE CABLE GUARD RAIL	2476 L.F.	
50-B	ANCHORAGES FOR G.R.	28 EACH	

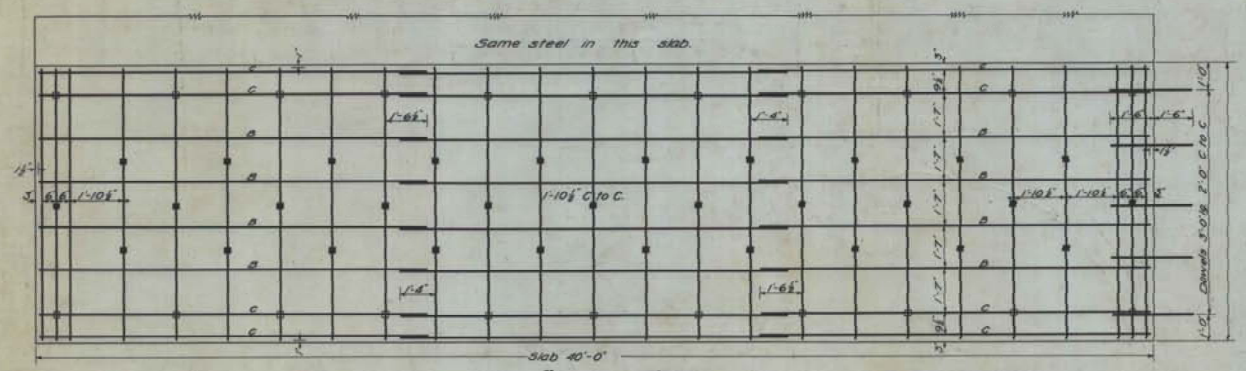
CULVERTS

STA.	SIZE	L.G.	KIND	REMARKS
131 + 40	18	46	CONCRETE PIPE	TWO HEADWALLS PLACED
140 + 80	18	44	" "	" " PLACED
161 + 41	24	72	" "	" " PLACED
93+79	24"	52'	" "	" "
110+36	24"	36'	" "	" "
124+91	2x3	6	CONC. BOX	ONE " REINFORCED
178+28	18"	36	CONC. PIPE	TWO "
180+82	2x2	20	CONC. BOX	ONE "
190+16	18"	36	CONC. PIPE	TWO "
18-18"x20'		DRIVEWAY C.M.P.		
3-15"x20		"	"	

Thos. G. Watson

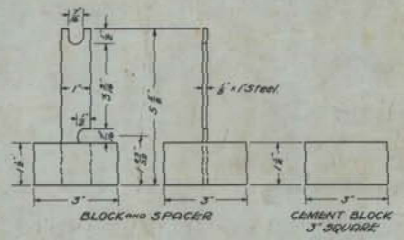
Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
9	Maine	117-B		3	21

PLAN OF PAVEMENT REINFORCEMENT



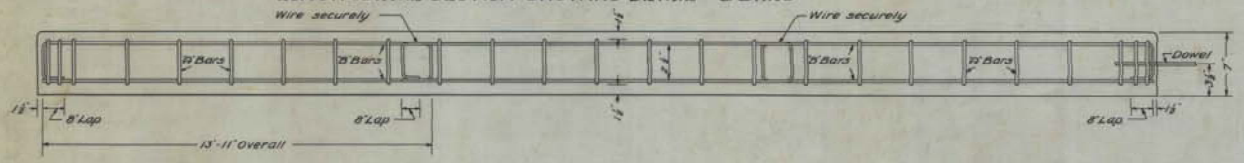
All bars ⅝" diam. Dowels ¾" diam.
All transverse bars are "A" bars.

■ Blocks and spacers
□ Cement blocks

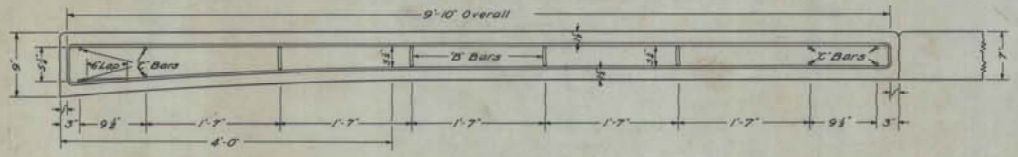


Blocks to be made of one part portland cement and two parts of approved sand and cured under cover for seven days.

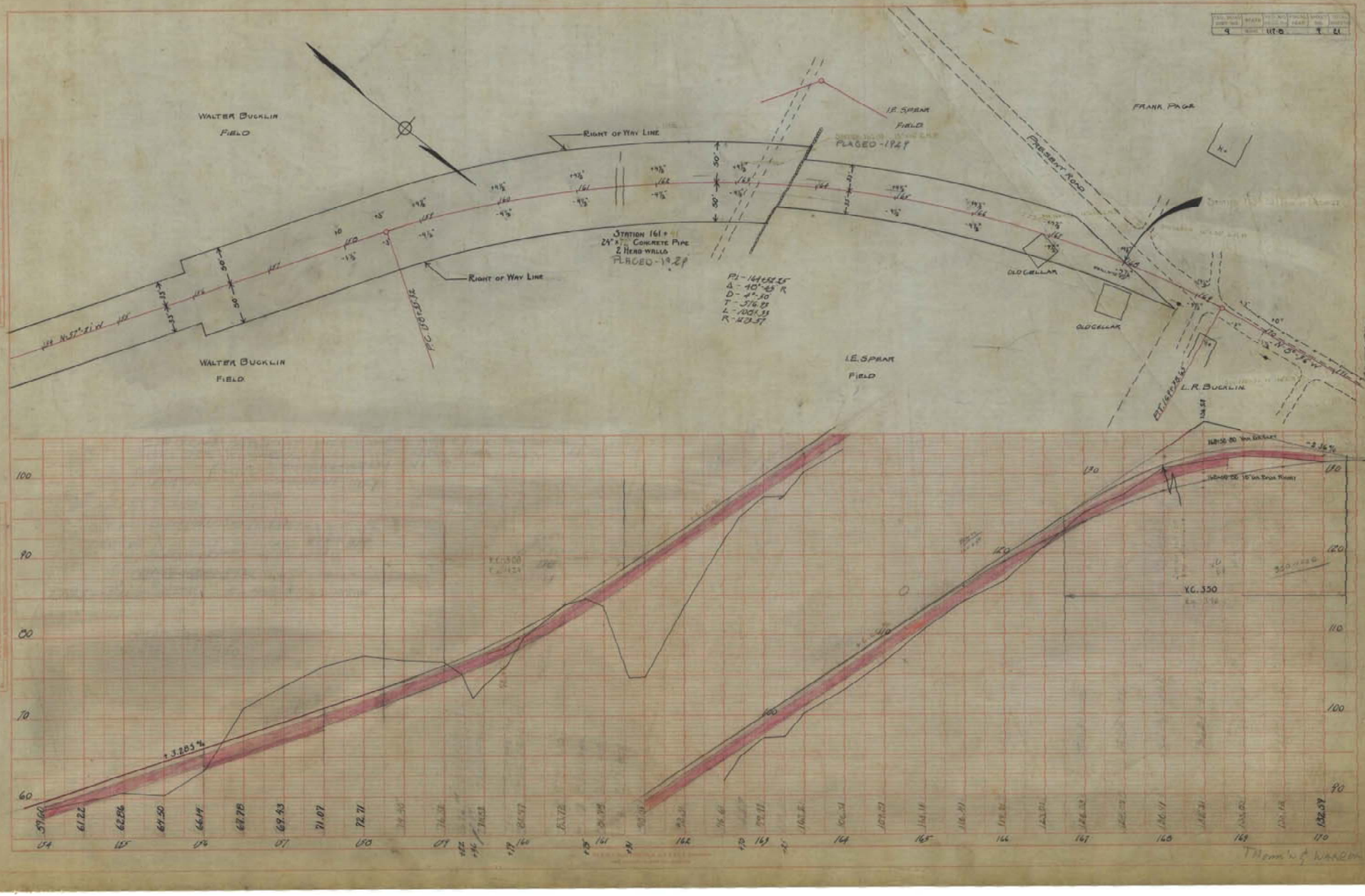
LONGITUDINAL SECTION SHOWING DETAIL OF "B" BARS

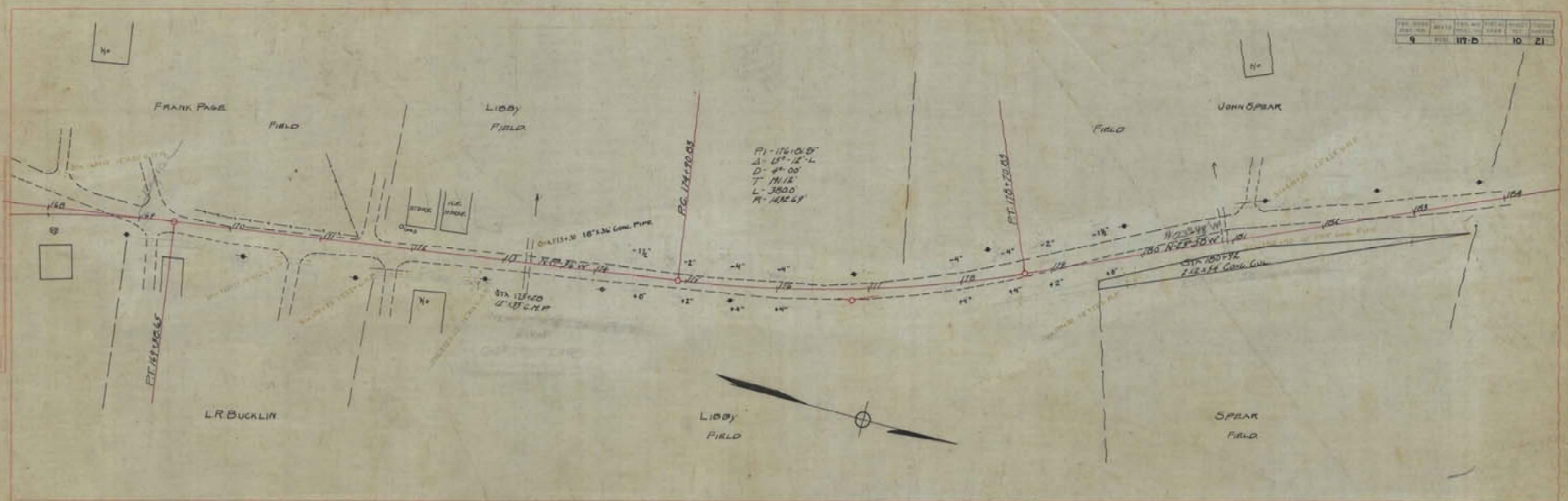


TRANSVERSE SECTION SHOWING DETAIL OF "A" BARS

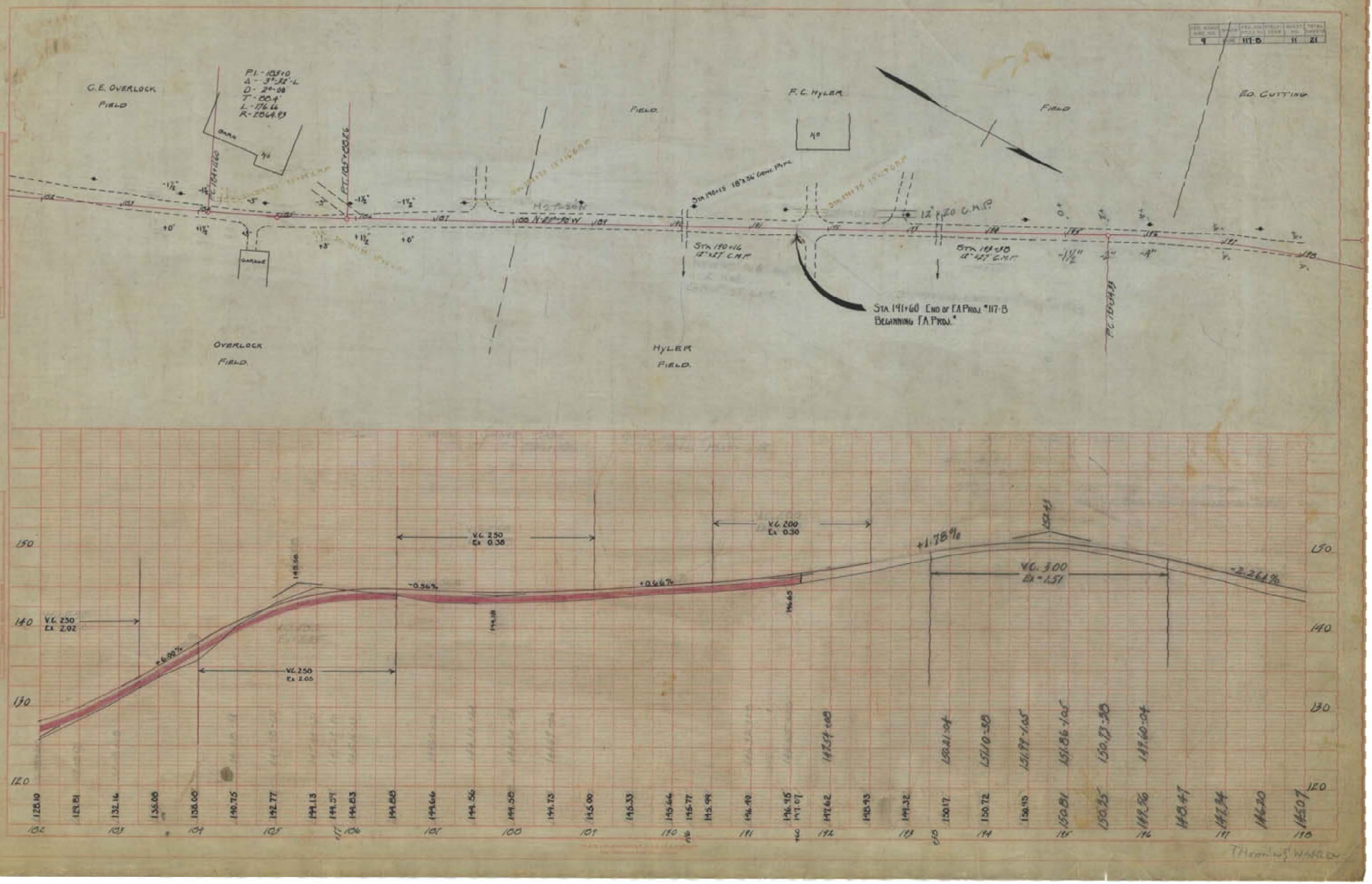


REINFORCING DATA
Bars ⅝" dia. Plain steel 0.376 sq. in. per lin. ft.
Dowels ¾" " " " 1.302 " " " "
Dowels 3'-0" lg. ½ Encased in metal tube
"A" Bars bent 9'-10" overall, lapped 6" & wired
"B" " " 13'-11" " " 8" " "
"C" " straight 13'-11" lg. top & bottom. Ends are 1½" from edge of slab.
Each 10' × 40' 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' × 40' slab contains a minimum of 22 cement blocks & 31 blocks and spacers to support steel. See detail.
Total weight of steel including dowels 10.70 lbs. per sq. yd.


WALTER BUCKLIN
FIELD
RIGHT OF WAY LINE
I.E. SPEAR
FIELD
PLACED-1929
FRANK PAGE
PRESENT ROAD
STATION 161+
24" x 7' CONCRETE PIPE
2 HEAD WALLS
PLACED-1929
RIGHT OF WAY LINE
PI-
Δ-
D-
T-
L-
R-
OLD CELLAR
OLD CELLAR
WALTER BUCKLIN
FIELD
I.E. SPEAR
FIELD
L.R. BUCKLIN
Y.C. 350
+3.283%



Thomas W. & Warren


C.E. OVERLOCK
FIELD
P.I. - 103+10
Δ - 3°-32'-L
D - 2°-00
T - 00.4'
L - 176.66
R - 2864.93
BARN
PC 102+33.60
PT 105+09.26
GARAGE
OVERLOCK
FIELD.
FIELD.
HYLER
FIELD.
F.C. HYLER
HOUSE
FIELD
ED. CUTTING
STA. 190+13 18" x 36' CONC. PIPE
STA. 190+16
12" x 27' C.M.P.
12" x 20' C.M.P.
STA. 191+30
12" x 27' C.M.P.
STA. 191+60 END OF F.A. PROJ. "117-B
BEGINNING F.A. PROJ."
PC 186+43
V.C. 250
Ex 2.02
V.C. 250
Ex 0.38
V.C. 200
Ex 0.30
V.C. 300
Ex 1.51
V.C. 250
Ex 2.05
+6.00%
-0.56%
+0.66%
+1.78%
-2.26%
145.56
144.18
146.45
150.43
150
140
130
120
128.10
129.81
132.16
135.08
138.00
140.75
142.77
144.13
144.59
144.83
144.88
144.66
144.56
144.50
144.73
145.00
145.33
145.66
145.77
145.99
146.40
146.75
147.07
147.62
148.43
149.32
150.17
150.72
150.95
150.81
150.25
149.36
148.47
147.34
146.20
145.07
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
T. Hennings WARREN

Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
4	Maine	117-C	1930	1	24

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE
STATE HIGHWAY "D"
WARREN
KNOX COUNTY
FEDERAL AID PROJECT NO. 117-C

TOTAL LENGTH 2.835 MILES

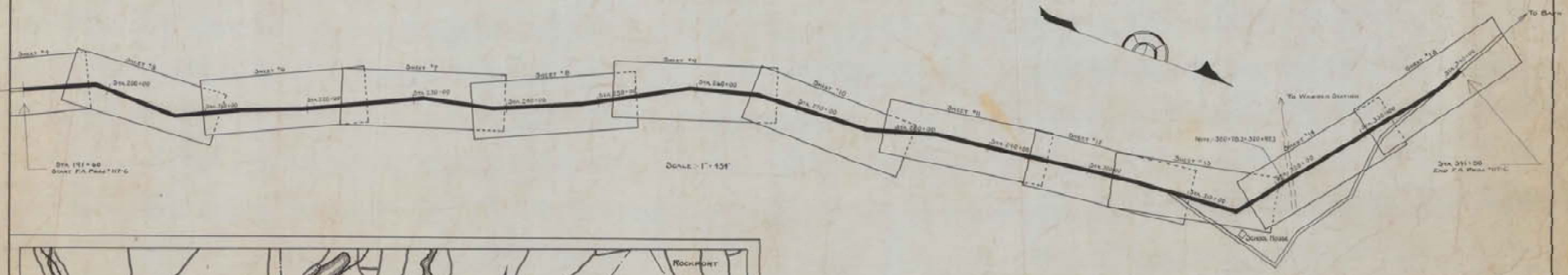
SCALES:
- PLAN 1 IN. = 50 FT.
- PROFILE HOR. 1 IN. = 50 FT. / VER. 1 IN. = 5 FT.
- CROSS SECTIONS 1 IN. = 5 FT.

CONVENTIONAL SIGNS

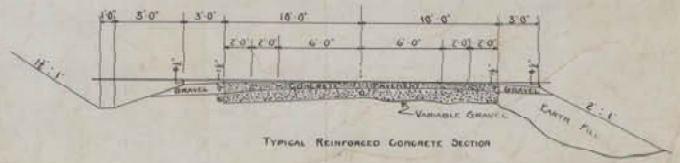
State or National Line	Survey Line
County Line	Culvert
Town Line	Drop Inlet
Unfenced Property	Trolley Pole
Fence	Power Pole
Right of Way Line	Tel. Pole
Traveled Way	Marsh
Railroad	Trees
Retaining Wall	Stone Wall

INDEX OF SHEETS

Sheet No. 1	Title Page	Sta. 191+60 - 341+50	
Sheet No. 2	Typical Sections		
Sheet No. 4-15	Plan and Profile	Sta. 191+60 - 341+50	
Sheet No. 16-24	Cross-Sections	Sta. 191+60 - 341+50	
Sheet No.	Bridges	Sta.	
Sheet No. 3	Special Details		



A PORTION OF KNOX COUNTY



Typical Reinforced Concrete Section

NOTE: All work contemplated under this contract to be covered by and in conformity with the specifications adopted May 21, 1930 except as modified on this plan.

Approved:
Maine State Highway Commission

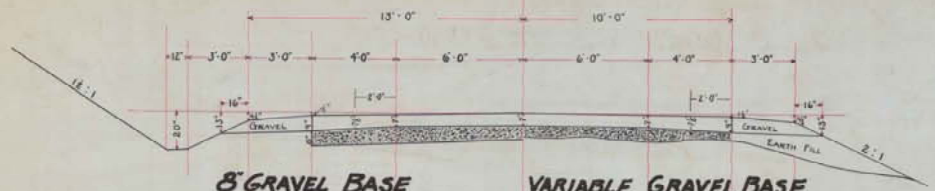
Chief Engineer

Approved:
U. S. Bureau of Public Roads

[redacted]
District Engineer

[redacted]
Chief Engineer

[redacted]
Director



8" GRAVEL BASE

VARIABLE GRAVEL BASE

8" GRAVEL BASE 53.4526 CU YDS. PER 100 LIN. FT.

CONCRETE PAVEMENT 44.8560 CU YDS. PER 100 LIN. FT.

GRAVEL SHOULDER 9.3364 CU YDS. PER 100 LIN. FT.

12" GRAVEL BASE

12" GRAVEL BASE 80.1440 CU YDS. PER 100 LIN. FT.

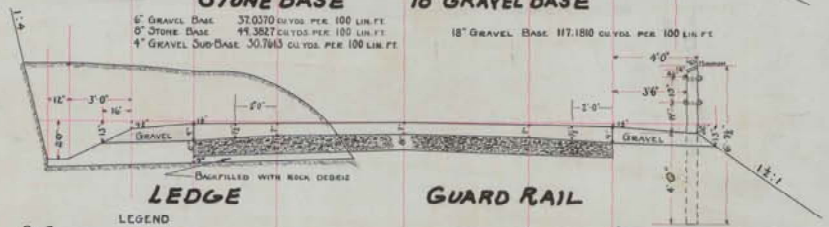
GRAVEL SHOULDER 9.3364 CU YDS. PER 100 LIN. FT.

STONE BASE

18" GRAVEL BASE

6" GRAVEL BASE 37.0370 CU YDS. PER 100 LIN. FT.
6" STONE BASE 49.3827 CU YDS. PER 100 LIN. FT.
4" GRAVEL SUB-BASE 30.7683 CU YDS. PER 100 LIN. FT.

18" GRAVEL BASE 117.1810 CU YDS. PER 100 LIN. FT.



LEDGE

GUARD RAIL

GRAVEL SHOULDER FOR GUARD RAIL 10.8923 CU YDS. PER 100 LIN. FT.

LEGEND

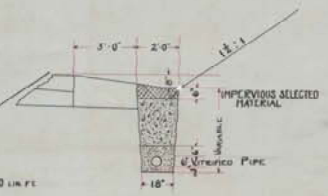
B = FULL BANK IN INCHES FOR W.
W = UNWIDENED WIDTH OF PAVEMENT IN FEET.
S = DISTANCE FROM CENTER LINE TO EDGE OF SHOULDER IN FEET.
D = DISTANCE FROM CENTER LINE TO OUTSIDE EDGE OF DITCH IN FEET.

WIDENED SUPERELEVATED GRAVEL BASE

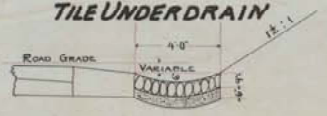
FOR INSIDE DITCH ON WIDENED OR UNWIDENED SUPERELEVATED CURVES
DEPTH OF DITCH IN INCHES BELOW CENTER GRADE EQUALS
THICKNESS OF SECTION AT CENTER LINE PLUS $\frac{B}{8}$ × B.

FOR UNWIDENED CURVES
8"—10"—8" GRAVEL BASE 60.0822 CU YDS. PER 100 LIN. FT.

FOR OUTSIDE DITCH ON SUPERELEVATED CURVES
DEPTH OF DITCH IN INCHES BELOW CENTER GRADE
EQUALS THICKNESS OF SECTION AT CENTER LINE
PLUS 2" MINUS $\frac{B}{8}$ × B.



TILE UNDERDRAIN



COBBLE GUTTER

CURVES OF 2° OR MORE TO BE SUPERELEVATED

B EQUALS DEGREE OF CURVE × 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' RUN-OFF.
CURVES OF 8° OR MORE TO BE WIDENED ACCORDING TO FORMULA $\frac{D}{10}$ + 2" WHERE D EQUALS DEGREE OF CURVE.

QUANTITY

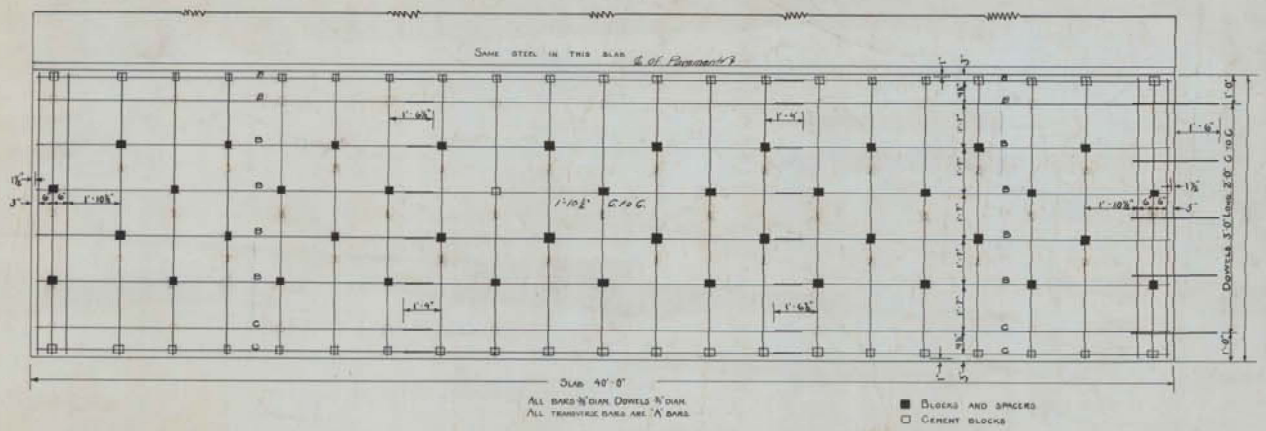
ITEM	DESCRIPTION	QUANT.	REMARKS

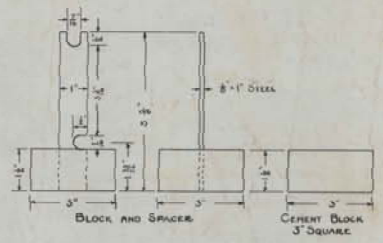
CULVERTS

STA	KIND	SIZE	LENGTH	REMARKS

9		117-G	1931	3	29

PLAN OF PAVEMENT REINFORCEMENT

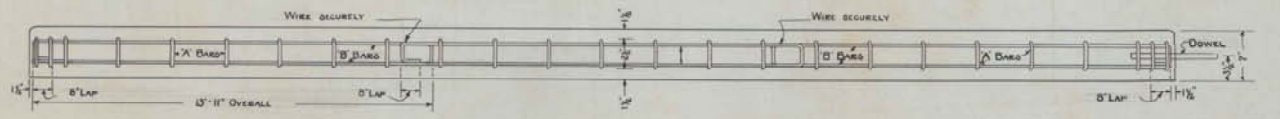




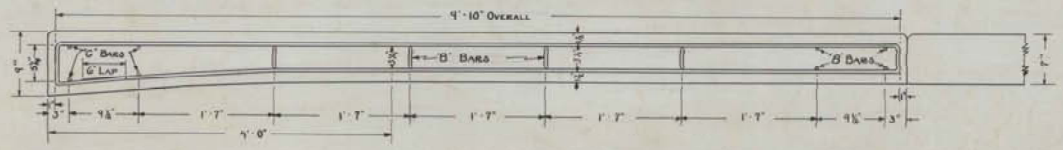
Blocks to be made of one part Portland Cement and two parts of approved Sand and cured under cover for seven days.

Other types of steel supports may be used if approved by the Engineer.

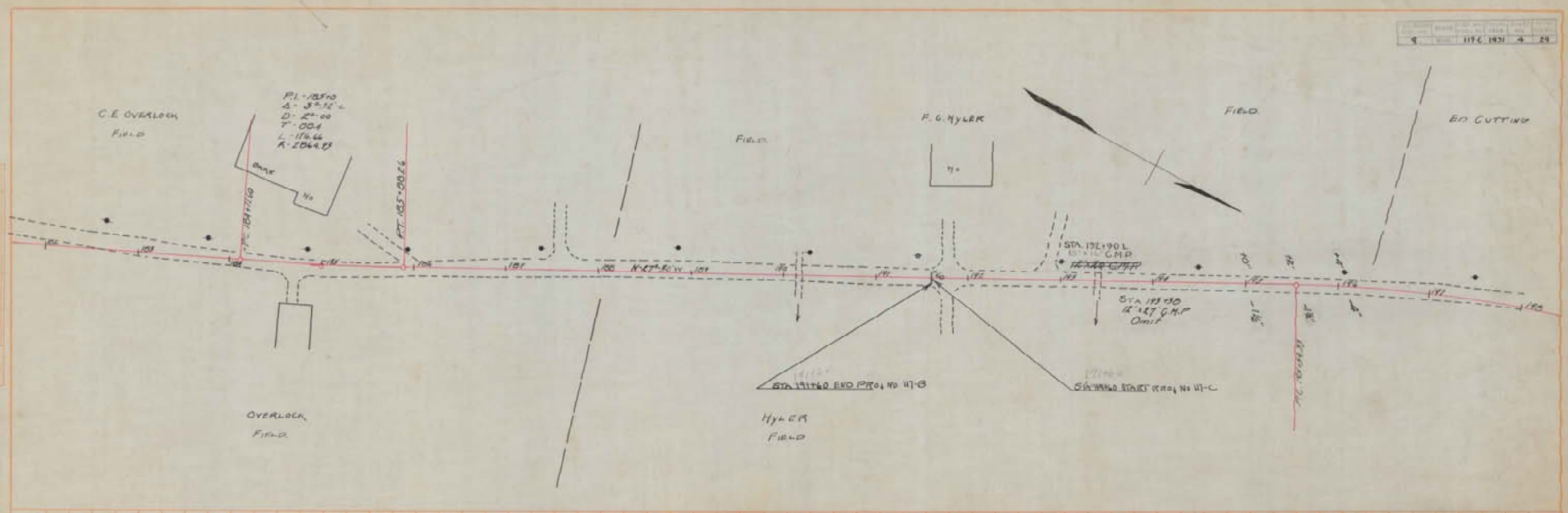
LONGITUDINAL SECTION SHOWING DETAIL OF 'B' BARS

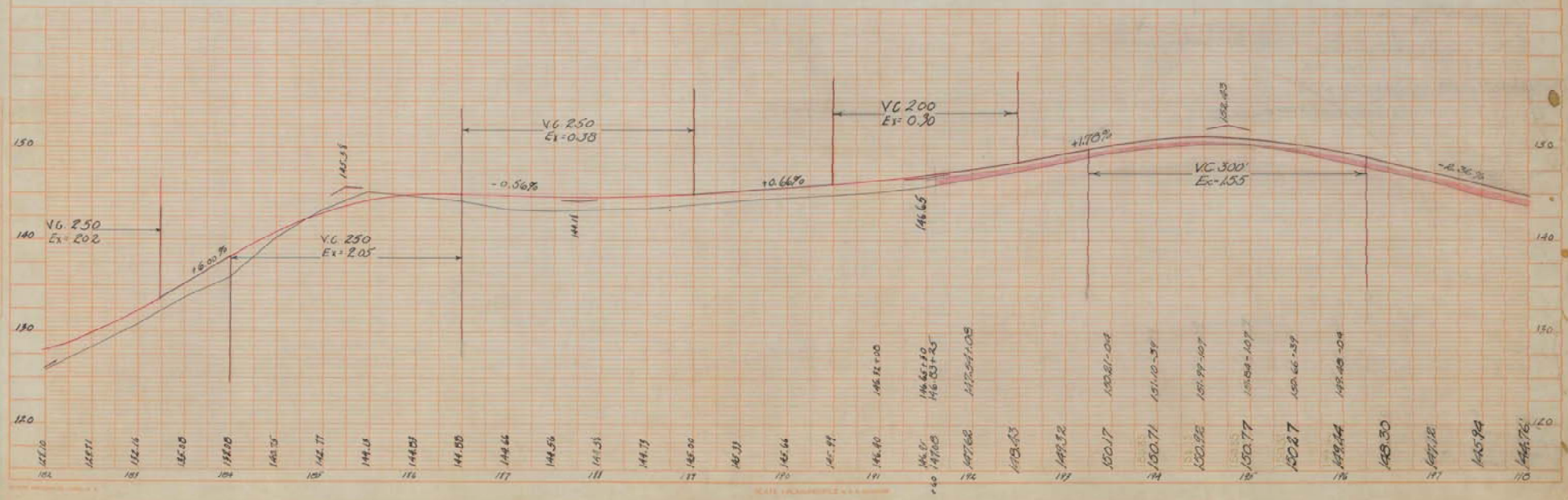


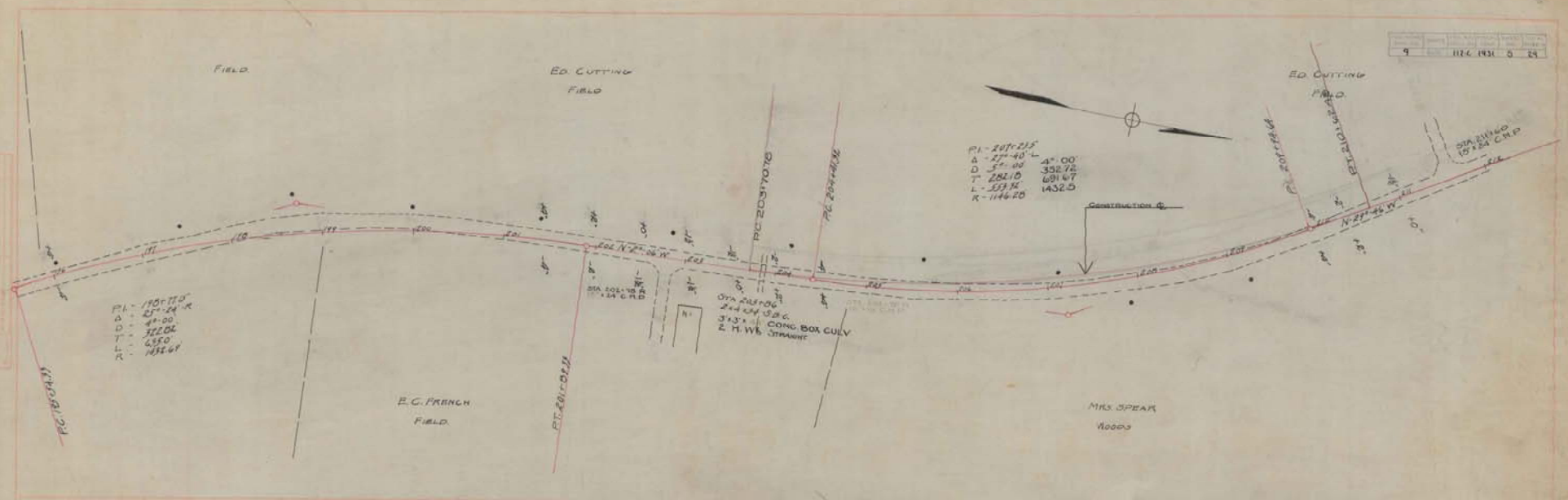
TRANSVERSE SECTION SHOWING DETAIL OF 'A' BARS



REINFORCING DATA		
Bars ⅝" dia.	Plain steel	0.376 lbs. per linear ft.
Dowels ¾" "	" "	1.502 " " " "
Dowels 3'-0" long		½ Encased in metal tube.
'A' Bars bent 9'-10" overall,		Lapped 8" & wired.
'B' " " 13'-11" "		" 8" "
'C' " straight 13'-11" long,		Top & bottom.
Ends are 12" from edge of slab.		
Each 10' × 40' slab contains 63 'A' Bars, 18 'B' Bars & 18 'C' Bars made up in 3 sections. Each section to be securely wired before placing.		
Each 18' × 40' slab contains a minimum of 42 cement blocks & 42 blocks and spacers to support steel. See detail.		
Total weight of steel including dowels 10.76 lbs. per square yard.		

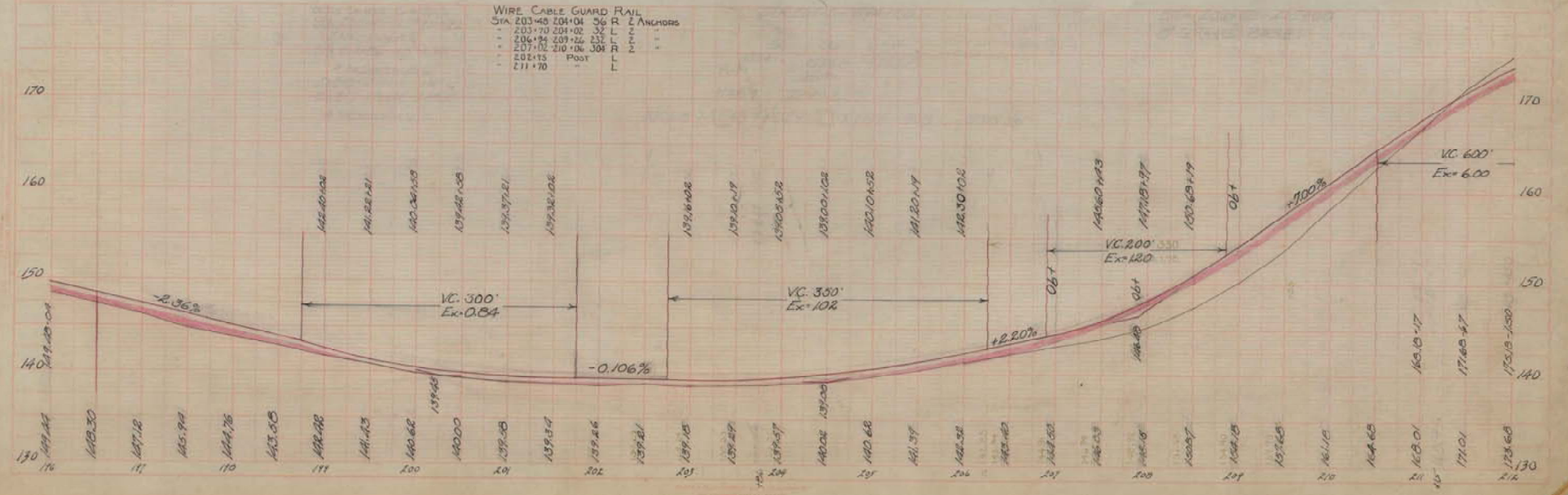

C.E. OVERLOCK
FIELD
P.I. - 185+10
Δ - 3°-12'-L
D - 22°-00
T - 00.1
L - 1166
R - 2064.83
OMIT
PC - 184+76.0
PT - 185+90.26
N-27°-30'-W
OVERLOCK
FIELD.
FIELD.
F. G. HYLER
HYLER
FIELD
STA. 191+60 END PROJ. NO 117-B
STA. 191+60 START PROJ. NO 117-C
STA. 192+90 L
18"x16" C.M.P.
STA. 193+30
12" LET C.M.P.
Omit
FIELD.
ED. CUTTING
PC - 195+40.11


V.C. 250
Ex = 2.02
V.C. 250
Ex = 2.05
V.C. 250
Ex = 0.38
V.C. 200
Ex = 0.30
V.C. 300'
Ec = 1.55
+6.00%
-0.56%
+0.66%
+1.70%
-0.36%
145.58
144.11
146.65
150
140
130
120

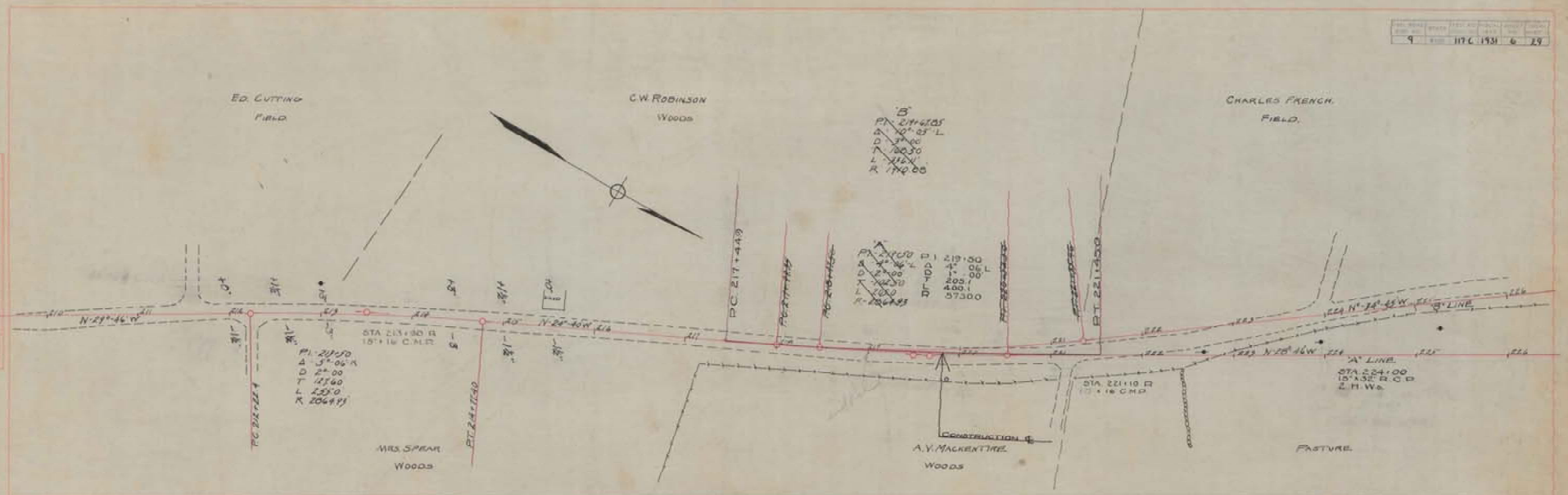


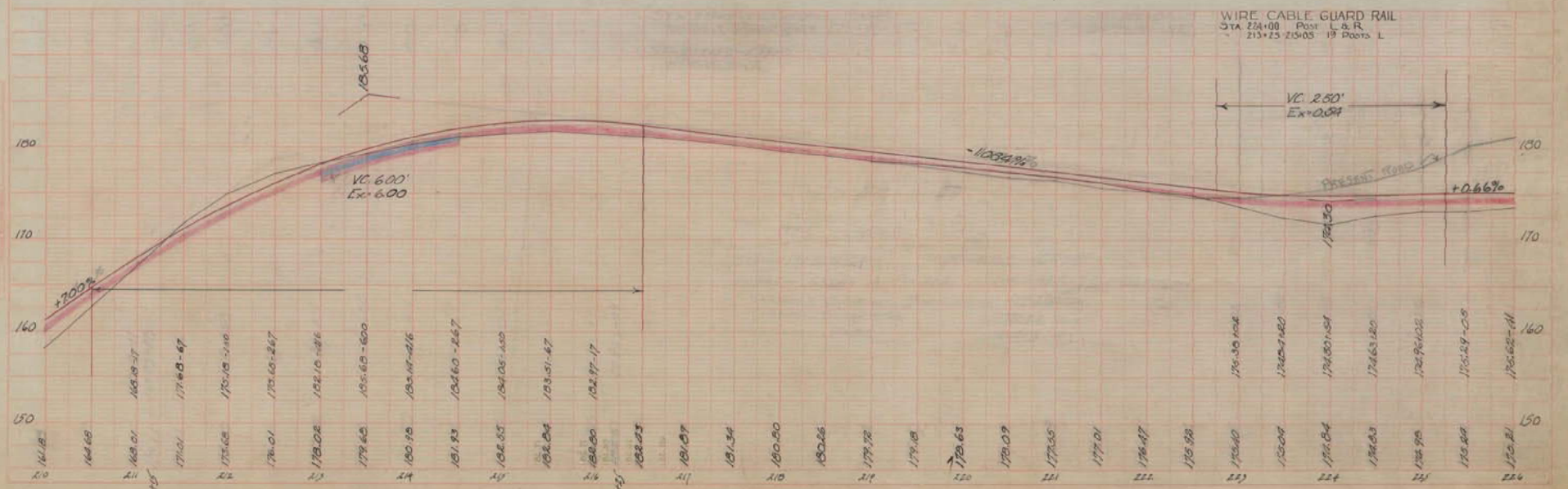
WIRE CABLE GUARD RAIL

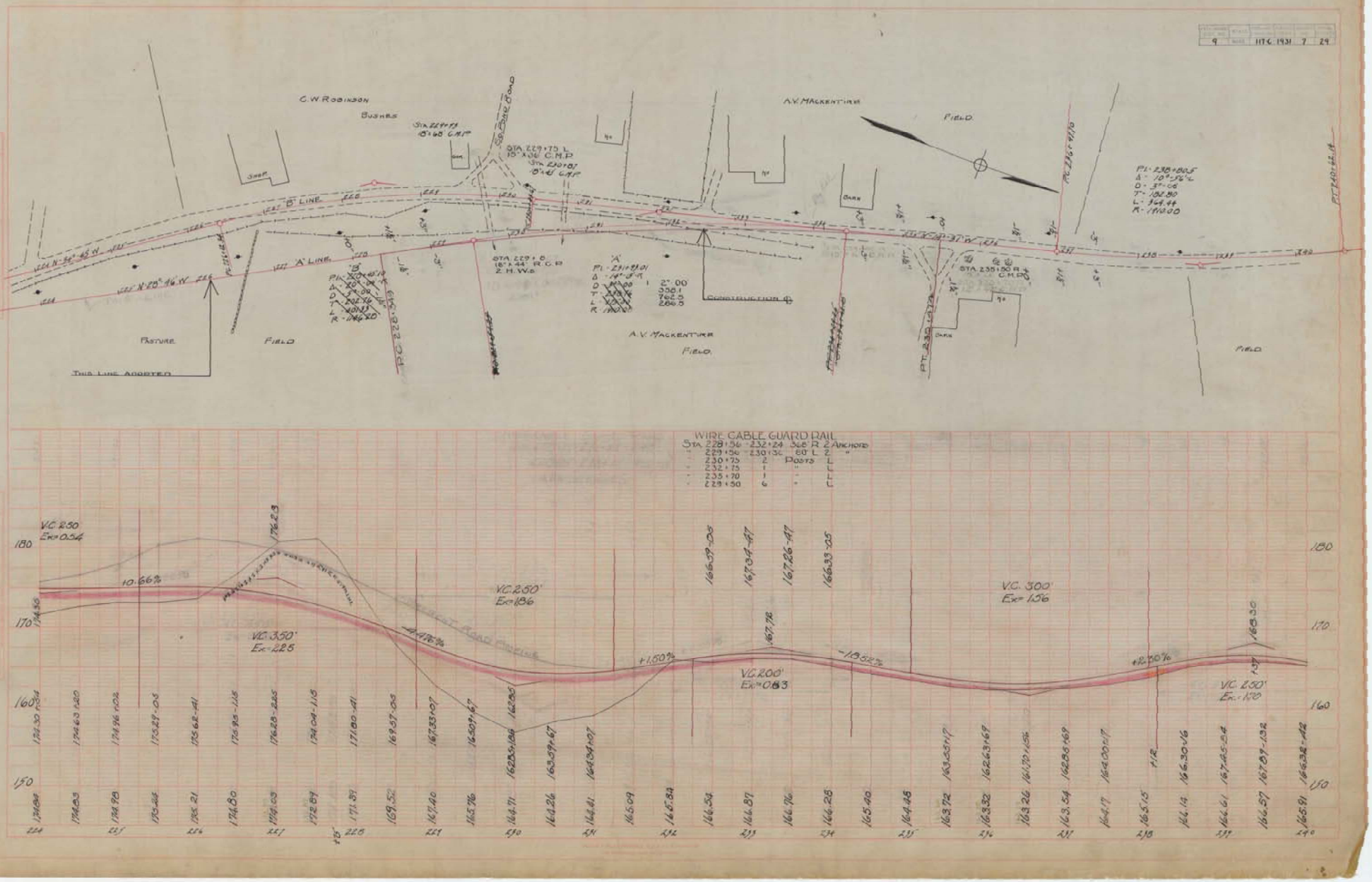
STA. 203+45	204+04	56	R	2	ANCHORS
" 203+70	204+02	32	L	2	"
" 206+34	209+66	232	L	2	"
" 207+02	210+06	304	R	2	"
" 202+75	POST		L		
" 211+70	"		L		



9		117 C	1931	6	29






C.W. ROBINSON
BUSHES
A.V. MACKENTIRE
FIELD
'B' LINE
'A' LINE
PASTURE
FIELD
THIS LINE ADOPTED
A.V. MACKENTIRE
FIELD
FIELD
WIRE CABLE GUARD RAIL
Sta. 229+56 - 232+24 36.8' R 2 Anchors
" 229+56 - 230+36 60' L 2 "
" 230+75 2 Posts L
" 232+75 1 " L
" 235+70 1 " L
" 229+50 6 " L
V.C. 250 Ex=0.54
10.66%
V.C. 350' Ex=225
V.C. 250' Ex=186
+1.50%
V.C. 200' Ex=0.83
-1.95%
V.C. 300' Ex=156
+2.30%
V.C. 250' Ex=170

F. H. A. Proj. No.	STATE	FEDERAL AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
1	MAINE	FS 1 (408)	1	7

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE
STATE HIGHWAY "26"
WARREN
KNOX COUNTY
STATE PROJECT NO. 26-1(408)

TOTAL LENGTH 0.199 MILES

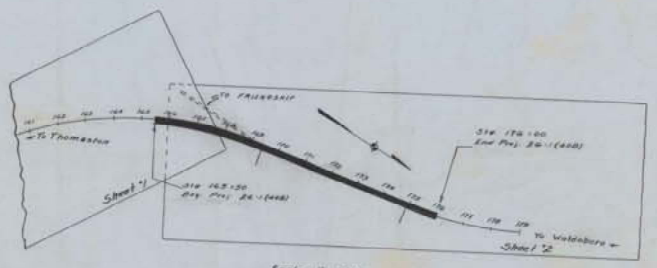
SCALES:
- PLAN 1 IN. = 50 FT.
- PROFILE HOR. 1 IN. = 50 FT.; VER. 1 IN. = 5 FT.
- CROSS SECTIONS 1 IN. = 5 FT.

CONVENTIONAL SIGNS

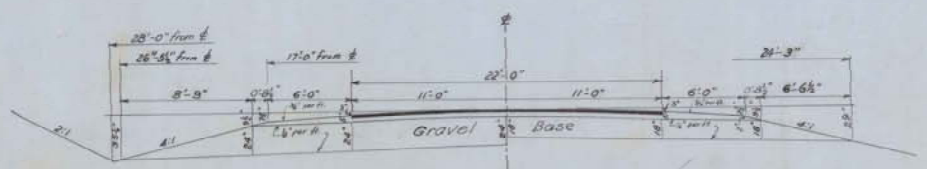
STATE OR NATIONAL LINE	SURVEY LINE
COUNTY LINE	CULVERT
TOWN LINE	DROP INLET
UNFENCED PROPERTY	TROLLEY POLE
FENCE	POWER POLE
RIGHT OF WAY LINE	TEL. POLE
TRAVELED WAY	MARSH
RAILROAD	TREES
RETAINING WALL	STONE WALL

INDEX OF SHEETS

SHEET NO. 1	TITLE PAGE	STA. 165+50 to 176+00
SHEET NO. 1	TYPICAL SECTIONS	
SHEET NO. 2	QUANTITIES	
SHEET NO.	STANDARD DETAILS	
SHEET NO. 2 & 3	PLAN AND PROFILE	STA. 165+50 to 176+00
SHEET NO. 4, 5, 6 & 7	CROSS SECTIONS	STA. 165+50 to 176+00
SHEET NO.	BRIDGES	STA.
SHEET NO.	SPECIAL DETAILS	



Scale 1" = 200'

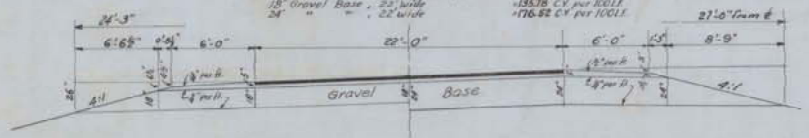


NORMAL

24" Gravel Base, Shoulder = 82.10 C.Y. per 100 L.F.

2" Bituminous Concrete Surface Course, 22' wide = 13.58 C.Y. per 100 L.F.
3" " " Base Course, 22' wide = 20.38 C.Y. per 100 L.F.
18" Gravel Base, 22' wide = 135.78 C.Y. per 100 L.F.
24" " " , 22' wide = 176.52 C.Y. per 100 L.F.

5-2" Bit. Conc. Base Course, Shoulder = 6.70 C.Y. per 100 L.F.
18" Gravel Base, Shoulder = 55.44 C.Y. per 100 L.F.

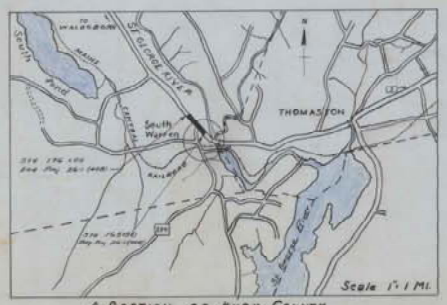


SUPERELEVATED

3" Bituminous Concrete Base Course, 22' wide = 20.38 C.Y. per 100 L.F.
18" Gravel Base, 22' wide = 122.22 C.Y. per 100 L.F.
24" " " , 22' wide = 162.96 C.Y. per 100 L.F.

5-3½" Bit. Conc. Base Course, Shoulder = 8.55 C.Y. per 100 L.F.
18" " " " " = 64.93 C.Y. per 100 L.F.
24" " " " " = 86.11 C.Y. per 100 L.F.

TYPICAL SECTIONS



A PORTION OF KNOX COUNTY

All work contemplated under this contract to be governed by and in conformity with the specifications adopted May 1953, except as modified on these plans.

APPROVED:
MAINE STATE HIGHWAY COMMISSION

Daniel H. Stanton
CHAIRMAN

Clarence S. Crosby

Horace A. B. Emery

Reuben A. Robertson
CHIEF ENGINEER

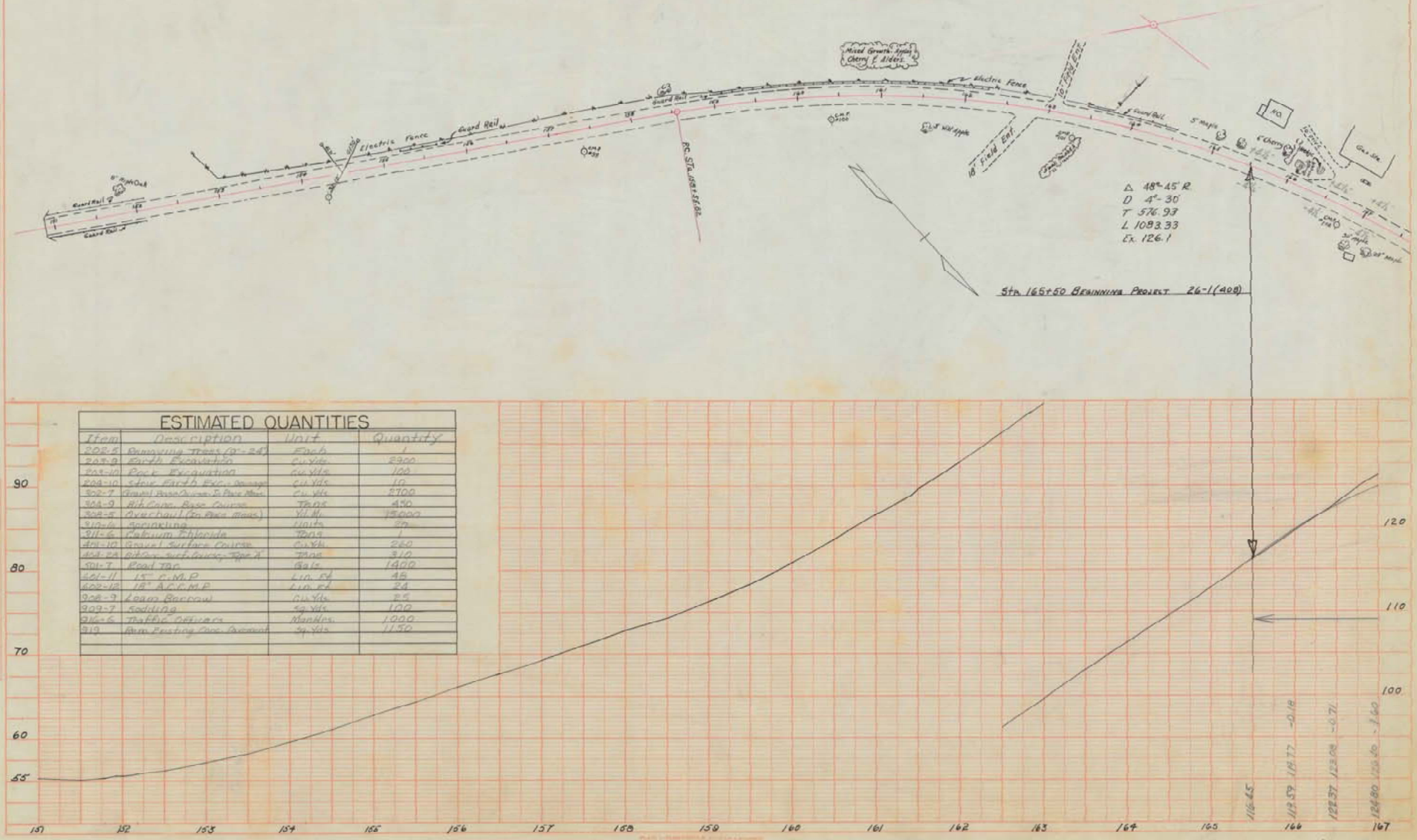
DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
DIVISION 1

APPROVED:

[redacted] [redacted]

DISTRICT ENGINEER DATE

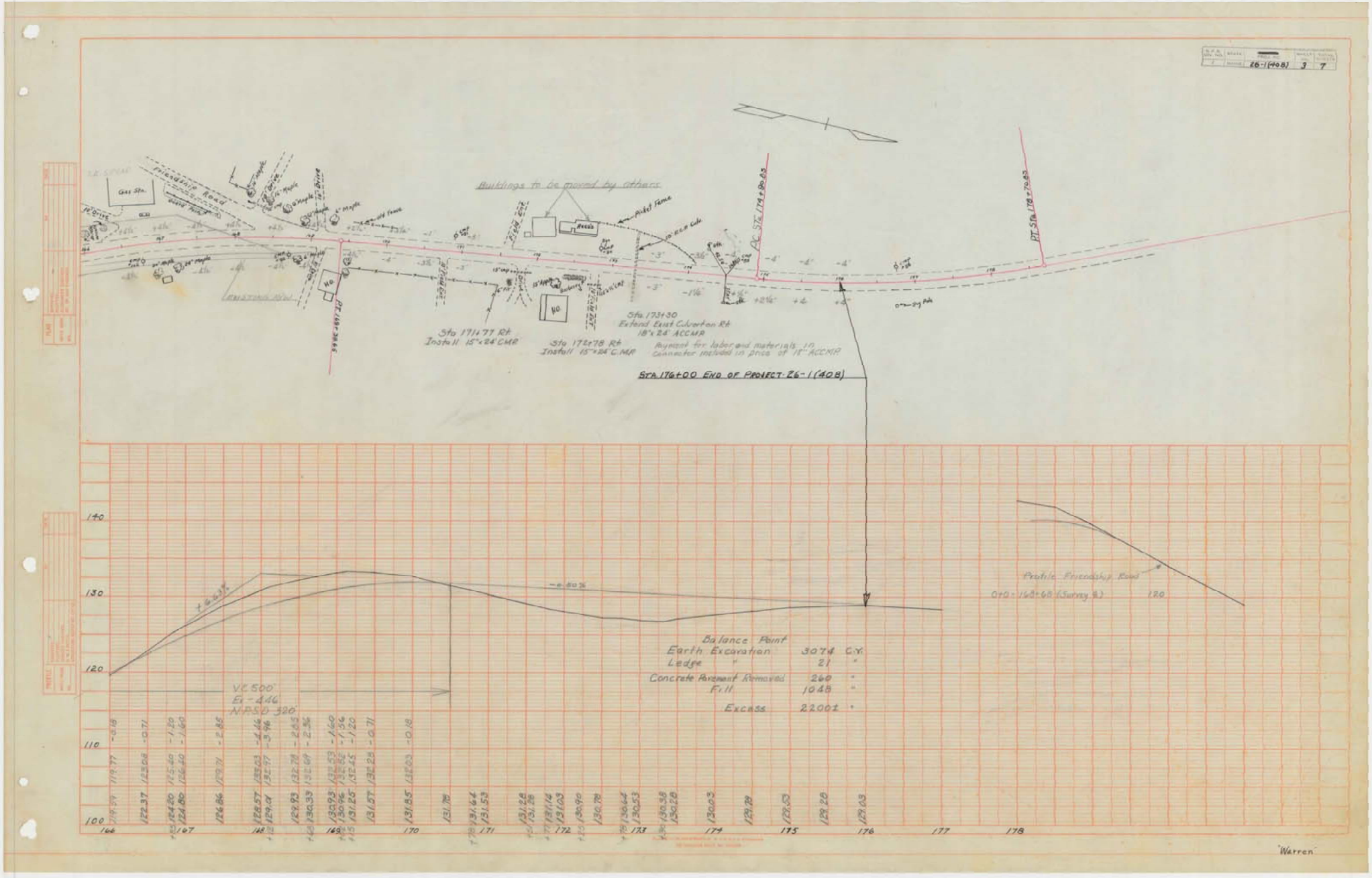
STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
MISSOURI	26-1(408)	2	7



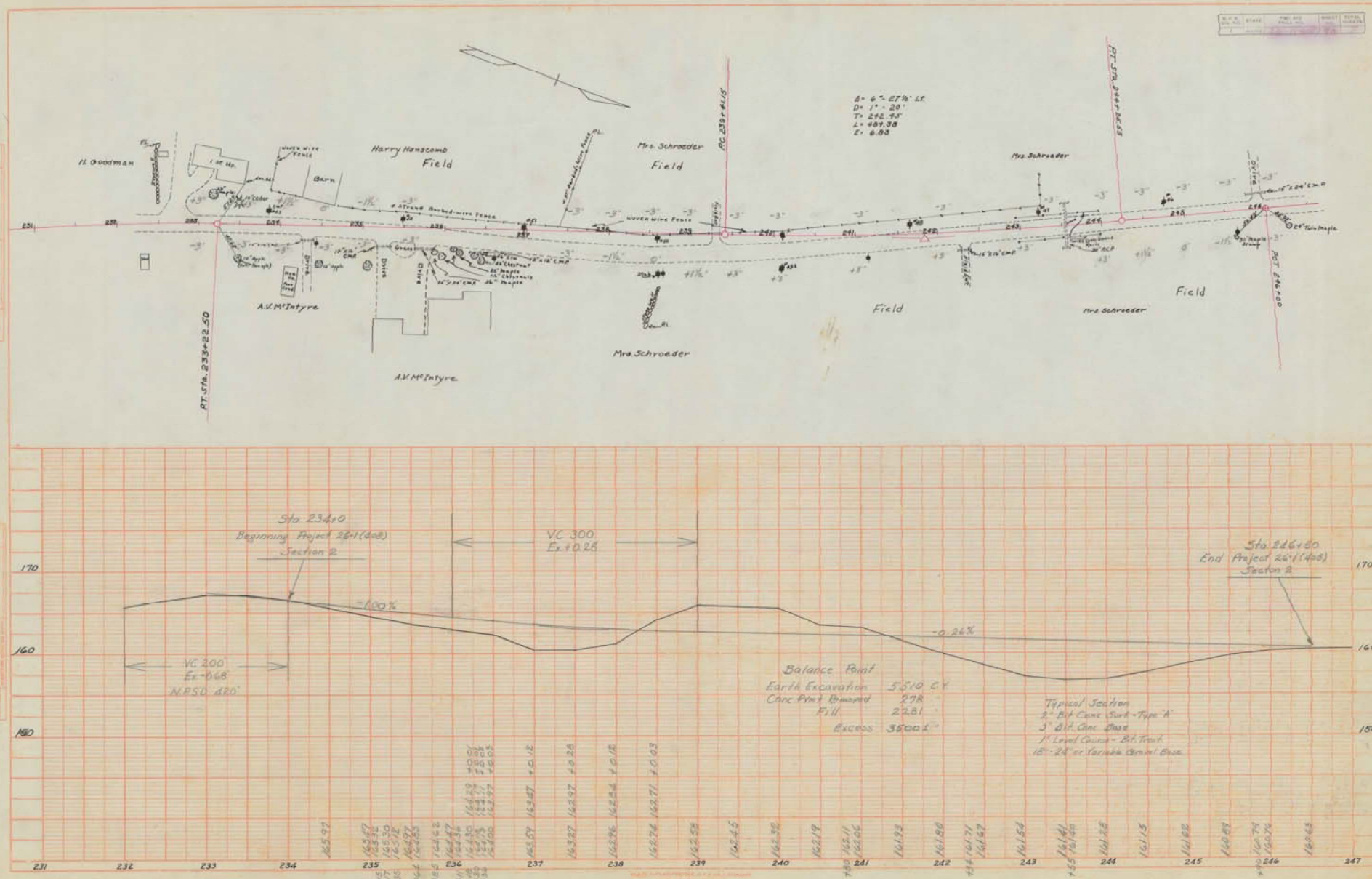
ESTIMATED QUANTITIES

Item	Description	Unit	Quantity
202-5	Removing Trees (8"-24")	Each	1
203-9	Earth Excavation	Cu. Yds.	2300
203-10	Rock Excavation	Cu. Yds.	100
203-10	Stew. Earth Exc. Drainage	Cu. Yds.	10
302-7	Gravel Base Course, Type Mod.	Cu. Yds.	2700
304-9	Bit. Conc. Base Course	Tons	450
308-5	Overhaul (To Base Meas.)	Yd. Mi.	15000
310-6	Sprinkling	Units	20
311-6	Calcium Chloride	Tons	1
401-10	Gravel Surface Course	Cu. Yds.	260
404-24	Bitum. Sub. Course, Type A	Tons	310
501-1	Road Tac	Gals.	1400
601-11	15" C.M.P.	Lin. Ft.	48
602-12	18" A.C.C.M.P.	Lin. Ft.	24
908-9	Loam Borrow	Cu. Yds.	25
909-7	Sodding	Sq. Yds.	100
916-6	Traffic Stripes	Months	1000
919	Rem. Existing Conc. Pavement	Sq. Yds.	1150

Warren


26-1(408) 3 7
Friendship Road
Gas Sta.
Buildings to be moved by others
Picket Fence
PC Sta. 174+90.83
PT Sta. 178+79.83
Sta. 171+77 Rt
Install 15"x24" CMP
Sta. 172+78 Rt
Install 15"x24" C.M.P.
Sta. 173+30
Extend East Culvert on Rt
18"x24" ACCMP
Payment for labor and materials in connector included in price of 18" ACCMP
STA. 176+00 END OF PROJECT Z6-1(408)
Profile Friendship Road
Ot O: 168+68 (Survey ℄)
+0.63%
-0.60%
VC 500'
El. - 446
N.P.S.D. 320'
Balance Point
Earth Excavation 3074 C.Y.
Ledge " 21 "
Concrete Pavement Removed 260 "
Fill 1048 "
Excess 22001 "
140
130
120
110
100
166
167
168
169
170
171
172
173
174
175
176
177
178
119.77 -0.18
122.37 -0.71
124.80 -1.20
126.64 -1.60
129.71 -2.85
128.57 -2.46
129.01 -3.96
129.93 -2.83
130.39 -2.36
130.93 -1.60
130.96 -1.56
131.25 -1.20
131.57 -0.71
131.55 -0.18
131.78
131.64
131.53
131.28
131.28
131.14
131.03
130.90
130.78
130.64
130.53
130.38
130.28
130.03
129.78
129.53
129.28
129.03

"Warren"


Δ = 6° - 27½' Lt.
D = 1° - 20'
T = 242.45'
L = 484.38'
E = 6.83
PC 239+41.15
PT 244+25.53
R.L. Goodman
Harry Hanscomb
Field
Barn
Mrs. Schroeder
Field
Mrs. Schroeder
A.V. McIntyre
A.V. McIntyre
Mrs. Schroeder
Field
Mrs. Schroeder
Field
RT. Sta. 233+22.50
PCT 246+00
Sta 234+0
Beginning Project 26-1 (408)
Section 2
VC 300
Ex +0.28
Sta 246+50
End Project 26-1 (408)
Section 2
-1.00%
-0.26%
VC 200
Ex -0.68
N.P.S.D. 420'
Balance Point
Earth Excavation 5,510 C.Y.
Conc Pvmt Removed 278
Fill 2281
Excess 3500±
Typical Section
2" Bit. Conc. Surf. - Type "A"
3" Bit. Conc. Base
1" Level Course - Bit. Treat.
18" - 24" or Variable Gravel Base
170
160
150
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247

"Warren"

17889.00 Warren, Route 1
AS-BUILT Station Conversion to Design Stations

as built	design
229+75	115+65
229+50	115+90
229+25	116+15
229+00	116+40
228+75	116+65
228+50	116+90
228+25	117+15
228+00	117+40
227+75	117+65
227+50	117+90
227+25	118+15
227+00	118+40
226+75	118+65
226+50	118+90
226+25	119+15
226+00	119+40
225+75	119+65
225+50	119+90
225+25	120+15
225+00	120+40
224+75	120+65
224+50	120+90
224+25	121+15
224+00	121+40
223+75	121+65
223+50	121+90
223+25	122+15
223+00	122+40
222+75	122+65
222+50	122+90
222+25	123+15
222+00	123+40
221+75	123+65
221+50	123+90
221+25	124+15
221+00	124+40
220+75	124+65
220+50	124+90
220+25	125+15
220+00	125+40
219+75	125+65
219+50	125+90
219+25	126+15
219+00	126+40
218+75	126+65
218+50	126+90
218+25	127+15
218+00	127+40
217+75	127+65
217+50	127+90
217+25	128+15
217+00	128+40
216+75	128+65
216+50	128+90
216+25	129+15
216+00	129+40
215+75	129+65
215+50	129+90
215+25	130+15
215+00	130+40
214+75	130+65
214+50	130+90
214+25	131+15
214+00	131+40
213+75	131+65

as built	design
213+50	131+90
213+25	132+15
213+00	132+40
212+75	132+65
212+50	132+90
212+25	133+15
212+00	133+40
211+75	133+65
211+50	133+90
211+25	134+15
211+00	134+40
210+75	134+65
210+50	134+90
210+25	135+15
210+00	135+40
209+75	135+65
209+50	135+90
209+25	136+15
209+00	136+40
208+75	136+65
208+50	136+90
208+25	137+15
208+00	137+40
207+75	137+65
207+50	137+90
207+25	138+15
207+00	138+40
206+75	138+65
206+50	138+90
206+25	139+15
206+00	139+40
205+75	139+65
205+50	139+90
205+25	140+15
205+00	140+40
204+75	140+65
204+50	140+90
204+25	141+15
204+00	141+40
203+75	141+65
203+50	141+90
203+25	142+15
203+00	142+40
202+75	142+65
202+50	142+90
202+25	143+15
202+00	143+40
201+75	143+65
201+50	143+90
201+25	144+15
201+00	144+40
200+75	144+65
200+50	144+90
200+25	145+15
200+00	145+40
199+75	145+65
199+50	145+90
199+25	146+15
199+00	146+40
198+75	146+65
198+50	146+90
198+25	147+15
198+00	147+40
197+75	147+65
197+50	147+90

as built	design
197+25	148+15
197+00	148+40
196+75	148+65
196+50	148+90
196+25	149+15
196+00	149+40
195+75	149+65
195+50	149+90
195+25	150+15
195+00	150+40
194+75	150+65
194+50	150+90
194+25	151+15
194+00	151+40
193+75	151+65
193+50	151+90
193+25	152+15
193+00	152+40
192+75	152+65
192+50	152+90
192+25	153+15
192+00	153+40
191+75	153+65
191+50	153+90
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191+00	154+40
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190+00	155+40
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189+50	155+90
189+25	156+15
189+00	156+40
188+75	156+65
188+50	156+90
188+25	157+15
188+00	157+40
187+75	157+65
187+50	157+90
187+25	158+15
187+00	158+40
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185+25	160+15
185+00	160+40
184+75	160+65
184+50	160+90
184+25	161+15
184+00	161+40
183+75	161+65
183+50	161+90
183+25	162+15
183+00	162+40
182+75	162+65
182+50	162+90
182+25	163+15
182+00	163+40
181+75	163+65
181+50	163+90
181+25	164+15

as built	design
181+00	164+40
180+75	164+65
180+50	164+90
180+25	165+15
180+00	165+40
179+75	165+65
179+50	165+90
179+25	166+15
179+00	166+40
178+75	166+65
178+50	166+90
178+25	167+15
178+00	167+40
177+75	167+65
177+50	167+90
177+25	168+15
177+00	168+40
176+75	168+65
176+50	168+90
176+25	169+15
176+00	169+40
175+75	169+65
175+50	169+90
175+25	170+15
175+00	170+40
174+75	170+65
174+50	170+90
174+25	171+15
174+00	171+40
173+75	171+65
173+50	171+90
173+25	172+15
173+00	172+40
172+75	172+65
172+50	172+90
172+25	173+15
172+00	173+40
171+75	173+65
171+50	173+90
171+25	174+15
171+00	174+40
170+75	174+65
170+50	174+90
170+25	175+15
170+00	175+40
169+75	175+65
169+50	175+90
169+25	176+15
169+00	176+40
168+75	176+65
168+50	176+90

MaineDOT

Route Log Mile
~ Expanded ~
Detail Report

Tide Load date: 10/05/2013
Tide year: 2013

Back

Filter Results

Warren -- Primary Route: 0001X; Begin MP: 119.5, End MP: 121.25

Node ID	Node Description	MP	Pavement Data: Surface	IRI	PCR	Inv Year	Rut Left	Rut Right	PIN (year, type)
		119.64	Flexible	112	3.62	2011	.2	.4	000098.00 (1982, LINK) 000591.00 (1997, LINK) 005175.06 (1992, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
30464	Int of ATLANTIC HWY SANDY SHORES RD	120.02	Flexible	112	3.62	2011	.2	.4	000098.00 (1982, LINK) 000591.00 (1997, LINK) 005175.06 (1992, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		120.08	Flexible	127	3.31	2011	.1	.4	000098.00 (1982, LINK) 000591.00 (1997, LINK) 005175.06 (1992, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		120.61	Flexible	120	3.22	2011	.1	.3	000098.00 (1982, LINK) 000591.00 (1997, LINK) 005175.06 (1992, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		121.07	Flexible	120	3.22	2011	.1	.3	000098.00 (1982, LINK) 000591.00 (1997, LINK) 005175.06 (1992, LINK) 012965.00 (2006, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		121.08	Flexible	120	3.22	2011	.1	.3	000098.00 (1982, LINK) 000591.00 (1997, LINK) 012965.00 (2006, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		121.14	Flexible	136	3.51	2011	.1	.2	000098.00 (1982, LINK) 000591.00 (1997, LINK) 012965.00 (2006, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
		121.19	Flexible	136	3.51	2011	.1	.2	000098.00 (1982, LINK) 000591.00 (1997, LINK) 001876.00 (1991, LINK) 012965.00 (2006, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)
30465	Int of ATLANTIC HWY CUSHING RD	121.20	Flexible	136	3.51	2011	.1	.2	000098.00 (1982, LINK) 000591.00 (1997, LINK) 001876.00 (1991, LINK) 012965.00 (2006, LINK) 006165.00 (1994, LINK) 009640.00 (2001, LINK)

BORING SUMMARY
Warren, Route 1 - WIN 17889.00 (7869.10)

Boring No.	Design Station	Offset (ft)	Exploration Depth (ft)	Refusal Depth (ft)	Depth to water BGS (ft)	Pavement Thickness			Total Pavement Thickness (in)	Subbase Classification (USCS & AASHTO)	Subgrade Type
						HMA (in)	Concrete (in)	Subbase (in)			
FWD 290	103+33	7.9 R	4.5			6.0	7.0	20.5	33.5		sandy SILT
HB-WARR-301	105+93	37.7 R	14.0		8.2						
HB-WARR-302	110+53	30.3 R	10.0								
HB-WARR-303A	114+43	41.6 L	14.0		1.3						
HB-WARR-303B	115+31	40.9 L	38.0		6.9						
HB-WARR-304	115+65	39.4 L	24.4		9.8						
Rod Sounding	116+50	45.0 Rt.	10.0								
Rod Sounding	116+50	20.0 Lt.	10.0								
Rod Sounding	117+00	20.0 Lt.	5.1	5.1							
HB-WARR-305	117+16	32.2 R	5.0	0							
Rod Sounding	117+80	20.0 Lt.	4.5	4.5							
Rod Sounding	118+50	20.0 Lt.	3.1	3.1							
HB-WARR-306	118+70	21.3 L	9.1	4.14	3.6						
Rod Sounding	119+00	20.0 Lt.	1.5	1.5							
Rod Sounding	119+50	20.0 Lt.	7.0	7.0							
HB-WARR-307	120+37	31.6 R	10.0		3.28						
FWD 890	123+00	7.9 R	4.5			6.0	7.0	21.7	34.7		silty SAND
HB-WARR-308	123+26	29.1 L	5.7		0.98						
HB-WARR-309	128+19	24.2 L	9.5	4.5	1.6						
HB-WARR-310	130+69	34.8 R	6.5	1.5							
Rod Sounding	132+00	35.0 Rt.	4.5	4.5							
HB-WARR-311	132+99	37.5 L	8.5	3.5	1.7						
Rod Sounding	133+50	35.0 Rt.	4.6	4.6							
HB-WARR-312	133+83	18.0 R	9.0	4	2.4						
Rod Sounding	136+00	35.0 Rt.	4.0	4.0							
HB-WARR-313	137+74	29.7 L	14.0		7.2						
HB-WARR-314	141+24	38.7 L	12.5	7.5	0.75						
FWD 1490	142+72	7.9 R	4.5			6.0	8.5	10.6	25.1		sandy SILT
HB-WARR-315	144+93	13.0 R	10.0		2.4	8.0	4.0	36.0	48.0		CLAY-SILT
HB-WARR-316	149+87	10.6 L	7.8		6.9	6.0	12.5	8.0	26.5	SW, a-1-b	silty SAND
Rod Sounding	150+25	20.0 Lt.	10.0								
Rod Sounding	151+25	20.0 Lt.	6.8	6.8							
Rod Sounding	152+00	35.0 Rt.	4.8	4.8							

Rod Sounding	152+50	35.0 Rt.	4.9	4.9							
Rod Sounding	153+00	35.0 Rt.	5.8	5.8							
Rod Sounding	153+50	35.0 Rt.	3.8	3.8							
HB-WARR-317	154+80	20.5 R	10.0								
HB-WARR-318	159+39	8.9 R	11.3	6.3	1.8	6.0	12.5	6.0	24.5	SP, a-1-b	silty SAND
Rod Sounding	159+75	20.0 Lt.	10.0								
Rod Sounding	159+95	20.0 Rt.	5.2	5.2							
Rod Sounding	160+40	20.0 Rt.	3.1	3.1							
Rod Sounding	160+75	20.0 Lt.	10.0								
Rod Sounding	161+00	20.0 Rt.	10.0								
Rod Sounding	161+50	20.0 Rt.	10.0								
Rod Sounding	161+75	20.0 Rt.	10.0								
FWD 2090	162+39	7.9 R	4.5			5.5	7.5	14.5	27.5		sandy SILT
HB-WARR-319	164+34	23.9 L	14.0								
HB-WARR-320	169+58	8.9 R	10.0			3.0		15" (reclaim)	18.0	SW, a-1-b	silty SAND
Rod Sounding	175+25	20.0 Rt.	10.0								
HB-WARR-321	175+61	18.5 R	3.8								
Rod Sounding	176+25	20.0 Lt.	10.0								
Rod Sounding	176+25	20.0 Rt.	2.2	2.2							
Probe	176+50	18.0 Rt.	4.0	4.0							
Rod Sounding	176+50	20.0 Lt.	5.0	5.0							
Rod Sounding	176+50	20.0 Rt.	4.5	4.5							
Probe	176+75	19.0 Rt.	5.5	5.5							
Probe	177+20	17.0 Rt.	8.3	8.3	4.0						
Rod Sounding	177+25	20.0 Rt.	4.0	4.0							
Probe	177+45	26.0 Rt.	10.0								
Rod Sounding	177+50	20.0 Rt.	2.9	2.9							
Probe	178+00	30.0 Rt.	6.1	6.1							
HB-WARR-322	178+04	16.6 L	3.7								
Rod Sounding	178+15	20.0 Rt.	3.0	3.0							
Probe	179+75	14.0 Rt.	10.0								
Probe	180+25	13.0 Rt.	10.0								
HB-WARR-323	181+86	20.7 R	12.0		3.2	3.0		4.0	7.0	SP, a-1-b	CLAY-SILT
FWD 2690	182+09	8.5 R	4.5			6.0	7.0	22.8	35.8		sandy SILT

Warren, Route 1 WIN 17889.00
Refusal/No Refusal/H2O Locations

Boring No.	Station	Offset from Design CL (ft)	Direction from Design CL	Refusal Depth below exising ground (ft)	No Refusal Depths (ft)	H2O Depth (ft)
FWD 290	103+33	8.54	R		4.5	
HB-WARR-301	105+93	37.7	R		14	8.2
HB-WARR-302	110+53	30.3	R		10	
HB-WARR-303A	114+43	41.6	L		14	1.3
HB-WARR-303B	115+31	40.9	L		38	6.9
HB-WARR-304	115+65	39.4	L		24.4	9.8
	116+50	45.0.	R		10.0	
	116+50	20.0.	L		10.0	
	117+00	20.0.	L	5.1		
HB-WARR-305	117+16	32.2	R	5		
	117+80	20.0	L	4.5		
	118+50	20.0.	L	3.1		
HB-WARR-306	118+70	21.6	L	4.1		3.6
	119+00	20.0	L	1.5		
	119+50	20.0	L	7.0		
HB-WARR-307	120+37	31.6	R		10	3.28
FWD 890	123+00	8.27	R		4.5	
HB-WARR-308	123+26	29.1	L		5.75	0.98
HB-WARR-309	128+19	24.2	L	4.5		1.6
HB-WARR-310	130+69	34.8	R	1.5		
	132+00	35.0	R	4.5		
HB-WARR-311	132+99	37.5	L	3.5		1.7
	133+50	35.0	R	4.6		
HB-WARR-312	133+83	18.0	R	4		2.4
	136+00	35.0.	R	4.0		
HB-WARR-313	137+74	29.7	L		14	7.2
HB-WARR-314	141+24	38.7	L	7.5		0.75
HB-WARR-315	144+93	13.0	R		10	2.4
FWD 1490	147+72	9.09	R		4.5	
HB-WARR-316	149+87	10.6	L		7.8	6.9
	150+25	20.0.	L		10.0	
	151+25	20.0	L	6.8		
	152+00	35.0	R	4.8		
	152+50	35.0	R	4.9		
	153+00	35.0	R	5.8		
	153+50	35.0	R	3.8		
HB-WARR-317	154+81	20.5	R		10	
HB-WARR-318	159+39	8.9	R	6.3		1.8
	159+75	20.0	L		10.0	
	159+95	20.0	R	5.2		
	160+40	20.0	R	3.1		
	160+75	20.0	L		10.0	
	161+00	20.0	R		10.0	
	161+50	20.0	R		10.0	

	161+75	20.0	R		10.0	
FWD 2090	162+39	9.08	R		4.5	
HB-WARR-319	164+34	23.9	L		14	
HB-WARR-320	169+58	9.6	R		10	
	175+25	20.0	R		10.0	
HB-WARR-321	175+61	18.5	R		3.8?	
	176+25	20.0	L		10.0	
	176+25	20.0	R	2.2		
	176+50	18.0	R	4.0		
	176+50	20.0	L	5.0		
	176+50	20.0	R	4.5		
	176+75	19.0	R	5.5		
	177+20	17.0	R	8.3		4
	177+25	20.0	R	4.0		
	177+45	26.0	R		10.0	
	177+50	20.0	R	2.9		
	178+00	30.0	R	6.1		
HB-WARR-322	178+04	16.6	L	3.7		
	178+15	20.0	R	3.0		
	179+75	14.0	R		10.0	
	180+25	13.0	R		10.0	
	181+86	20.7	R		12	3.2

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-301
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	125.5 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/26/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	105+92.8, 37.7 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	8.2 ft below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/20	0.00 - 2.00	1/3/8/12	11	HSA	125.42	(D1) 1" TOPSOIL — 0.08	A-6 CL
								(D1 cont.) 1"-20" Mottled orange and brown, stiff, CLAY, some fine sand, low plasticity, homogeneous, thread can be rolled, no dilatency, (DESSICATED MARINE CLAY).	
5	D2	24/24	4.00 - 6.00	9/11/13/19	24			(D2) Similar to 1"-20" D1, except very stiff.	A-6 CL WC=24.2%
10	D3	24/24	8.00 - 10.00	3/6/9/12	15			(D3) Similar to 1"-20" D1, q_p=5013 psf	A-6 CL
							114.50	11.00	
	D4	24/20	12.00 - 14.00	6/8/12/27	20			(D4) Olive to grayish brown, medium dense, fine SAND, some nonplastic fines, trace fine gravel, stratified, (GLACIOMARINE OUTWASH).	A-2 SM
							111.50	Boring terminated in glaciomarine outwash at 14.0. — 14.00	
15								**Bottom of Exploration at 14.00 feet below ground surface.**	
20									
25									

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at 8.8 ft bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-302
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	120.9 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/26/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	110+52.7, 30.3 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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	D1	24/1	0.00 - 2.00	1/3/2/5	5	HSA			(D1) TOPSOIL, remainder of sample fell out of split spoon.	
							119.40		1.50	
	D2	24/24	4.00 - 6.00	5/14/20/21	34				(D2) Grayish brown to brown, hard, CLAY, some fine sand, low plasticity, homogeneous, q_p=8980 psf, (DESSICATED MARINE CLAY).	A-6 CL
5										
	D3	24/24	8.00 - 10.00	6/9/9/14	18				(D3) Similar to D2 except very stiff.	A-6 CL
									Boring terminated in dessicated marine clay at 10.0 ft.	
10							110.90		10.00	
15										
20										
25										

Bottom of Exploration at 10.00 feet below ground surface.

Remarks:

1. Borehole caved in at 6.5 ft.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-303A
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	114.2 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/26/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	114+43.3, 41.6 Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	1.3' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/20	0.00 - 2.00	1/1/2/7	3	HSA	114.06	(D1) 2" TOPSOIL — 0.14	A-2 SM
								(D1 cont.) 2-20" Mottled gray and olive, very loose, fine SAND, some nonplastic fines, (POSSIBLE FILL).	
							112.20	2.00	
	D2	24/15	4.00 - 6.00	10/8/9/10	17			(D2) Olive brown, very stiff, CLAY, some fine sand, low plasticity, homogeneous, can be rolled to a thread, cracked, (DESSICATED MARINE CLAY).	A-6 CL WC=27.4%
5									
							107.20	7.00	
	D3	24/24	8.00 - 10.00	1/1/1/1	2			(D3) Bluish gray, very soft, CLAY, low plasticity, homogeneous, (MARINE CLAY).	A-6 CL WC=25.9%
10	V1			S_u=439/147 psf				51 mm x 178 mm vane V1: 12.0/3.4 ft-lb	
	D4	24/20	12.00 - 14.00	woh/woh/woh/1	woh			(D4) 0"-18" Similar to D3.	A-6 CL
							101.53	12.67	A-2 SM
								(D4 cont.) Gray, very loose, fine SAND, some nonplastic fines, stratified, (GLACIOMARINE OUTWASH).	
							100.20	Boring terminated in glaciomarine outwash at 14.0 ft. — 14.00	
15								**Bottom of Exploration at 14.00 feet below ground surface.**	
20									
25									

Remarks:

1. Water level measured in observation well 72 hours after installation.
2. Observation well installed to 10.0 ft bgs.
3. Elevation estimated from preliminary plans.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-303B
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	113.7 ft	**Auger ID/OD:**	n/a
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	CWB	**Core Barrel:**	n/a
Boring Location:	115+13.1, 40.9 ft Lt.	**Casing ID/OD:**	4"	**Water Level*:**	6.9" below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/16	0.00 - 2.00	woh/1/1/4	2	CWB		(D1) Mottled orange and brown, very loose, fine SAND, some nonplastic fines, trace roots, (POSSIBLE FILL).	A-2 SM
							110.70	3.00	
	U1	24/22	4.00 - 6.00	n/a	n/a			(U1) Olive, CLAY, low plasticity, homogenous, (DESSICATED MARINE CLAY).	A-6 CL
5	D2	24/24	5.00 - 7.00	woh/woh/woh/1	woh	CWB	108.70	5.00 (D2) Bluish gray, very soft, CLAY, low plasticity, homogeneous, q_p=0 psf, (MARINE CLAY).	WC=28%-30% S_u(lab)= 2339-3050/209 668 psf A-6 CL LL=35 PL=20 PI=15 WC=34%
10									
15	U2	24/22	15.00 - 17.00	n/a	n/a			(U2) Gray, soft, CLAY, low plasticity, homogenous.	A-6 CL WC=34%-35% S_u(lab)=376 - 418/63 psf
20	D3	24/24	20.00 - 22.00	woh/woh/woh/woh	woh			(D3) Similar to D2.	A-4 CL-ML LL=21 PL=16 PI=5 WC=24%
25	D4	24/24	25.00 - 27.00	woh/woh/1/1	woh	CWB		(D4) 0 0"-12" Similar to D3.	A-4 CL

Remarks:

1. Water level measured in open borehole upon completion of drilling. 2. Borehole caved at 28.9".

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.

Boring No.: HB-WARR-303B

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-303B
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	113.7 ft	**Auger ID/OD:**	n/a
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	CWB	**Core Barrel:**	n/a
Boring Location:	115+13.1, 40.9 ft Lt.	**Casing ID/OD:**	4"	**Water Level*:**	6.9" below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
							87.70	(D4 cont.) Gray, very loose, SILT, some sand, nonplastic, stratified, (GLACIOMARINE OUTWASH). — 26.00	A-4 ML
							84.70		
	D5	24/20	29.00 - 31.00	8/23/23/15	46			(D5) Gray, dense, fine SAND, little coarse sand, trace fine to coarse gravel, (GLACIAL TILL). — 29.00	A-3 SP
30									
35									
	D6	24/16	36.00 - 38.00	22/14/15/20	29			(D6) Similar to D5 except medium dense.	A-3 SP
							75.70	Boring terminated in glacial till at 38.0 ft. — 38.00	
40									
45									
50									

Bottom of Exploration at 38.00 feet below ground surface.

Remarks:

1. Water level measured in open borehole upon completion of drilling. 2. Borehole caved at 28.9".

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-304
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	114.6 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/26/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	115+64.6, 39.4 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	9.8' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/24	0.00 - 2.00	1/1/1/1	2	HSA		(D1) Olive brown to brown, very loose, fine SAND, little nonplastic fines, trace organics, (POSSIBLE FILL).	A-2 SM
							112.60	2.00	
	D2	24/24	4.00 - 6.00	3/3/3/7	6			(D2) Mottled gray, olive, brown, medium stiff, CLAY, medium plasticity, homogeneous, cracked, q_p=5013 psf, (DESSICATED MARINE CLAY).	A-6 CL LL=38 PL=19 PI=19 WC=28%
5									
	D3	24/24	8.00 - 10.00	1/3/3/3	6			(D3) Similar to D2 except bluish gray.	A-6 CL LL=36 PL=21 PI=15 WC=31%
10									
							103.60	11.00	
	D4	24/24	12.00 - 14.00	woh/woh/woh/2	woh			(D4) Bluish gray, very soft, CLAY, low plasticity, homogeneous, (MARINE CLAY).	A-6 CL
15									
20	D5	24/24	20.00 - 22.00	woh/woh/woh/woh	woh			(D5) Similar to D4.	A-6 CL WC=30.6%
							90.20	Pushed probe tip to refusal at 24.4'. Boring terminated at 24.4 ft.	
25								24.40	

Bottom of Exploration at 24.40 feet below ground surface.

Remarks:

1. Water level measured in open borehole upon completion of drilling. 2. Borehole caved in at about 9.8'.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-305
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	130.2 ft	**Auger ID/OD:**	n/a
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	n/a
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	n/a
Date Start/Finish:	03/27/02	**Drilling Method:**	n/a	**Core Barrel:**	NQ
Boring Location:	117+15.6, 32.2 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not measured

Definitions:
D = Split Spoon Sample S = Sample off Auger Flight
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 ≅ = Similar or Equal too
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	R1	60/60	0.00 - 5.00	RQD = 45%		NQ			(R1) Light pink to white with black/gray speckling, fine to medium grained, IGNEOUS ROCK, hard, slightly weathered, joints spaced from 3"-15" apart and stained orange, poor RQD, (BEDROCK)	GRANITE
5							125.20		Boring terminated in apparent bedrock 5.0 ft. 5.00	
									Bottom of Exploration at 5.00 feet below ground surface.	
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: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-306
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	133.0 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	118+69.6, 21.6 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	3.6' below ground surface

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	D1	24/6	0.00 - 2.00	1/3/5/7	8	HSA			(D1) Brown, loose, fine SAND, little nonplastic fines, trace coarse sand, trace roots, (POSSIBLE FILL).	A-2 SM
	D2	2/0	4.00 - 4.17	50-50 mm	>50	NQ	128.86		(D2) No recovery. Split spoon refusal.	SCHIST
5	R1	60/54	4.14 - 9.14	RQD = 44%					4.14 (R1) White/dark gray, METASEDIMENTARY ROCK, hard, schistose bedding, slightly weathered, joints spaced from 1"-20" apart and stained orange, poor RQD, (BEDROCK).	
							123.86		Boring terminated in apparent bedrock at 9.14 ft. 9.14	
10									**Bottom of Exploration at 9.14 feet below ground surface.**	
15										
20										
25										

Remarks:

1. Water level measured in open borehole upon completion of drilling.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-307
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	136.2 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	120+37.2, 31.6 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	3.28' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/6	0.00 - 2.00	2/2/4/8	6	HSA	135.70	(D1) TOPSOIL 0.50	
	D2	24/16	4.00 - 6.00	7/16/9/15	25			(D2) Brown, medium dense, fine to medium SAND, trace coarse sand, trace nonplastic fines.	A-3 SP
5									
	D3	24/20	8.00 - 10.00	45/53/51/37	104			(D3) 0"-8" Similar to D2 except very dense.	A-3 SP
							127.53	8.67	
								8"-20" Mottled olive brown and brown, very dense, fine SAND, some nonplastic fines, trace coarse sand, trace fine gravel, (GLACIAL TILL).	A-2 SM
10							126.20	Boring terminated in glacial till at 10.0 ft. 10.00	
15									
20									
25									

Bottom of Exploration at 10.00 feet below ground surface.

Remarks:

1. Water level measured in open borehole upon completion of drilling. 2. Borehole caved in at depth of 3.6'.

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.

Boring No.: HB-WARR-307

State of Maine - Department of Transportation

Power Auger Probe Summary Sheet

Town(s): Warren

Work Number: 17889.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 6/5/2012
176+50	18.0 Rt.		4.0			
176+75	19.0 Rt.		5.5			
177+20	17.0 Rt.		8.3		4.0	
177+45	26.0 Rt.			10.0		
178+00	30.0 Rt.		6.1			
179+75	14.0 Rt.			10.0		
180+25	13.0 Rt.			10.0		

MaineDOT Drill Crew
Logged By: B. Wilder
Drill Rig: CME 45C

5" Solid Stem Auger

State of Maine - Department of Transportation

Rod Sounding Summary Sheet

Town(s): Warren Work Number: 17889.00

Boring	Station (Feet)	Offset (Feet)	Refusal (Feet)	No Refusal (Feet)	Water (X) = Yes	Comments 6/6-7/2012
	116+50	45.0 Rt.		10.0		
	116+50	20.0 Lt.		10.0		
	117+00	20.0 Lt.	5.1			
	117+80	20.0 Lt.	4.5			
	118+50	20.0 Lt.	3.1			
	119+00	20.0 Lt.	1.5			
	119+50	20.0 Lt.	7.0			
	132+00	35.0 Rt.	4.5			
	133+50	35.0 Rt.	4.6			
	136+00	35.0 Rt.	4.0			
	150+25	20.0 Lt.		10.0		
	151+25	20.0 Lt.	6.8			
	152+00	35.0 Rt.	4.8			
	152+50	35.0 Rt.	4.9			
	153+00	35.0 Rt.	5.8			
	153+50	35.0 Rt.	3.8			
	159+75	20.0 Lt.		10.0		
	159+95	20.0 Rt.	5.2			
	160+40	20.0 Rt.	3.1			
	160+75	20.0 Lt.		10.0		
	161+00	20.0 Rt.		10.0		
	161+50	20.0 Rt.		10.0		
	161+75	20.0 Rt.		10.0		
	175+25	20.0 Rt.		10.0		
	176+25	20.0 Lt.		10.0		
	176+25	20.0 Rt.	2.2			
	176+50	20.0 Lt.	5.0			
	176+50	20.0 Rt.	4.5			
	177+25	20.0 Rt.	4.0			
	177+50	20.0 Rt.	2.9			
	178+15	20.0 Rt.	3.0			

MaineDOT
Logged By: C. Giles

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-308
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	140.4 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	65 kg/760 mm
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	123+25.8, 29.1 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	0.98' below ground surface

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	D1	24/16	0.00 - 2.00	1/1/2/5	3	HSA			(D1) Mottled grayish brown to brown, very loose, fine SAND, little nonplastic fines, trace coarse sand, (GLACIAL TILL).	A-2 SM
	D2	9/6	4.00 - 4.75	24/60-76mm	60-76m				(D2) Similar to S2 except very dense.	A-2 SM
5							134.65		Split spoon refusal. Boring terminated in glacial till at 5.75 ft.	
									5.75 **Bottom of Exploration at 5.75 feet below ground surface.**	
10										
15										
20										
25										

Remarks:

1. Water level measured in observation well 48 hours after installation.
2. Observation well installed to 5.2' bgs.
3. Elevation estimated from preliminary plans.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-309
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	140.7 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	128+19, 24.2 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	1.6' below ground surface

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	D1	24/12	0.00 - 2.00	1/5/36/34	41	HSA			(D1) Dense, sandy GRAVEL, fine to coarse gravel, fine to coarse sand, little nonplastic fines, (POSSIBLE FILL) G=45% gravel, 39% sand, 16% nonplastic fines.	G A-1-b SM
	R1	60/58	4.50 - 9.50	RQD = 10%	n/a	NQ	136.20		4.50 (R1) White/dark gray, METASEDIMENTARY ROCK, hard, schistose bedding, slightly weathered, joints spaced from 3"-5" apart and stained orange, very poor RQD, (BEDROCK).	SCHIST
5										
							131.20		Boring terminated in apparent bedrock at 9.5 ft. 9.50 **Bottom of Exploration at 9.50 feet below ground surface.**	
10										
15										
20										
25										

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at 3.5' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-310
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	142.4 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	130+68.6, 34.8 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not measured

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	D1	14/2	0.00 - 1.17	9/16/50-50 mm	66-203	HSA			(D1) TOPSOIL HSA refusal.	
	R1	60/60	1.50 - 6.50	RQD = 33%	n/a	NQ	140.90		1.50 (R1) White/dark gray, METASEDIMENTARY ROCK, hard, schistose bedding, moderately weathered, joints spaced from 2"-12" apart and stained orange, poor RQD, (BEDROCK).	SCHIST
5							135.90		Boring terminated in apparent bedrock at 6.5 ft. 6.50 **Bottom of Exploration at 6.50 feet below ground surface.**	
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: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-311
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	139.8 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	132+99.5, 37.5 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	1.7' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/10	0.00 - 2.00	1/1/2/3	3	HSA	139.30	(D1) 0"-6" TOPSOIL	
								0.50	A-2 SM
								(D1 cont.) 6"-10" Brown to olive brown, very loose, fine SAND, little nonplastic fines, trace fine gravel. -GLACIAL TILL-	
	R1	60/60	3.50 - 8.50	RQD = 83%	n/a	NQ	136.30	3.50	SCHIST
								(R1) White/dark gray, METASEDIMENTARY ROCK, hard, schistose bedding, unweathered, joints spaced about 20" apart and stained orange, good RQD, (BEDROCK).	
5									
							131.30	Boring terminated in apparent bedrock at 8.5'.	
								8.50	
								Bottom of Exploration at 8.50 feet below ground surface.	
10									
15									
20									
25									

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at depth of 3.3'.

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.

Boring No.: HB-WARR-311

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-312
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	133.9 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	133+83.2, 18.0 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	2.4' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/16	0.00 - 2.00	1/5/3/4	8	HSA		(D1) 0"-12" Brown, loose, fine to coarse SAND, trace nonplastic fines, (FILL).	A-1 SW
							132.90	1.00	
								(D1 cont.) Mottled olive brown to brown, loose, fine SAND, some nonplastic fines, (GLACIAL TILL).	A-2 SM
							129.90	HSA refusal.	
	R1	60/60	4.00 - 9.00	RQD = 95%	n/a	NQ		4.00	GRANITE
5								(R1) Light pink to white with black/gray speckling, coarse grained, IGNEOUS ROCK, hard, unweathered, joints spaced about 12" apart and stained orange, excellent RQD, (BEDROCK).	
							124.90	Boring terminated in apparent bedrock at 9.0 ft.	
								9.00	
								Bottom of Exploration at 9.00 feet below ground surface.	
10									
15									
20									
25									

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at 3.5' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-313
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	107.9 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	137+74.2, 29.7 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	7.2' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/10	0.00 - 2.00	1/2/2/2	2	HSA		(D1) TOPSOIL	
							105.90	2.00	
	D2	24/3	4.00 - 6.00	2/3/3/1	6			(D2) Brown, loose, fine SAND, little nonplastic fines, trace coarse sand, trace fine gravel, (FILL).	A-2 SP-SM
5							101.40	6.50	
	D3	24/24	8.00 - 10.00	4/6/6/6	12			(D3) Mottled gray/brownish orange, stiff, clayey SILT, some fine sand, plasticity increasing from nonplastic at top of split spoon to slightly plastic at bottom of spoon, cracked.	A-4 CL-ML
							98.40	9.50	
10									
	D4	24/24	12.00 - 14.00	3/5/5/6	10			(D4) Grayish brown to brown, stiff, CLAY, low plasticity, homogeneous, cracked with dark brown staining, q_p=5013 psf, (DESSICATED MARINE CLAY).	A-6 CL
								Boring terminated in dessicated marine clay at 14.0 ft.	
							93.90	14.00	
15								**Bottom of Exploration at 14.00 feet below ground surface.**	
20									
25									

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at 9.4' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-314
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	97.8 ft	**Auger ID/OD:**	4.25/7.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	NQ
Boring Location:	141+24.2, 38.7 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	0.75' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/16	0.00 - 2.00	1/1/1/3	2	HSA	97.13	(D1) 0"-8" TOPSOIL	
								0.67	
								(D1 cont.) 8"-16" Olive brown, very loose, SILT,nonplastic, little sand, trace gravel, trace black ash, (FILL). G=83% nonplastic fines, 16% sand, 1% gravel.	G A-4 ML
							95.30	2.50	
	D2	24/20	4.00 - 6.00	9/19/29/32	48			(D2) Mottled olive gray to orangish brown, dense, fine SAND, little nonplastic fines, trace coarse sand, (GLACIAL TILL).	A-2 SM
5									
	R1	60/60	7.50 - 12.50	RQD = 87%	n/a	NQ	90.30	7.50	SCHIST
								(R1) White/dark gray, fine to medium grained, METASEDIMENTARY ROCK, hard, schistose bedding, fresh, moderate to steep dipping joints spaced 20" apart and stained orange, Good RQD, (BEDROCK). HSA refusal.	
10									
								Boring terminated in apparent bedrock at 12.5 ft.	
							85.30	12.50	
								Bottom of Exploration at 12.50 feet below ground surface.	
15									
20									
25									

Remarks:

1. Water level measured in observation well 48 hours after installation.
2. Observation well installed to 7.5' bgs.
3. Elevation estimated from preliminary plans.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-315
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	100.5 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/27/02	**Drilling Method:**	HSA	**Core Barrel:**	HQ
Boring Location:	144+93.2, 13.0 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	2.4' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	C1	18/12	0.00 - 1.50	n/a	n/a	HQ	99.83	(C1) 0"-8" ASPHALT — 0.67	
	D1	24/0	1.50 - 3.50	19/14/11/10	25	~~HSA~~	99.50	(C1 cont.) 8"-12" CONCRETE: 32 mm maximum aggregate size, 7 mm dia steel reinforcing rod at 0.92' bgs. — 1.00	
								(D1) No recovery.	
	D2	24/24	4.00 - 6.00	2/1/2/7	3		96.50	4.00 — (D2) Bluish gray, soft, CLAY, homogeneous, moderately plastic, cracked, (DESSICATED MARINE CLAY).	A-6 CL WC=27%
5									
	D3	24/24	8.00 - 10.00	3/4/7/7	11			(D3) Similar to D2 except stiff.	A-6 CL
10							90.50	Boring terminated in dessicated marine clay at 10.0 ft. — 10.00	
15									
20									
25									

Bottom of Exploration at 10.00 feet below ground surface.

Remarks:

1. Water level measured in open borehole upon completion of drilling.
2. Borehole caved-in at depth of 7.9'.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-316
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	109.9 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	HQ
Boring Location:	149+86.8, 10.6 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	6.9' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	C1	15/15	0.00 - 1.25	n/a	n/a	HQ	109.40	(C1) 0"-6" ASPHALT — 0.50	
	D1	24/14	1.50 - 3.50	9/7/7/13	14	HSA	108.40	(C1 cont.) 6"-15" CONCRETE: 32 mm maximum aggregate size. — 1.50	
							107.73	(D1) 0"-8" Brown/orangish brown, medium dense, fine to coarse SAND, trace nonplastic fines, trace fine gravel, (FILL). — 2.17	A-1-b SW
								(D1 cont.) 8"-14" Mottled brown to orange, medium dense, fine SAND, little nonplastic fines, trace coarse sand, (GLACIAL TILL).	A-2 SM
	D2	20/20	4.00 - 5.67	9/33/41/50-50 mm	74			(D2) Similar to D1 except very dense, split spoon refusal.	A-2 SM
5									
							102.10	HSA refusal. Boring terminated in apparent glacial till at 7.8 ft. — 7.80	
10									
15									
20									
25									

Bottom of Exploration at 7.80 feet below ground surface.

Remarks:

1. Water level measured in open borehole upon completion of drilling.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-317
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	106.2 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	154+80.5, 20.5 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/20	0.00 - 2.00	6/6/6/3	12	HSA		(D1) 0"-18" Brown, medium dense, fine to medium SAND, trace coarse sand, (FILL).	A-1-b SP
							104.70	1.50	
								(D1 cont.) 18"-20" Grayish brown to gray, stiff, CLAY, some nonplastic fines, occ. cobble, homogeneous, medium plasticity, cracked, (DESSICATED MARINE CLAY).	A-6 CL
	D2	20/20	4.00 - 5.67	3/4/7/50-100 mm	11			(D2) Similar to 18"-20" D1, q_p>8981 psf.	A-6 CL
5									
							98.20	8.00	
	D3	24/24	8.00 - 10.00	5/10/12/15	22			(D3) Olive brown, medium dense, fine SAND, little clay, trace nonplastic fines, stratified, (GLACIOMARINE OUTWASH).	A-2 SP
								Boring terminated in glaciomarine outwash at 10.0 ft.	
10							96.20	10.00	
								Bottom of Exploration at 10.00 feet below ground surface.	
15									
20									
25									

Remarks:

1. Borehole caved-in at 7.5' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-318
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	105.1 ft	**Auger ID/OD:**	n/a
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	CWB	**Core Barrel:**	NQ
Boring Location:	159+38.7, 8.9 ft Rt.	**Casing ID/OD:**	3"/3.5"	**Water Level*:**	1.8' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						CWB	104.60	0"-6" mm ASPHALT (not sampled) — 0.50	
								6"-17" CONCRETE (not sampled) — 1.50	
	D1	24/20	1.50 - 3.50	14/8/6/5	14		103.60	(D1) 0"-6" Brown, medium dense, fine to medium SAND, trace nonplastic fines, trace fine gravel, (FILL). — 2.00	A-1-b SP
							103.10	(D1 cont.) 6"-20" Mottled olive brown to reddish brown, medium dense, fine SAND, little nonplastic fines.	A-2 SM
								(D2) Similar to 6"-20" D1.	
	D2	24/20	4.00 - 6.00	8/11/13/20	24				A-2 SM
5									
	R1	60/59	6.30 - 11.30	RQD = 88%	n/a	NQ	98.80	(R1) White/dark gray, fine to medium grained, METASEDIMENTARY ROCK, hard, schistose bedding, slightly weathered, joints spaced 8" apart and stained orange, good RQD, (BEDROCK). — 6.30	SCHIST
10									
							93.80	Boring terminated in apparent bedrock at 11.3 ft. — 11.30	
15									
20									
25									

Bottom of Exploration at 11.30 feet below ground surface.

Remarks:

1. Borehole caved-in at 11.2' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-319
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	85.5 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	164+34.3, 23.9 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/10	0.00 - 2.00	1/1/2/4	3	HSA	85.00	(D1) 0"-2" TOPSOIL — 0.50	A-2 SM
								2"-10" (D1 cont.) Gray to brown, very loose, fine SAND, some nonplastic fines, (FILL).	
	D2	24/4	4.00 - 6.00	3/1/1/4	2			(D2) Brown to orange, very loose, gravelly fine to coarse SAND, fine gravel, little nonplastic fines, (FILL). G=48% sand, 39% fine gravel, 13% nonplastic fines.	G A-1-a SM
5							79.50	6.00	
	D3	24/24	8.00 - 10.00	1/1/2/2	3			(D3) Gray, soft, CLAY, low plasticity, homogeneous, cracked with orange staining in cracks, q_p=2088 psf, (DESSICATED MARINE CLAY).	A-6 CL WC=29%
10							75.50	10.00	
	D4	24/5	12.00 - 14.00	woh/woh/woh/woh	woh			(D4) Dark gray, very soft, lean CLAY, homogeneous, low plasticity, (MARINE CLAY).	A-6 CL
							71.50	Boring terminated in marine clay at 14.0 ft. — 14.00	
15								**Bottom of Exploration at 14.00 feet below ground surface.**	
20									
25									

Remarks:

1. Borehole caved-in at 3.3' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-320
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	88.8 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	HQ
Boring Location:	169+57.5, 9.6 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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	C1	18/3	0.00 - 1.50		n/a	HQ			(C1) ASPHALT Measured 15" of ASPHALT (possible reclaimed base) underneath asphalt surfacing	
	D1	24/8	1.50 - 3.50	9/9/5/12	14	~~HSA~~	87.30		1.50 (D1) 0"-5" Brown to black, medium dense, fine to coarse SAND, trace nonplastic fines, (FILL). (D1 cont.) 5"-8" Brown to black, medium dense, fine to coarse SAND, some nonplastic fines, some fine gravel, (FILL). G=49% sand, 26% nonplastic fines, 25% fine gravel.	A-1 SW G A-2 SM
	D2	24/24	4.00 - 6.00	5/8/12/14	20		84.80		4.00 (D2) Olive gray, brown, orange, very stiff, CLAY, low plasticity, homogeneous, cracked, q_p=8564 psf, (DESSICATED MARINE CLAY).	A-6 CL Qp=8564 psf
5										
	D3	24/24	8.00 - 10.00	6/8/8/9	16				(D3) Similar to D2.	
10							78.80		Boring terminated in dessicated marine clay at 10.0 ft. 10.00 **Bottom of Exploration at 10.00 feet below ground surface.**	
15										
20										
25										

Remarks:

1. Borehole caved-in at 6.9' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-321
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	91.8 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	175+61.4, 18.5 ft Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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	D1	24/16	0.00 - 2.00	7/8/10/10	18	HSA			(D1) Brown, medium dense, fine to medium SAND, trace coarse sand, trace fine gravel, (POSSIBLE FILL)	A-1-b SP
	D2	0/0	3.80 - 3.80	50-0 mm	>50		88.00		HSA refusal. Split spoon refusal. Boring terminated in possible fill at 3.8 ft.	
5									3.80 **Bottom of Exploration at 3.80 feet below ground surface.**	
10										
15										
20										
25										

Remarks:

1. Borehole caved-in at 3.6' bgs.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-322
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	87.2 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	178+03.9, 16.6 ft Lt.	**Casing ID/OD:**	n/a	**Water Level*:**	not encountered

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.
	D1	24/14	0.50 - 2.50	17/18/15/14	33	HSA			(D1) Brown, dense, fine to coarse SAND, some fine gravel, little nonplastic fines, (POSSIBLE FILL). G=66% sand, 21% fine gravel, 13% nonplastic fines.	G A-1-b SM
	D2	0/0	3.70 - 3.70	50-0 mm	>50		83.50		HSA refusal. Split spoon refusal. Boring terminated in fill at 3.7 ft. 3.70	
5									**Bottom of Exploration at 3.70 feet below ground surface.**	
10										
15										
20										
25										

Remarks:

1. Borehole caved in at depth of 3.9'.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Route 1 Reconstruction
Location: Warren, Maine

Boring No.: HB-WARR-323
WIN: 17889.00

Driller:	Maine Test Boring, Inc.	**Elevation (ft.)**	66.2 ft	**Auger ID/OD:**	2.25/6.25"
Operator:	G. Rudnicke	**Datum:**	NAVD88	**Sampler:**	SPT
Logged By:	A. Smart	**Rig Type:**	Bombardier B53	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	03/28/02	**Drilling Method:**	HSA	**Core Barrel:**	n/a
Boring Location:	181+85.5, 20.7 Rt.	**Casing ID/OD:**	n/a	**Water Level*:**	3.1' below ground surface

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.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	D1	24/24	0.25 - 2.25	3/6/6/9	12	HSA	65.95	0"-3" ASPHALT (not sampled) — 0.25	
								(D1) 0"-4" Brown, medium dense, medium SAND, trace coarse sand, (FILL). 4"-20" Mottled olive brown and brown, medium dense, fine SAND, little nonplastic fines, (FILL).	A-1-b SP; A-1-b SP
5	D2	24/24	4.00 - 6.00	1-305mm/1/1	1			(D2) Similar to 4"-20" D1, but very loose.	A-1-b SP
							58.70	7.50	
10	D3	24/24	10.00 - 12.00	4/7/8/10	15			(D3) Olive to bluish gray, very stiff, CLAY, low plasticity,homogeneous, trace organics, cracked, q_p=6892 psf, (DESSICATED MARINE CLAY).	A-6 CL
							54.20	Boring terminated in dessicated marine clay at 12.0 ft. — 12.00	
15								**Bottom of Exploration at 12.00 feet below ground surface.**	
20									
25									

Remarks:

1. Water level measured in observation well 24 hours after installation.
2. Observation well installed to depth of 10' bgs.

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.

17889.00

WARREN-THOMASTON ~~7369.00~~

Station	Offset (meters)	Depth (meters)	Sample Number	Description and Remarks
FWD 290 m 103+33	~~2.4 m~~ R 8.54'	Power Auger 0' - 0.5' 0.5' - 1.1' 1.1' - 2.8' 2.8' - 4.5'		67.9' 9/28/98 - ~~20.7 meters~~ east (north) of Pole 44/131 Asphalt pavement Concrete Brown silty sandy gravel Brown pebbly sandy silt with cobble No refusal
FWD 890 m 123+00	~~2.4 m~~ R 8.27'	Power Auger 0' - 0.5' 0.5' - 1.1' 1.1' - 2.9' 2.9' - 4.5'	49184	100.4' 9/28/98 - ~~30.6 meters~~ east (north) of Pole # 43/122 Asphalt pavement Concrete Brown silty sandy gravel Moist gray brown silty fine sand No refusal Note Ledge outcrop on left side of road
FWD 1490 m 142+72	~~2.4 m~~ R 9.09'	Power Auger 0' - 0.5' 0.5' - 1.2' 1.2' - 2.1' 2.1' - 4.5'	49184	26.2' 9/28/98 - ~~8 meters~~ west (south) of Pole 53/112 Asphalt pavement Concrete Brown silty sandy gravel Gray brown sandy clay silt No refusal
FWD 2090 162+39	~~2.4 m~~ R 9.08'	Power Auger 0' - 0.45' 0.45' - 1.1' 1.1' - 2.3' 2.3' - 4.5'	49185	70.5' 9/28/98 - ~~21.5 meters~~ west (south) of Pole 67/98 Asphalt pavement Concrete Brown silty sandy gravel Gray brown pebbly sandy silt with cobbles (rocky) No refusal
FWD 2690 m 182+09	~~2.6 m~~ R 10.0'	Power Auger 0' - 0.5' 0.5' - 1.1' 1.1' - 3.0' 3.0' - 4.5'		27.9' 9/28/98 ~~8.5 meters~~ west (south) of Pole 91/431/87 by Calvary Baptist Church Asphalt pavement Concrete Brown silty sandy gravel Gray brown sandy clay silt No refusal
~~FWD 3290 m~~	~~2.6 m R~~	~~Power Auger 0 - 152 mm 152 - 1.37 m~~	49186	~~9/28/98 - 5.3 m east (north) of Pole 99/15 Asphalt pavement Brown silty sandy gravel No refusal~~

State of Maine - Department of Transportation

Power Auger Probe Summary Sheet

Town(s): Warren

Work Number: 17889.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 6/5/2012
176+50	18.0 Rt.		4.0			
176+75	19.0 Rt.		5.5			
177+20	17.0 Rt.		8.3		4.0	
177+45	26.0 Rt.			10.0		
178+00	30.0 Rt.		6.1			
179+75	14.0 Rt.			10.0		
180+25	13.0 Rt.			10.0		

MaineDOT Drill Crew
Logged By: B. Wilder
Drill Rig: CME 45C

5" Solid Stem Auger

State of Maine - Department of Transportation

Rod Sounding Summary Sheet

Town(s): Warren Work Number: 17889.00

Boring	Station (Feet)	Offset (Feet)	Refusal (Feet)	No Refusal (Feet)	Water (X) = Yes	Comments 6/6-7/2012
	116+50	45.0 Rt.		10.0		
	116+50	20.0 Lt.		10.0		
	117+00	20.0 Lt.	5.1			
	117+80	20.0 Lt.	4.5			
	118+50	20.0 Lt.	3.1			
	119+00	20.0 Lt.	1.5			
	119+50	20.0 Lt.	7.0			
	132+00	35.0 Rt.	4.5			
	133+50	35.0 Rt.	4.6			
	136+00	35.0 Rt.	4.0			
	150+25	20.0 Lt.		10.0		
	151+25	20.0 Lt.	6.8			
	152+00	35.0 Rt.	4.8			
	152+50	35.0 Rt.	4.9			
	153+00	35.0 Rt.	5.8			
	153+50	35.0 Rt.	3.8			
	159+75	20.0 Lt.		10.0		
	159+95	20.0 Rt.	5.2			
	160+40	20.0 Rt.	3.1			
	160+75	20.0 Lt.		10.0		
	161+00	20.0 Rt.		10.0		
	161+50	20.0 Rt.		10.0		
	161+75	20.0 Rt.		10.0		
	175+25	20.0 Rt.		10.0		
	176+25	20.0 Lt.		10.0		
	176+25	20.0 Rt.	2.2			
	176+50	20.0 Lt.	5.0			
	176+50	20.0 Rt.	4.5			
	177+25	20.0 Rt.	4.0			
	177+50	20.0 Rt.	2.9			
	178+15	20.0 Rt.	3.0			

MaineDOT
Logged By: C. Giles

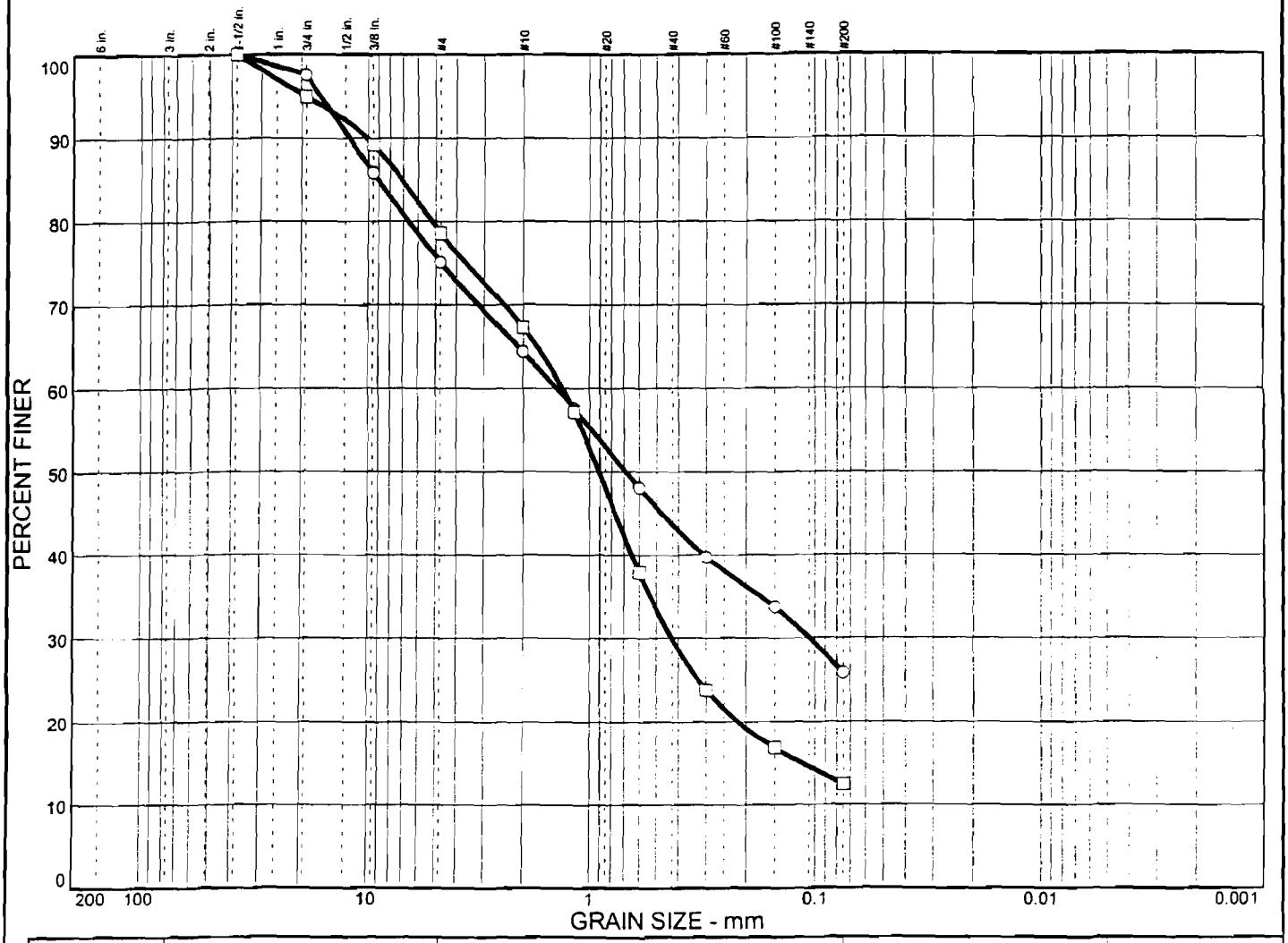
TABLE 1 - Summary of Geotechnical Laboratory Testing
US Route 1 Reconstruction
Warren-Thomaston
MDOT PIN 7869(00)

Boring	Sample	Depth (meters)	Soil Type (1)	Layer	Atterberg Limits (2)	Grain Size	Water Content (percent)	Lab. Vane Shear (3) (kilopascals)
HB-WARR- 301	D2	1.2 to 1.8	CL	clay crust			24.2	
HB-WARR- 303A	D2	1.2 to 1.8	CL	clay crust			27.4	
HB-WARR- 303A	D4	3.0 to 3.7	CL	soft clay			25.9	
HB-WARR- 303B	U1	1.9	CL	clay crust			30.2	112/10
HB-WARR- 303B	U1	2.0	CL	clay crust			28.2	146/32
HB-WARR- 303B	D2	1.5 to 2.1	CL	soft clay	LL=35, PI=15		34.0	
HB-WARR- 303B	U2	5.0	CL	soft clay			34.9	18/3
HB-WARR- 303B	U2	5.1	CL	soft clay			33.7	20/3
HB-WARR- 303B	D3	6.1 to 6.7	CL-ML	soft clay	LL=21,PI=5		24.0	
HB-WARR- 304	D2	1.2 to 1.8	CL	clay crust	LL=38,PI=19		28.3	
HB-WARR- 304	D3	2.4 to 3.1	CL	clay crust	LL=36, PI=15		30.8	
HB-WARR- 304	D5	6.1 to 6.7	CL	soft clay			30.6	
HB-WARR- 309	D1	0 to 0.6	SP/SM	fill		see lab report		
HB-WARR- 314	D1	0 to 0.6	SP/SM	fill		see lab report		
HB-WARR- 315	D2	1.2 to 1.8	CL	clay crust			27.0	
HB-WARR- 319	D2	1.2 to 1.8	SP/SM	fill		see lab report		
HB-WARR- 319	D3	2.4 to 3.0	CL	clay crust			28.8	
HB-WARR- 320	D1	0.5 to 1.1	SW,SP/SM	Subbase		see lab report		
HB-WARR- 322	D1	0.2 to 0.8	SP	Subbase		see lab report		

Notes:

1. Unified Soil Classification (USC) system group symbol
2. LL = Liquid Limit, PI = Plasticity Index
3. Peak shear strength/Residual shear strength

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	24.9	49.3	25.8	
□	0.0	21.4	66.1	12.5	

X	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			9.07	1.41	0.688	0.106				
□			7.11	1.33	0.908	0.430	0.113			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND, some silt, some gravel	SM	
□ SAND, some gravel, little silt	SM	

Project No. 02072-0 **Client:** MDOT PIN

Project: Warren - Rt 1 Improvements

○ **Source:** Boring 320 **Sample No.:** S1

□ **Source:** Boring 322 **Sample No.:** S1

Remarks:

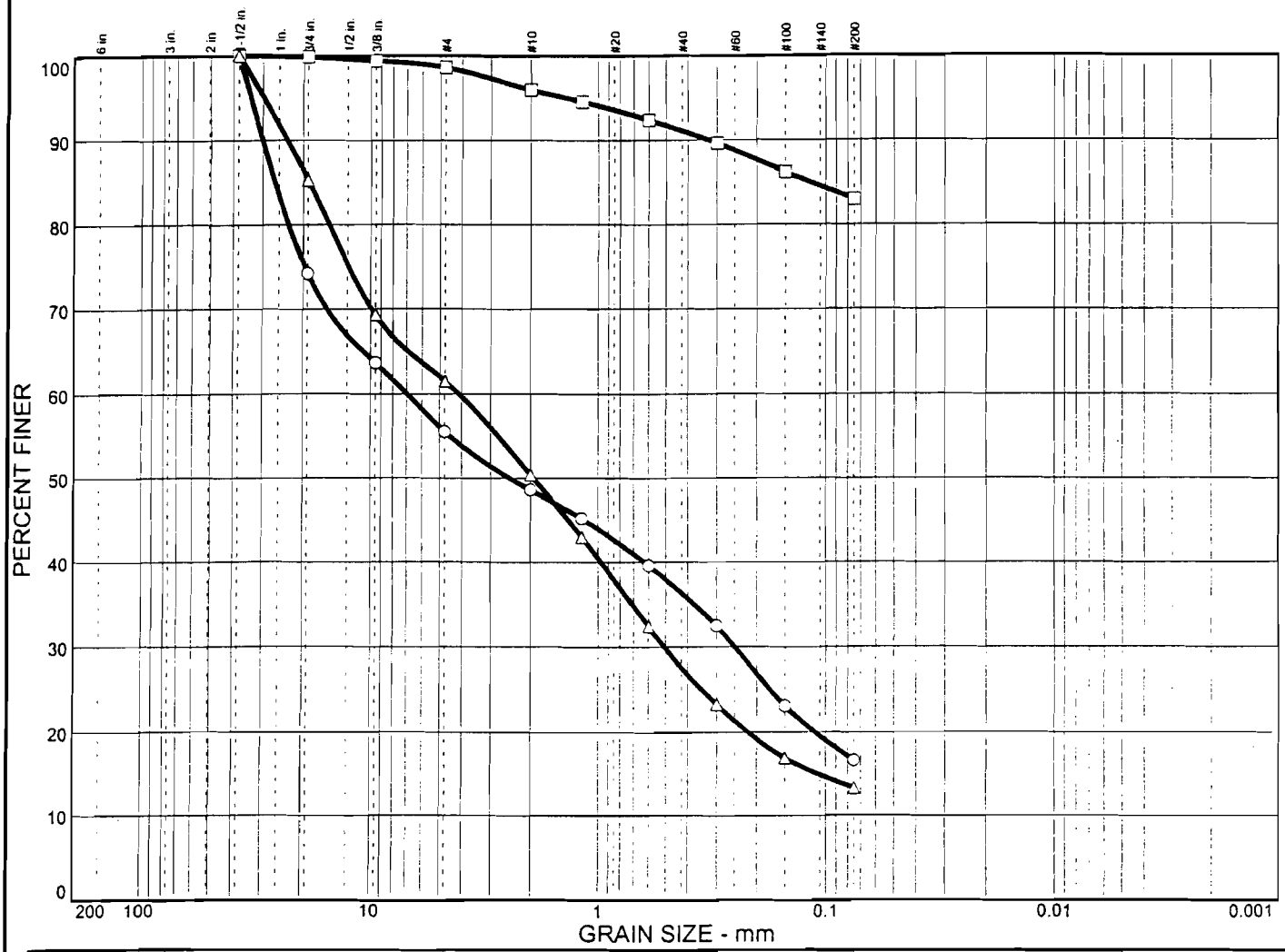
○

□

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	44.5	38.9	16.6	
□	0.0	1.4	15.6	83.0	
△	0.0	38.5	48.2	13.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			26.5	6.97	2.48	0.250				
□			0.117							
△			18.8	4.13	1.94	0.509	0.109			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy GRAVEL, little silt	GM	
□ SILT, little sand, trace gravel	ML	
△ Gravely SAND, little silt	SM	

Project No. 02072-0 **Client:** MDOT PIN

Project: Warren - Rt 1 Improvements

○ **Source:** Boring 309 **Sample No.:** S1

□ **Source:** Boring 314 **Sample No.:** S1

△ **Source:** Boring 319 **Sample No.:** S2

Remarks:

○

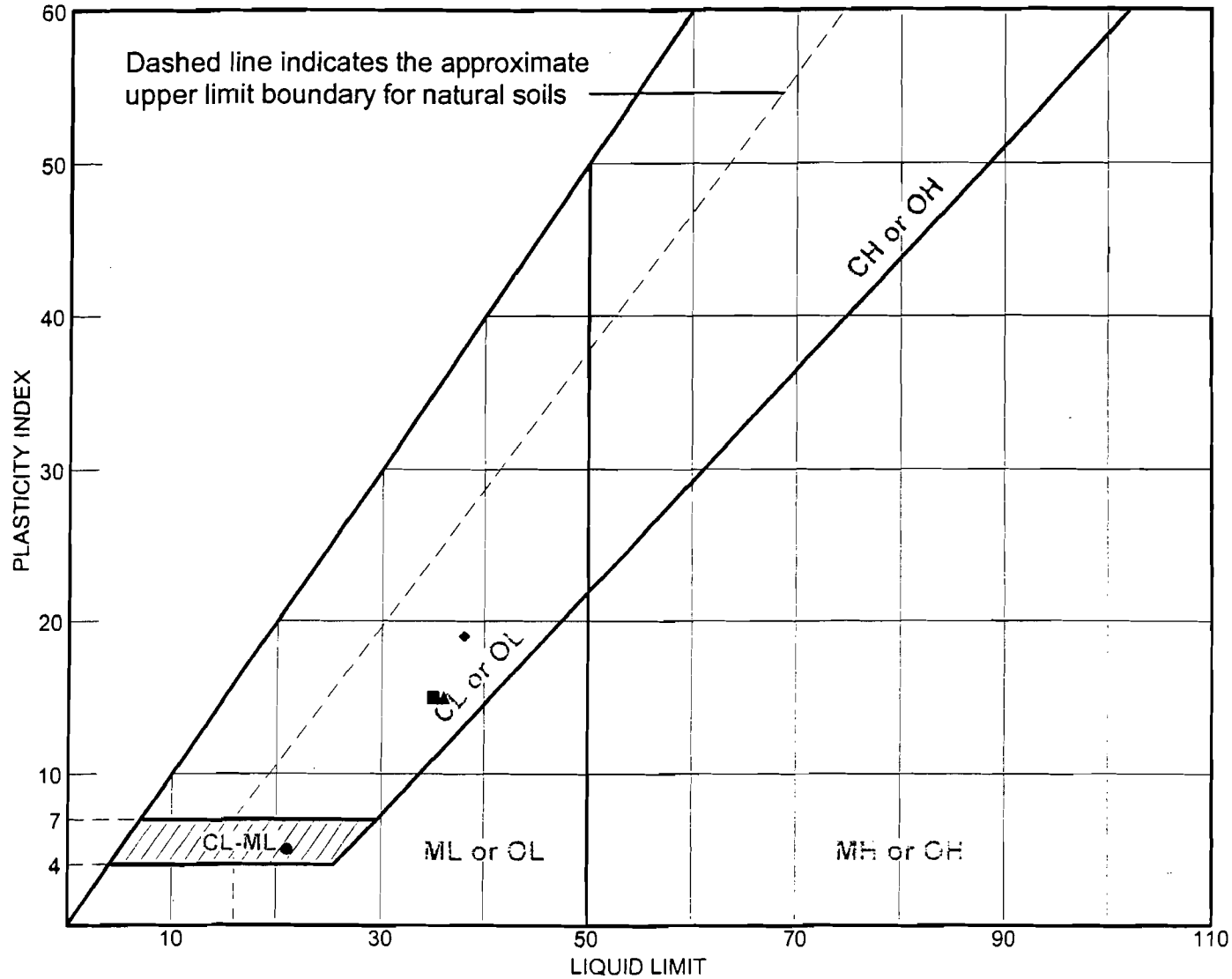
□ A lot of small roots in sample.

△

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring 303B	S3			16	21	5	
■	Boring 303B	S2			20	35	15	
▲	Boring 304	S3	8-10 ft.		21	36	15	
◆	Boring 304	S2	4-6 ft.		19	38	19	

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Client: MDOT PIN

Project: Warren - Rt 1 Improvements

Project No.: 02072-0

Fig.

LABORATORY VANE SHEAR TEST

SAMPLE INFORMATION

STRUCTURE:	Undisturbed tube sample.	DESCRIPTION: Olive lean CLAY	
BORING:	HB-WARR-303B		
SAMPLE:	U1	WET WT + TARE	112.178
DEPTH:	6.7 feet	DRY WT + TARE	96.408
		TARE WT.	40.475
		WATER CONTENT:	28.19 %

EQUIPMENT PARAMETERS

SPRING CONSTANTS:

SPRING NO.	CONSTANT kg.cm/deg.
1	0.00916
2	0.024444
3	0.027729
4	0.05111

MINIATURE VANE CONSTANTS :

Vane	Diameter cm.	Height cm.	K cm^3
1	1.27	1.27	4.29
2	1.27	1.91	5.91
3	1.27	2.54	7.51
4	2.54	2.54	34.32

TEST DATA

TRIAL NO.	SPRING NO.	VANE NO.	PEAK ROTATION (DEGREES)	RESIDUAL ROTATION (DEGREES)	PEAK SHEAR (KSF)	RESIDUAL SHEAR (KSF)	SENSITIVITY	REMARKS
1	4	1	128	25	3.12	0.61	5.12	
2	4	1	121	29	2.95	0.71	4.17	
				AVERAGE:	3.04	0.66	4.65	

GENERAL NOTES:

TEST DATE:	Aug. 13 2002
TESTED BY:	M. McKenna
CHECKED BY:	D. Aghjayan

Maine Department of Transportation	LABORATORY VANE SHEAR TEST	DATE Aug. 14, 2002
GEI Consultants, Inc.	Route 1 Reconstruction Warren, Maine Project 02072-0	Boring HB-WARR-303B Sample U1 TEST V1

LABORATORY VANE SHEAR TEST

SAMPLE INFORMATION

STRUCTURE:	Undisturbed tube sample.	DESCRIPTION: Olive lean CLAY	
BORING:	HB-WARR-303B		
SAMPLE:	U1	WET WT + TARE	98.374
DEPTH:	6.3 feet	DRY WT + TARE	84.989
		TARE WT.	40.613
		WATER CONTENT:	30.16 %

EQUIPMENT PARAMETERS

SPRING CONSTANTS:

SPRING NO.	CONSTANT kg.cm/deg.
1	0.00916
2	0.024444
3	0.027729
4	0.05111

MINIATURE VANE CONSTANTS :

Vane	Diameter cm.	Height cm.	K cm^3
1	1.27	1.27	4.29
2	1.27	1.91	5.91
3	1.27	2.54	7.51
4	2.54	2.54	34.32

TEST DATA

TRIAL NO.	SPRING NO.	VANE NO.	PEAK ROTATION (DEGREES)	RESIDUAL ROTATION (DEGREES)	PEAK SHEAR (KSF)	RESIDUAL SHEAR (KSF)	SENSITIVITY	REMARKS
1	4	1	66	2	1.61	0.05	33.00	
2	4	1	110	9	2.68	0.22	12.22	
3	4	1	112	14	2.73	0.34	8.00	
				AVERAGE:	2.34	0.20	17.74	

GENERAL NOTES:

TEST DATE: Aug. 13 2002
TESTED BY: M. McKenna
CHECKED BY: D. Aghjayan

Maine Department of Transportation	LABORATORY VANE SHEAR TEST	DATE Aug. 14. 2002
GEI Consultants, Inc.	Route 1 Reconstruction Warren, Maine Project 02072-0	Boring HB-WARR-303B Sample U1 TEST V2

LABORATORY VANE SHEAR TEST

SAMPLE INFORMATION

STRUCTURE:	Undisturbed tube sample.	DESCRIPTION: Gray lean CLAY	
BORING:	HB-WARR-303B		
SAMPLE:	U2	WET WT + TARE	220.404
DEPTH:	16.7 feet	DRY WT + TARE	173.48
		TARE WT.	34.074
		WATER CONTENT:	33.66 %

EQUIPMENT PARAMETERS

SPRING CONSTANTS:

SPRING NO.	CONSTANT kg.cm/deg.
1	0.00916
2	0.024444
3	0.027729
4	0.05111

MINIATURE VANE CONSTANTS :

Vane	Diameter cm.	Height cm.	K cm^3
1	1.27	1.27	4.29
2	1.27	1.91	5.91
3	1.27	2.54	7.51
4	2.54	2.54	34.32

TEST DATA

TRIAL NO.	SPRING NO.	VANE NO.	PEAK ROTATION (DEGREES)	RESIDUAL ROTATION (DEGREES)	PEAK SHEAR (KSF)	RESIDUAL SHEAR (KSF)	SENSITIVITY	REMARKS
1	1	3	160	23	0.40	0.06	6.96	
2	1	3	171	24	0.43	0.06	7.13	
3	1	3	163	21	0.41	0.05	7.76	
				AVERAGE:	0.41	0.06	7.28	

GENERAL NOTES:

TEST DATE: Aug. 13 2002
TESTED BY: M. McKenna
CHECKED BY: D. Aghjayan

Maine Department of Transportation	LABORATORY VANE SHEAR TEST	DATE Aug. 14, 2002
GEI Consultants, Inc.	Route 1 Reconstruction Warren, Maine Project 02072-0	Boring HB-WARR-303B Sample U2 TEST V1

LABORATORY VANE SHEAR TEST

SAMPLE INFORMATION

STRUCTURE:	Undisturbed tube sample.	DESCRIPTION: Gray lean CLAY	
BORING:	HB-WARR-303B		
SAMPLE:	U2	WET WT + TARE	273.075
DEPTH:	16.4 feet	DRY WT + TARE	210.632
		TARE WT.	31.73
		WATER CONTENT:	34.90 %

EQUIPMENT PARAMETERS

SPRING CONSTANTS:

SPRING NO.	CONSTANT kg.cm/deg.
1	0.00916
2	0.024444
3	0.027729
4	0.05111

MINIATURE VANE CONSTANTS :

Vane	Diameter cm.	Height cm.	K cm^3
1	1.27	1.27	4.29
2	1.27	1.91	5.91
3	1.27	2.54	7.51
4	2.54	2.54	34.32

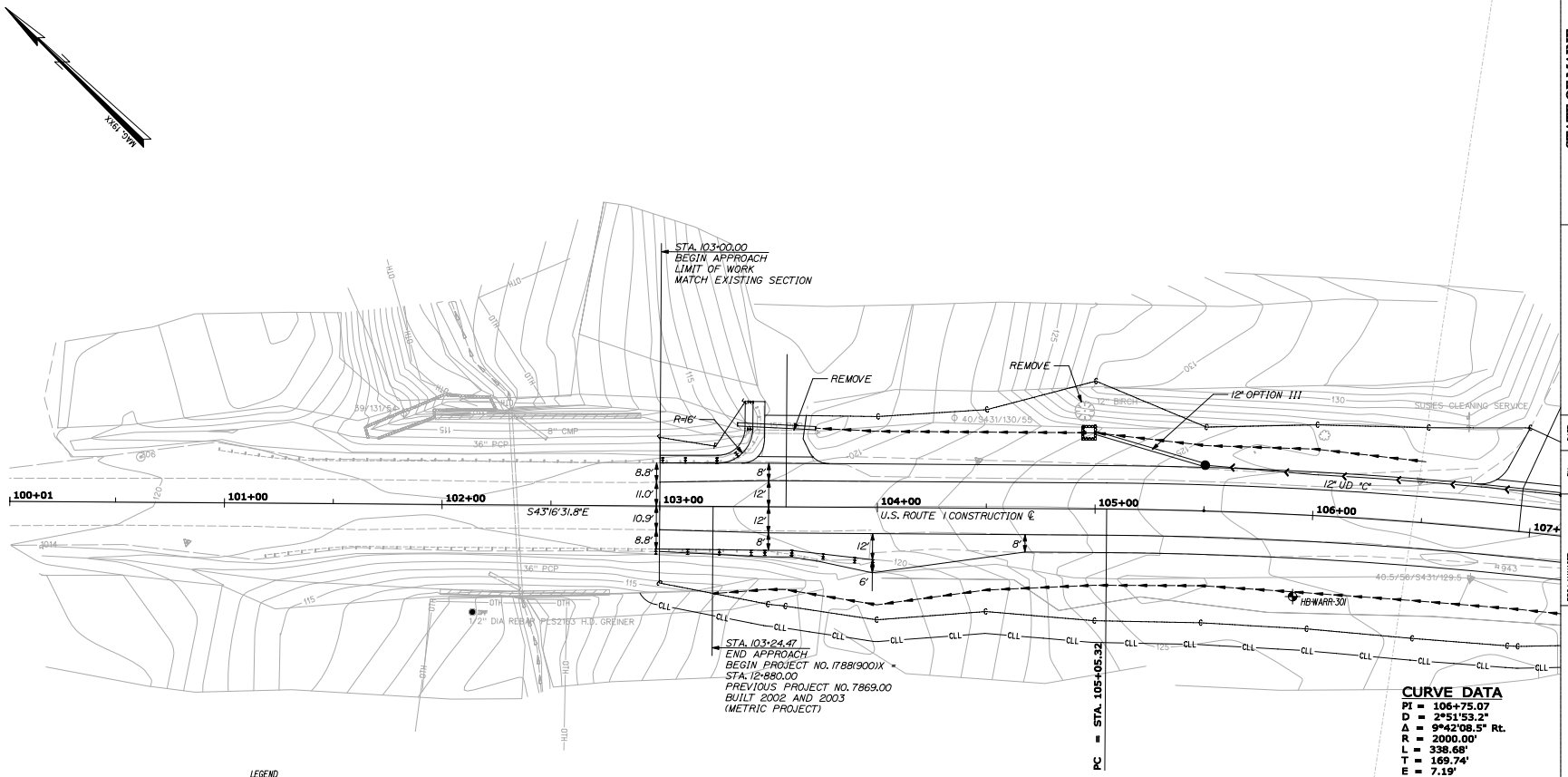
TEST DATA

TRIAL NO.	SPRING NO.	VANE NO.	PEAK ROTATION (DEGREES)	RESIDUAL ROTATION (DEGREES)	PEAK SHEAR (KSF)	RESIDUAL SHEAR (KSF)	SENSITIVITY	REMARKS
1	1	3	127	23	0.32	0.06	5.52	
2	1	3	158	24	0.39	0.06	6.58	
3	1	3	154	22	0.38	0.05	7.00	
				AVERAGE:	0.37	0.06	6.37	

GENERAL NOTES:

TEST DATE: Aug. 13 2002
TESTED BY: M. McKenna
CHECKED BY: D. Aghjayan

Maine Department of Transportation	LABORATORY VANE SHEAR TEST	DATE Aug. 14, 2002
GEI Consultants, Inc.	Route 1 Reconstruction Warren, Maine Project 02072-0	Boring HB-WARR-303B Sample U2 TEST V2



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	JUN 2012
CHECKED-DETAILED		
DESIGN-DETAILED2		
DESIGN-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1
GEOPLANS

SHEET NUMBER
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OF 13

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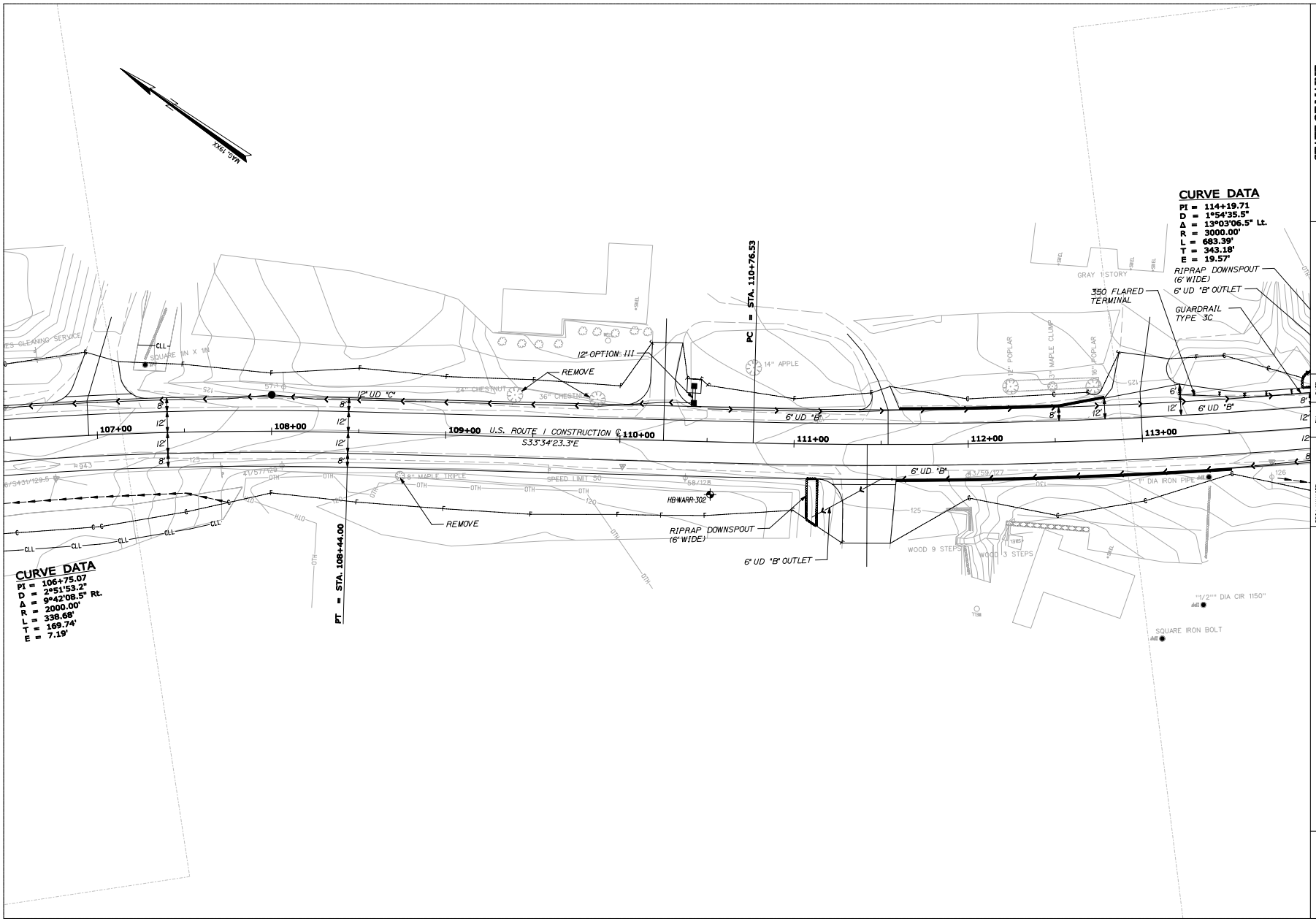

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17889.00

HIGHWAY PLANS

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CHECKED-DETAILED	K.GROSS	
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REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER
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OF 13

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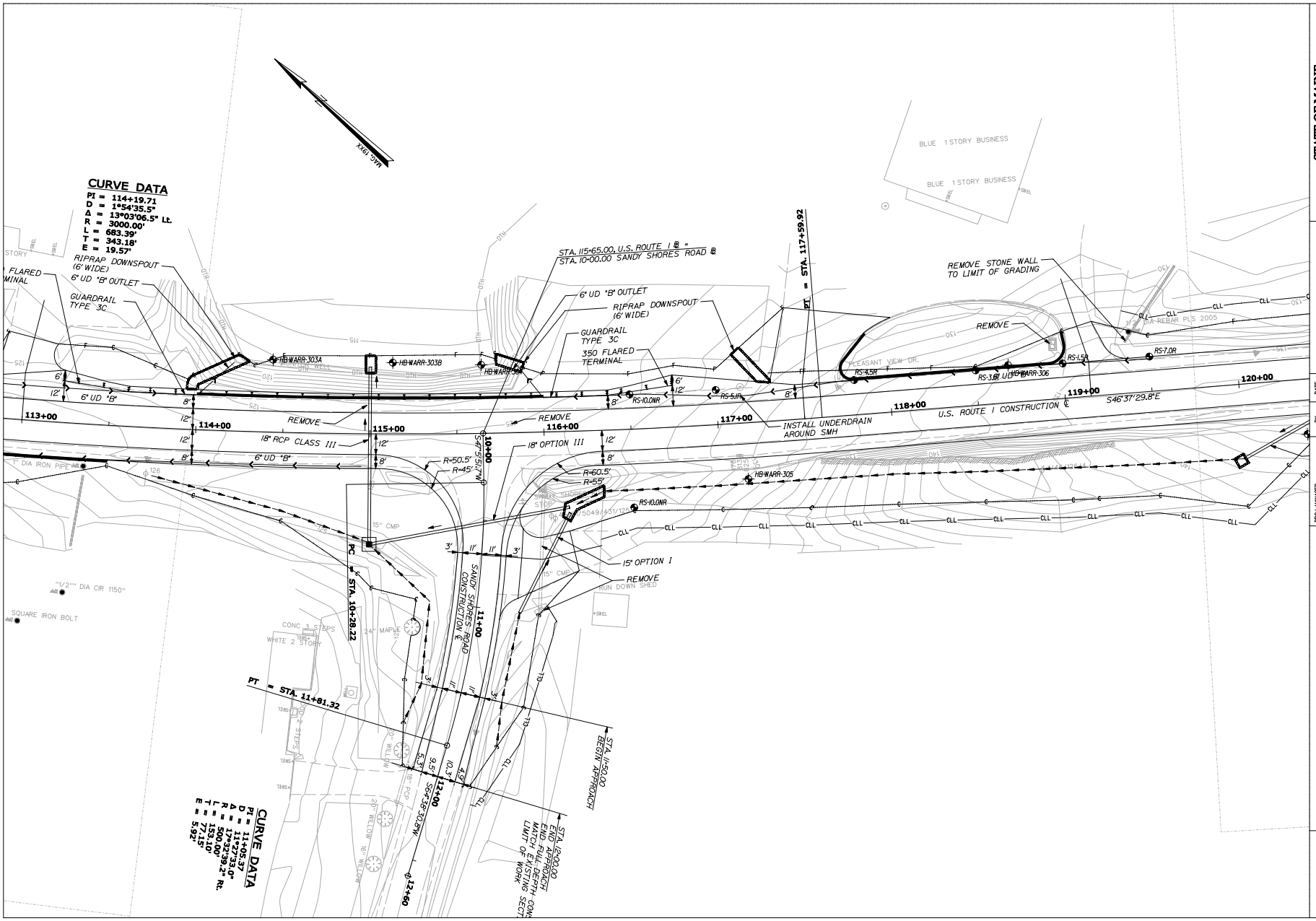

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17688.00

HIGHWAY PLANS

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CHECKED-REVIEWED		
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER
3
OF 13

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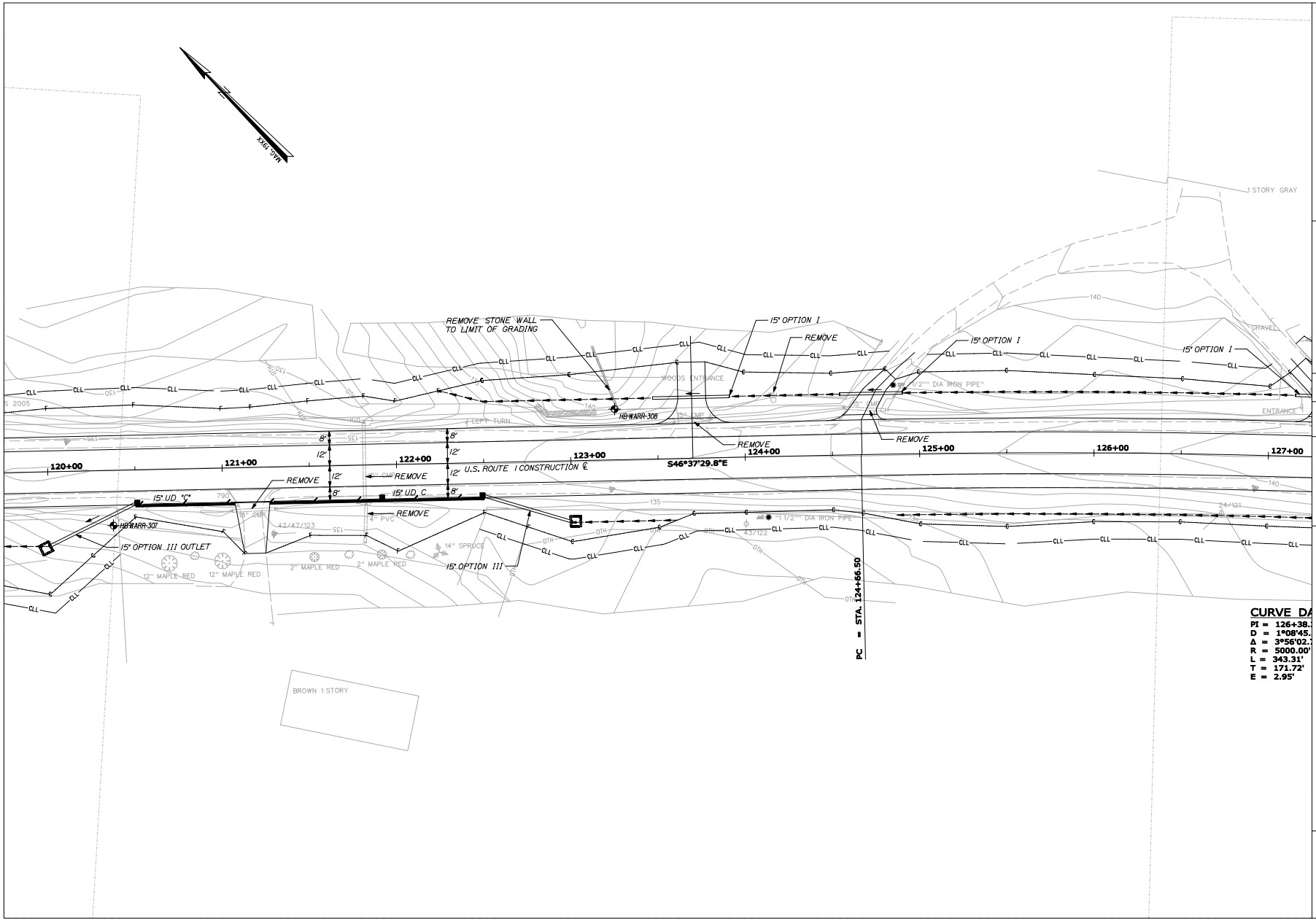

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17889.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	JUN 2012
CHECKED-REVIEWED		
DESIGN-DETAILED		
CHECKED-REVIEWED		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER

4

OF 13

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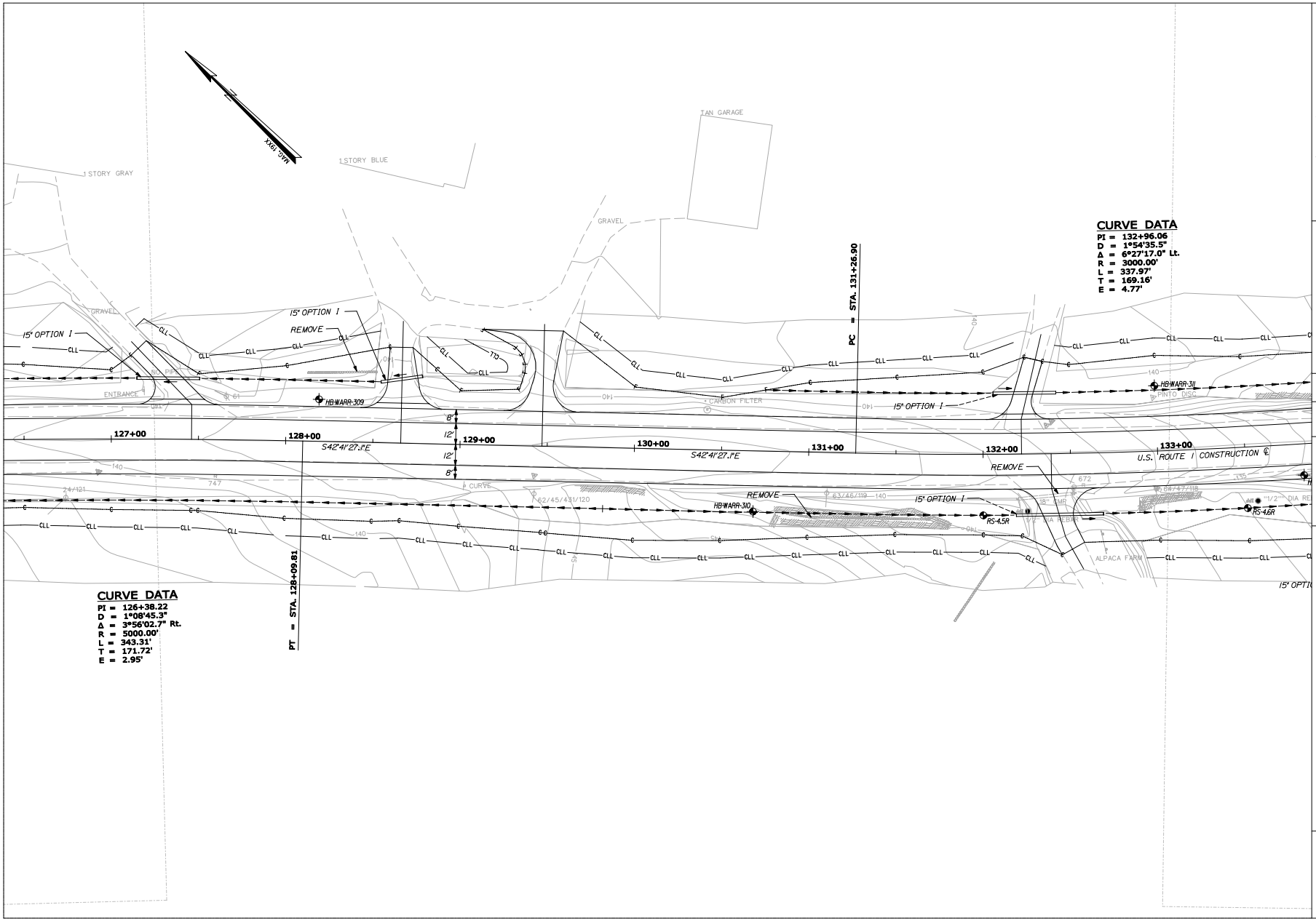

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17889.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	JUN 2012
CHECKED-REVIEWED		
DESIGN-DETAILED2		
DESIGN-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER

5

OF 13

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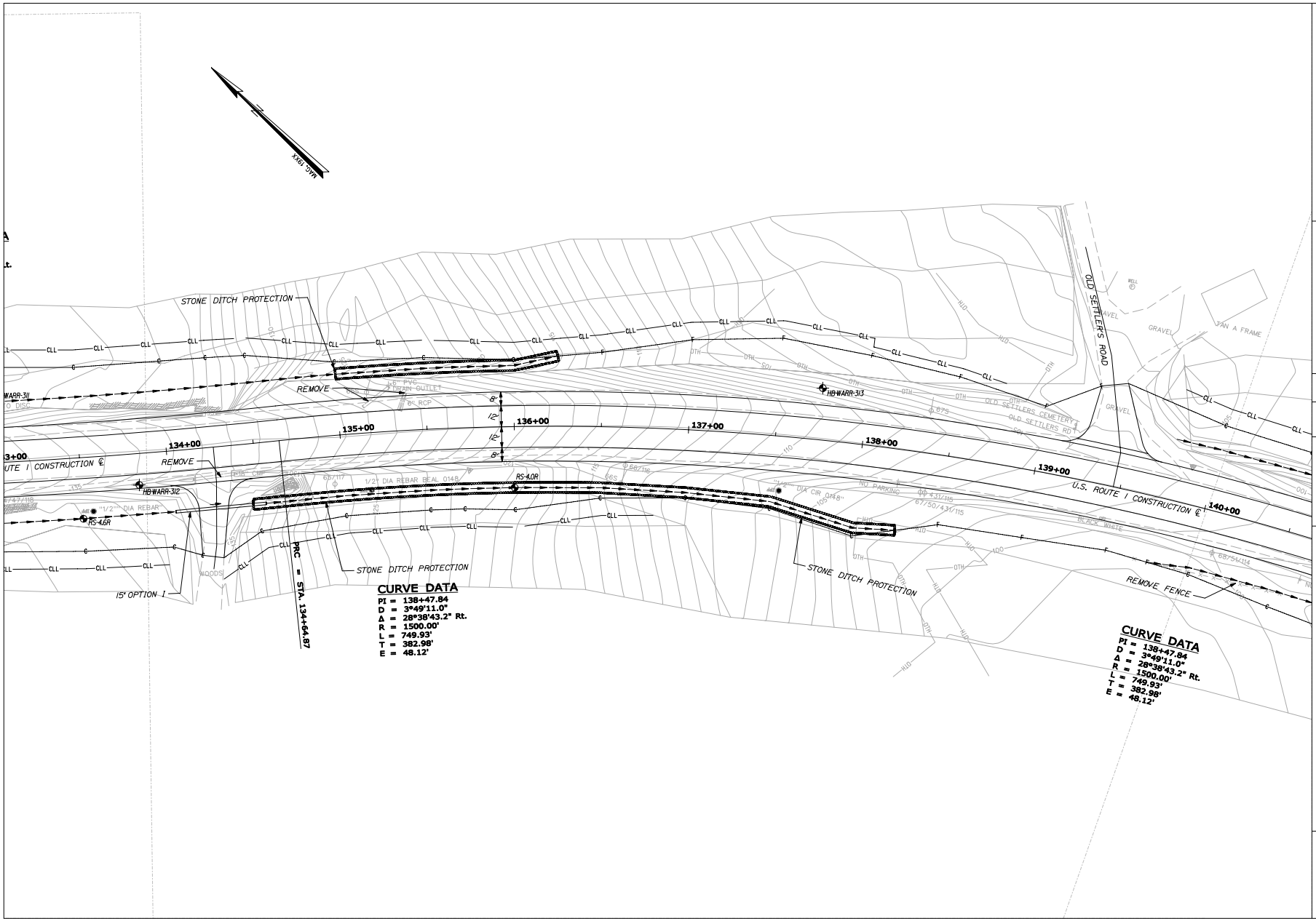

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

		BY	DATE
PROJ. MANAGER			
DESIGN-DETAILED	K.GROSS	T.WHITE	JUN 2012
CHECKED-REVIEWED			
DESIGNS-DETAILED2			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER

6

OF 13

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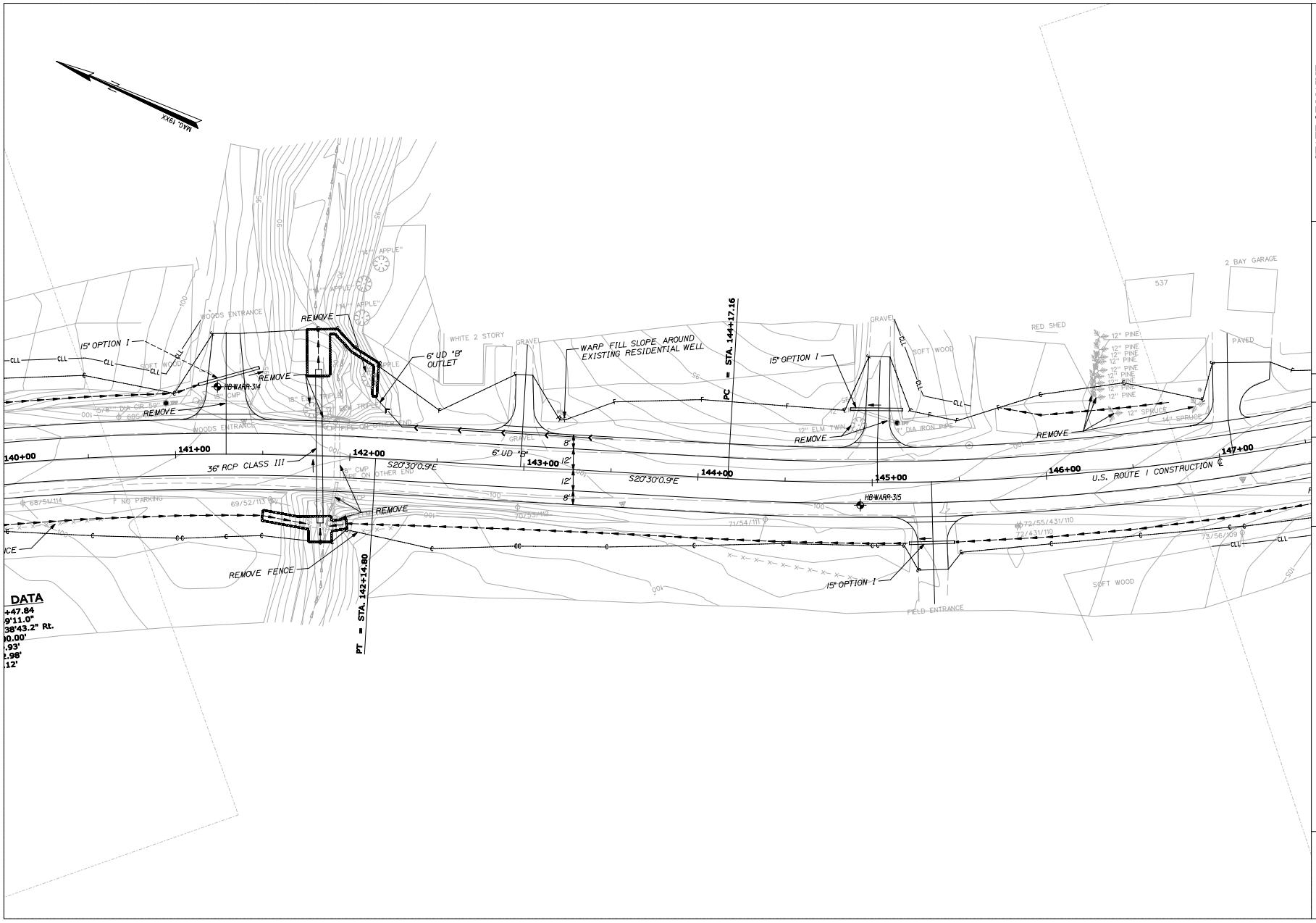


STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER	K.GROSS	
DESIGN-DETAILED	T.WHITE	JUN 2012
DESIGN-DETAILED2		
DESIGN-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

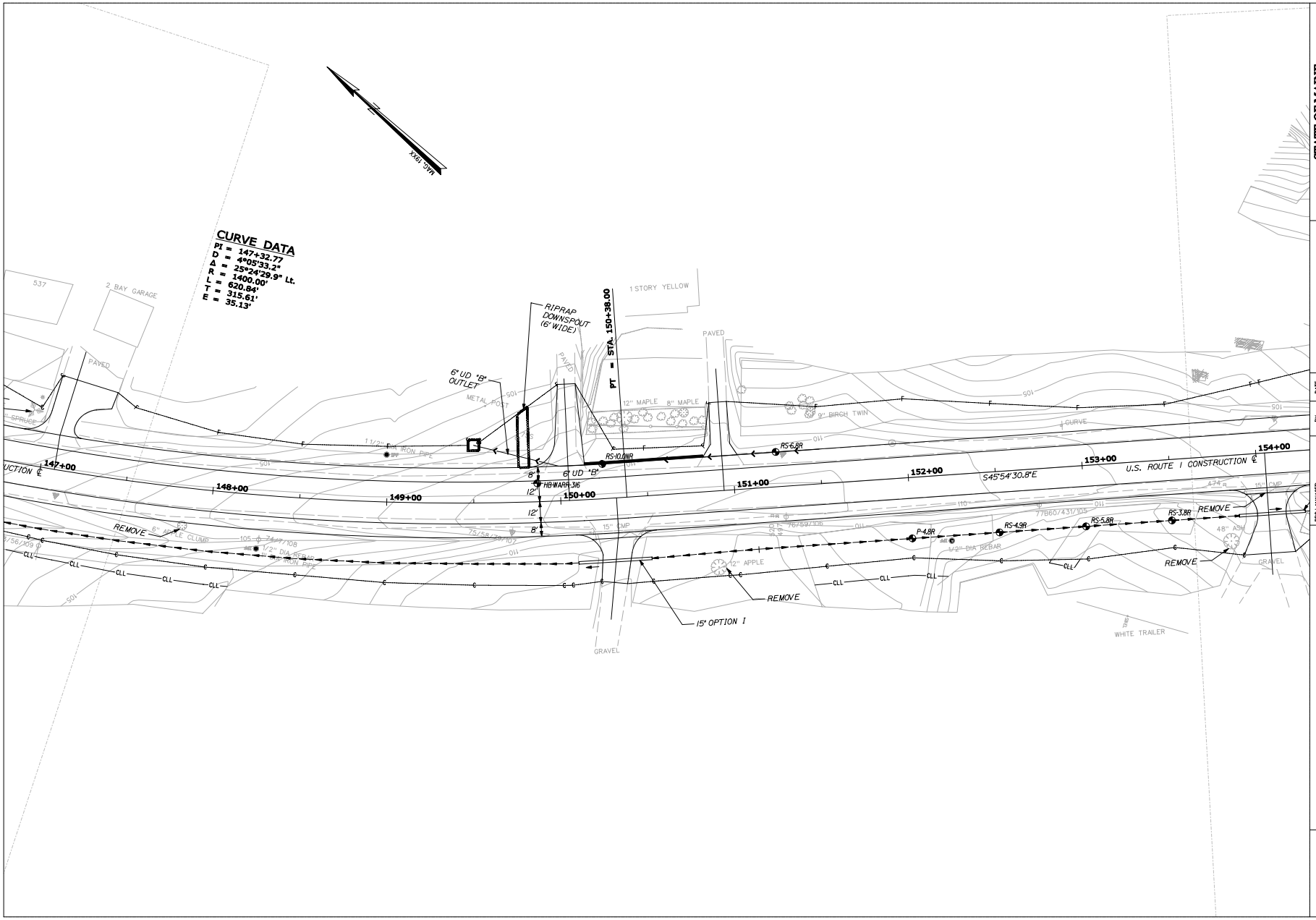
GEOPLANS

SHEET NUMBER

7

OF 13

Filename: ...\GEOTECH\MSTA\007_Geoplan7.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17889.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	T.WHITE	JAN 2012
CHECKED-REVIEWED		
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

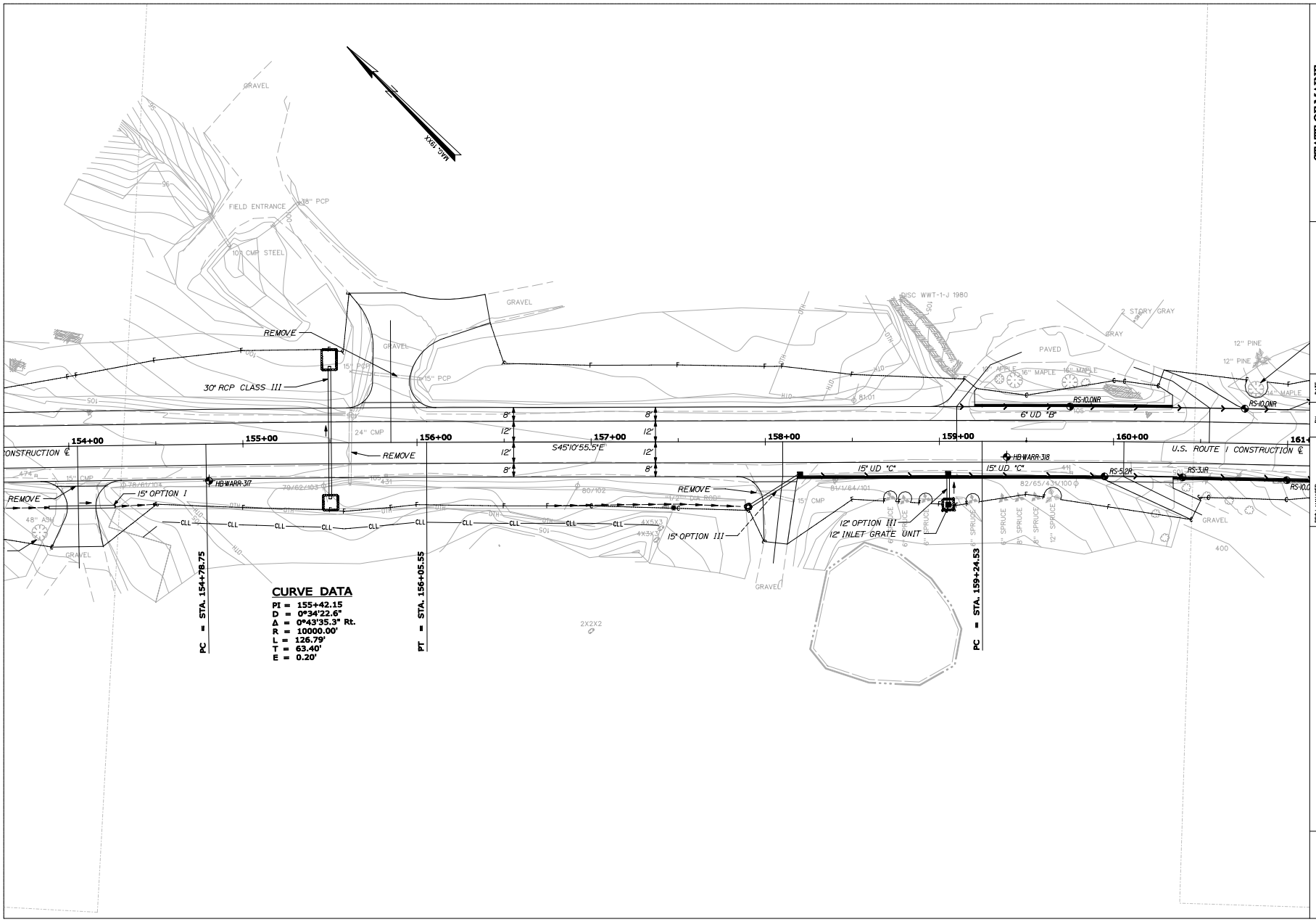
GEOPLANS

SHEET NUMBER

8

OF 13

Filename: ...\GEOTECH\MSTA\008_Geoplan8.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN
17889.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	JUN. 2012
CHECKED-REVIEWED		
DESIGN2-DETAILED2		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.R. NUMBER

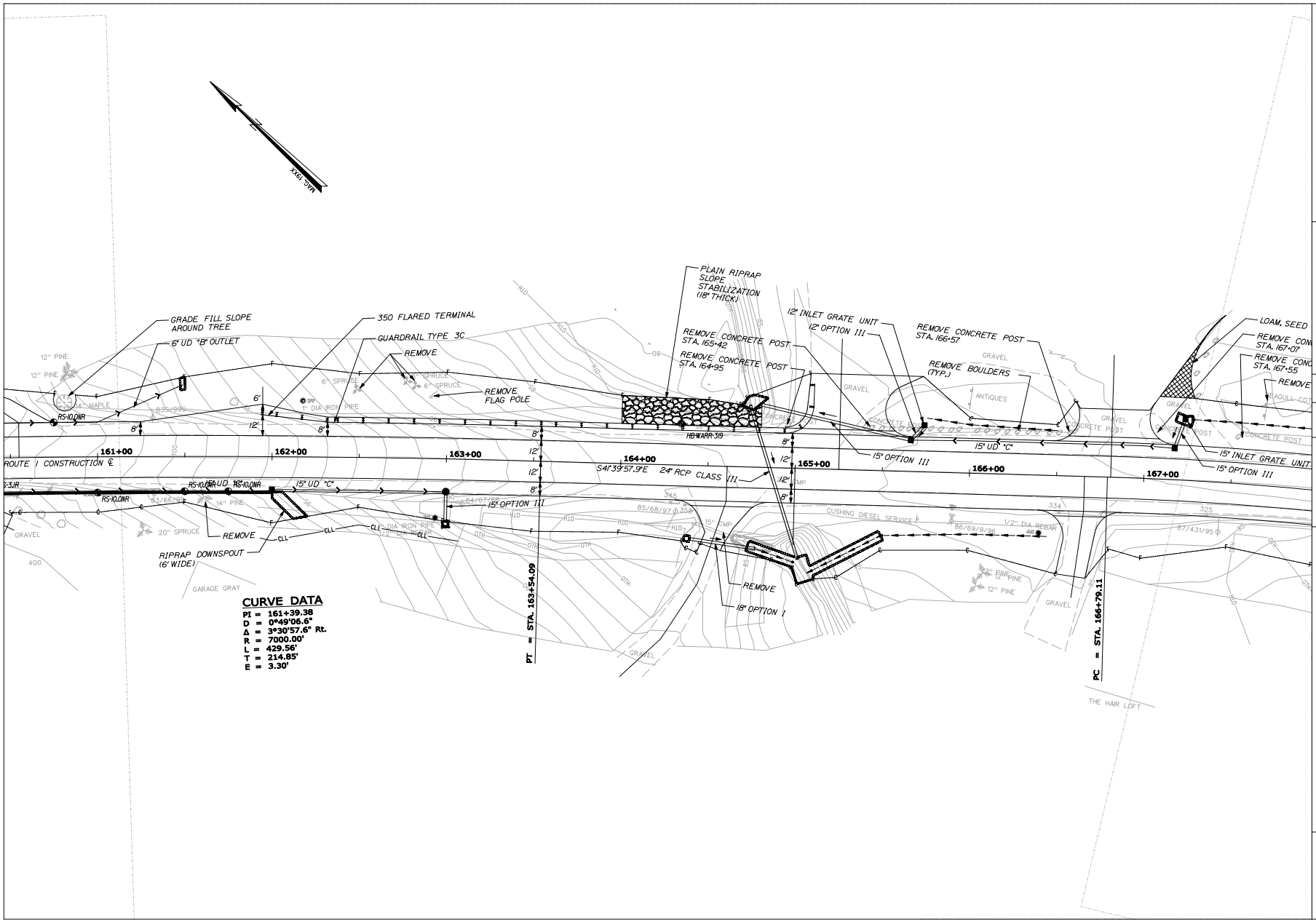
DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER
9
OF 13

Filename: ...\GEOTECH\MSTA\009_Geoplan9.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER	------	------
DESIGN-DETAILED	K.GROSS	JUN 2012
CHECKED-REVIEWED	------	------
DESIGNS DETAILED2	------	------
REVISIONS 1	------	------
REVISIONS 2	------	------
REVISIONS 3	------	------
REVISIONS 4	------	------
FIELD CHANGES	------	------

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

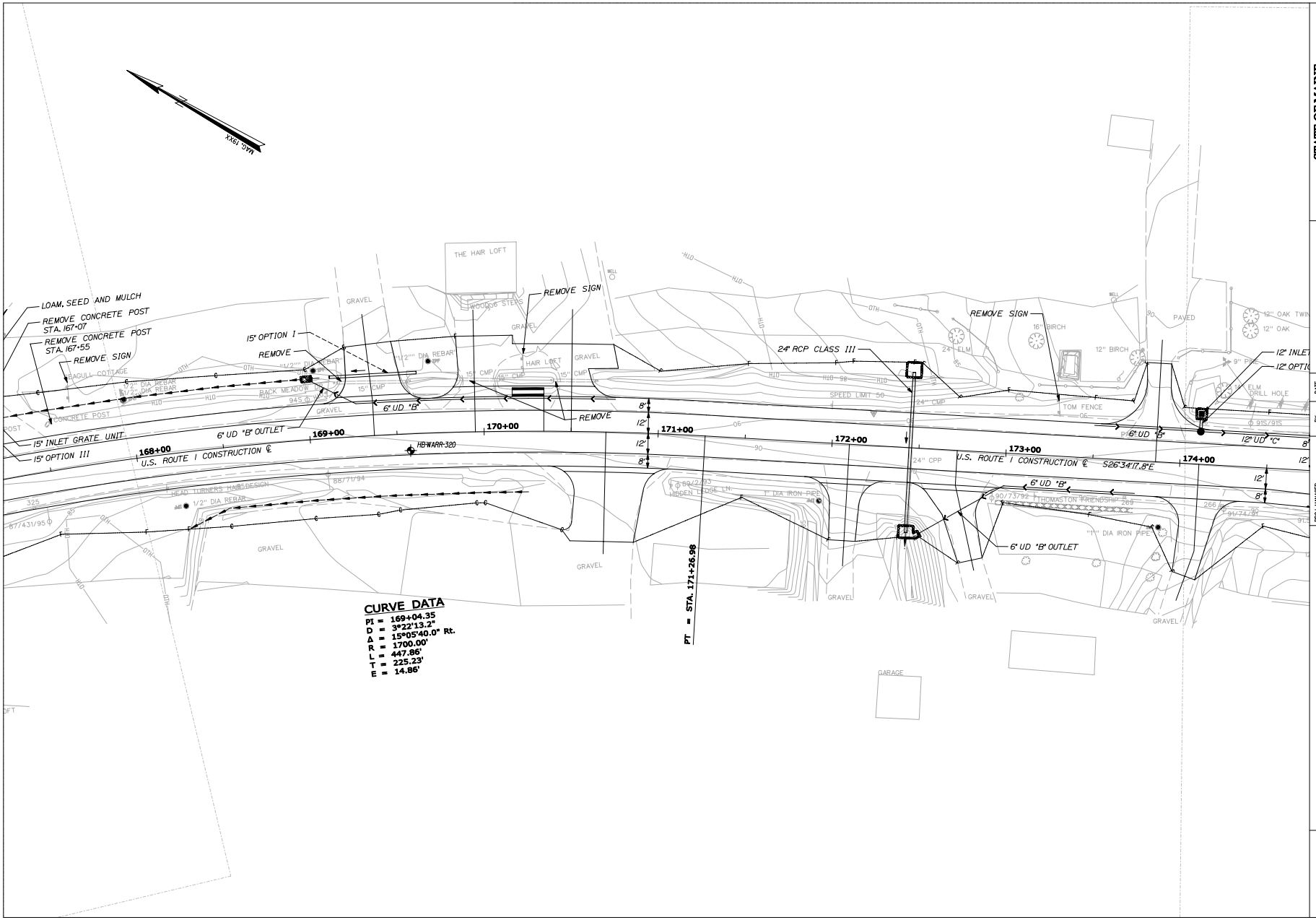
GEOPLANS

SHEET NUMBER

10

OF 13

Filename: ...\GEOTECH\MSTA\010_Geoplan10.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



CURVE DATA

PI = 169+04.35
D = 3°22'13.2"
Δ = 15°05'40.0" Rt.
R = 1700.00'
L = 447.86'
T = 225.23'
E = 14.86'

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.GROSS	
CHECKED-REVIEWED	T.WHITE	JAN. 2012
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

WARREN
ROUTE 1

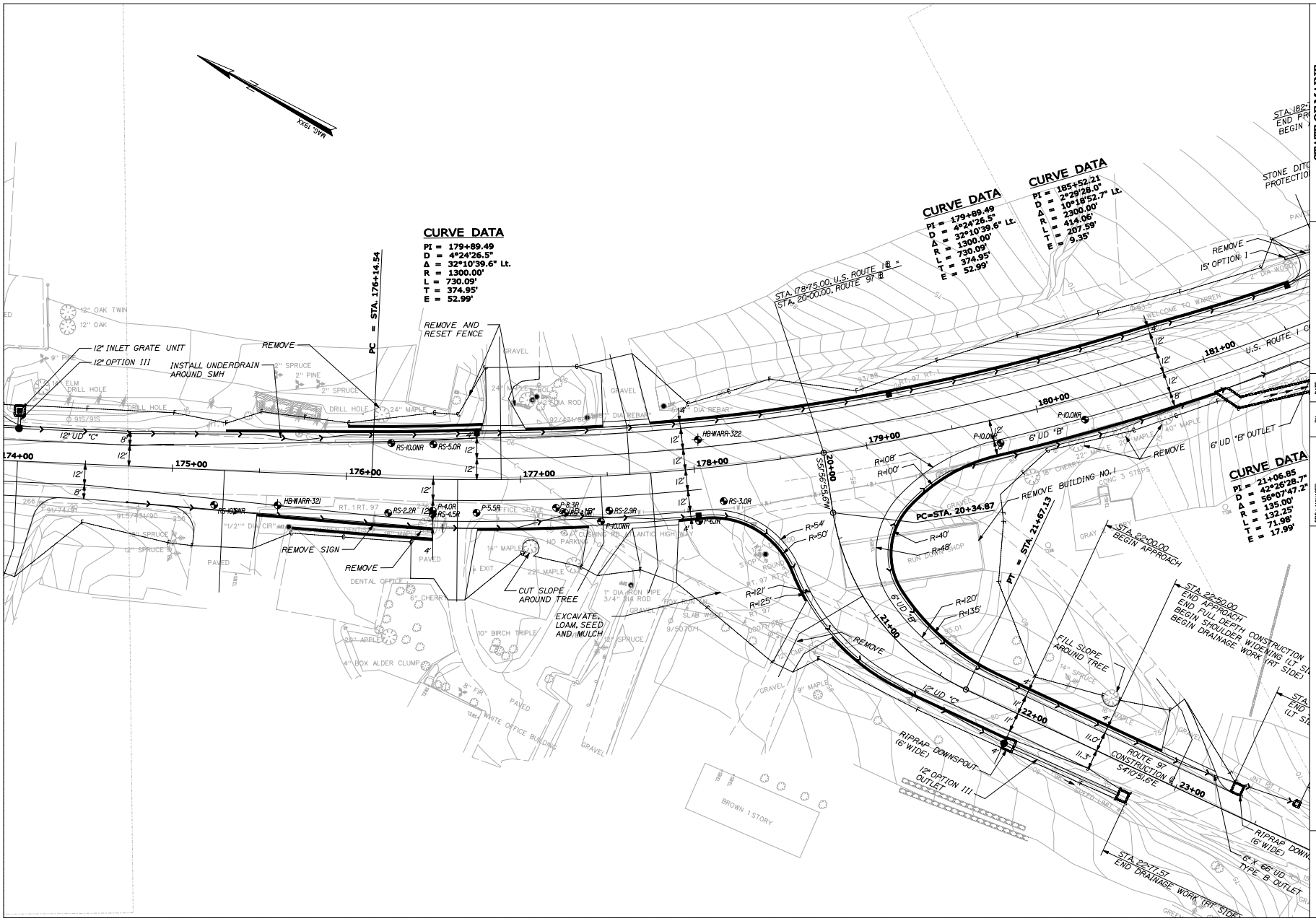
GEOPLANS

SHEET NUMBER

11

OF 13

Filename: ...\GEOTECH\MSTA\011_Geoplan11.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17888.00

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER	T. WHITE	JUN 2012
DESIGN-DETAILER	K. GROSS	
DESIGN-REVIEWER		
DESIGN-DETAILED2		
DESIGN-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

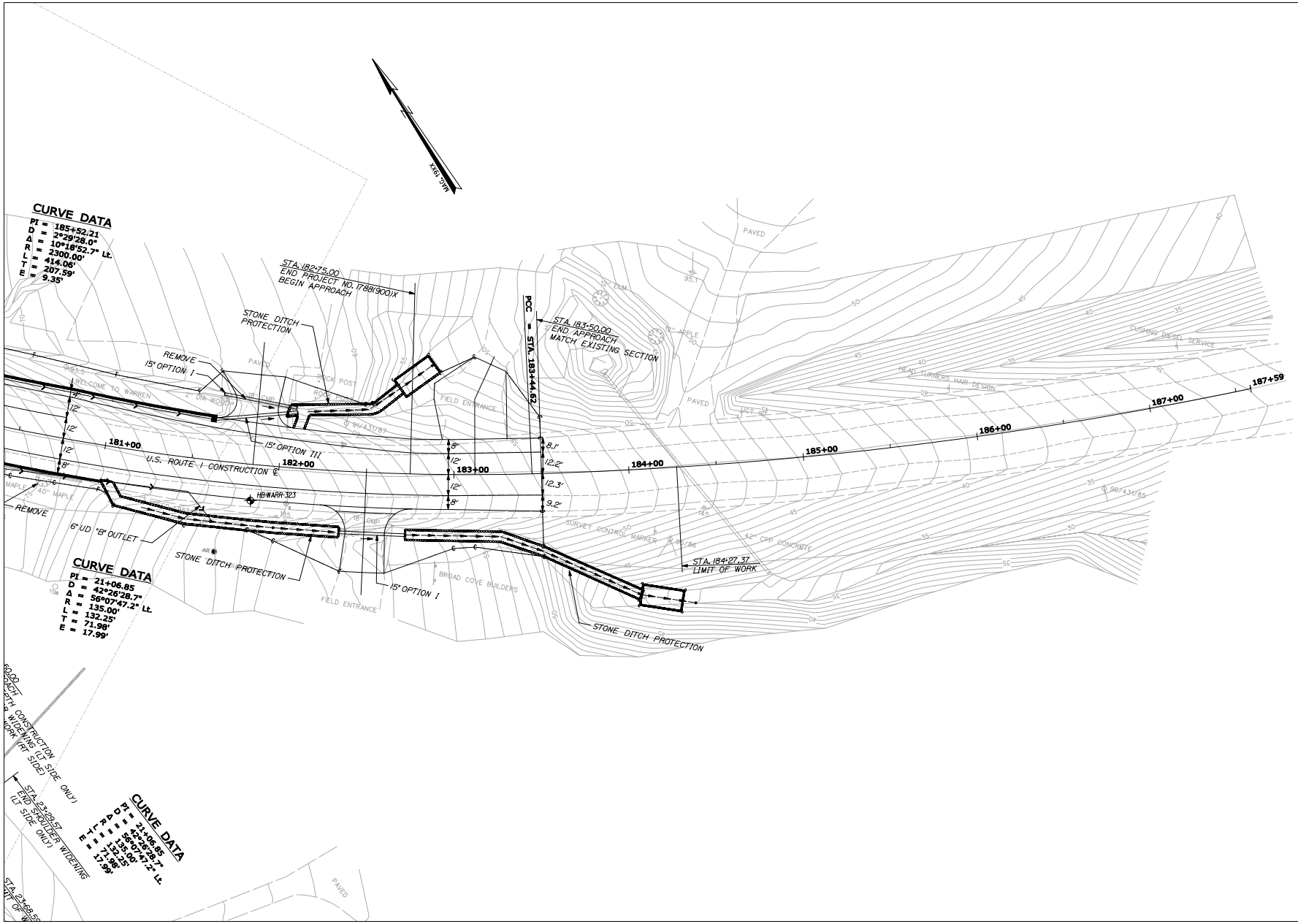
DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER
12
OF 13

Filename: ...\GEOTECH\MSTA\012_Geoplan12.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-1788(900)X

WIN 17889.00

HIGHWAY PLANS

		BY	DATE
PROJ. MANAGER			
DESIGN-DETAILED	K.GROSS	T.WHITE	JUN 2012
CHECKED-REVIEWED			
DESIGNE-DETAILED2			
DESIGNE-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

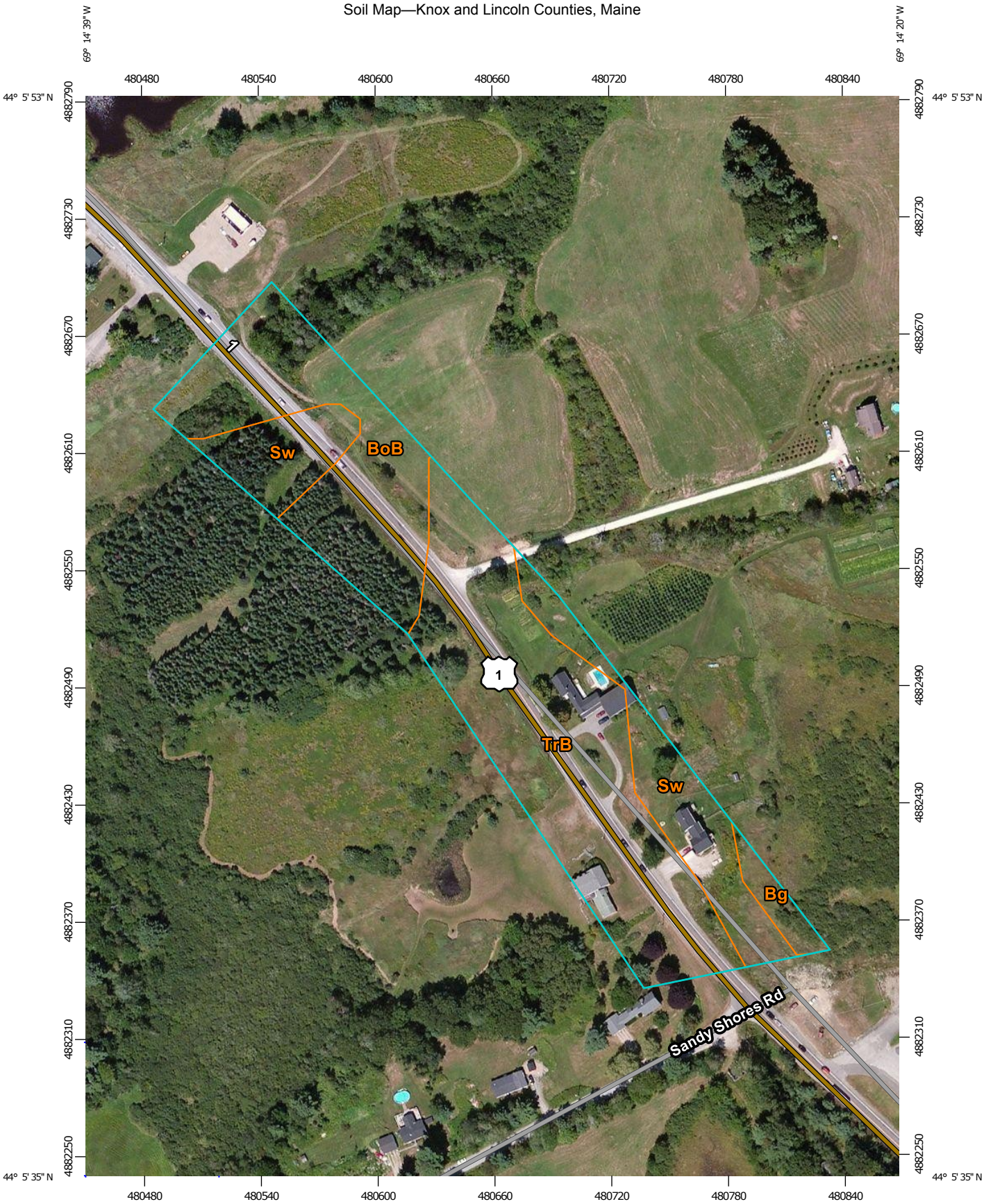
DATE

WARREN
ROUTE 1

GEOPLANS

SHEET NUMBER
13
OF 13

Filename: ...\GEOTECH\MSTA\013_Geoplan13.dgn Division: HIGHWAY Username: karen.gross Date:10/31/2012



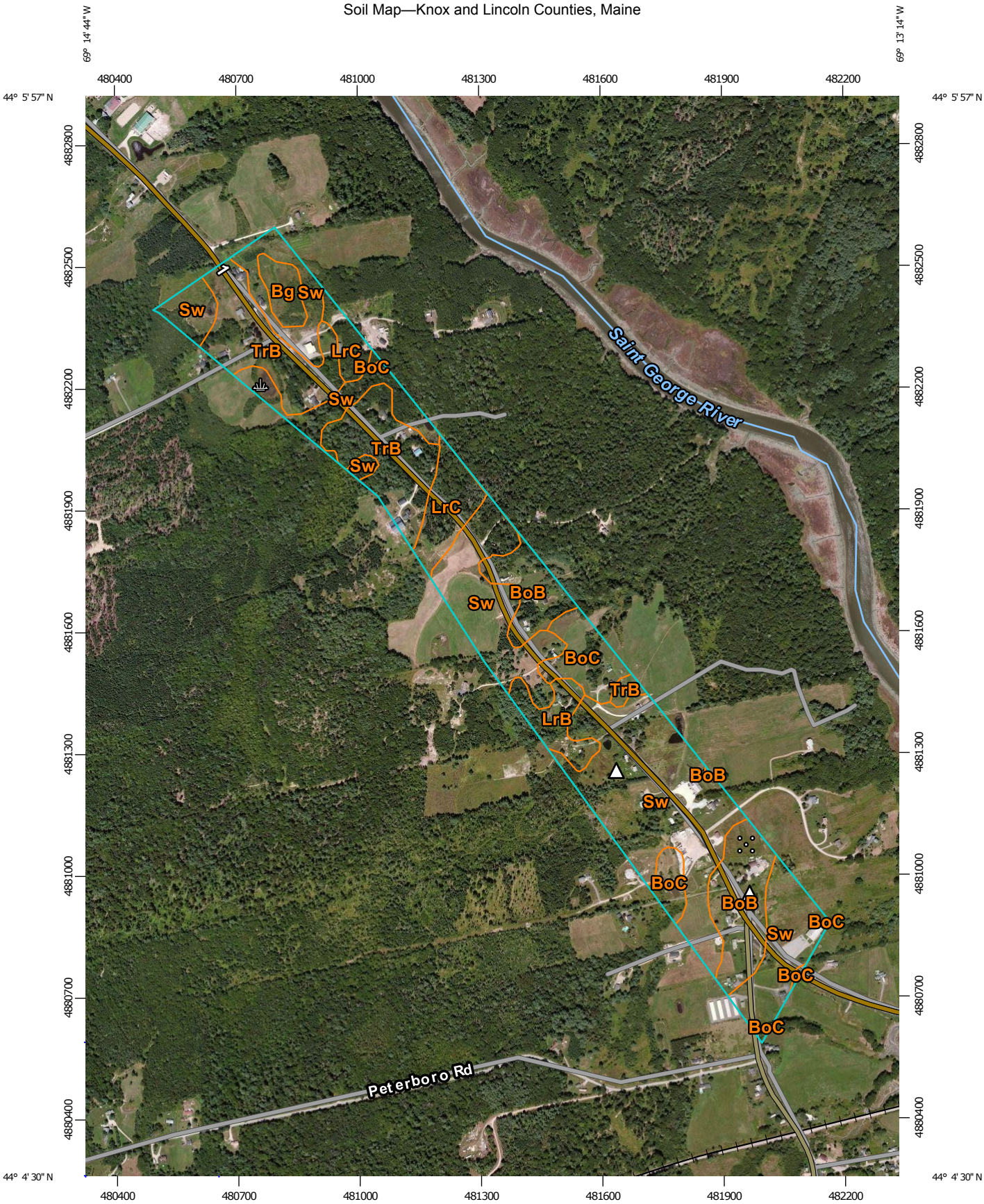
Map Scale: 1:2,690 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



Map Scale: 1:13,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

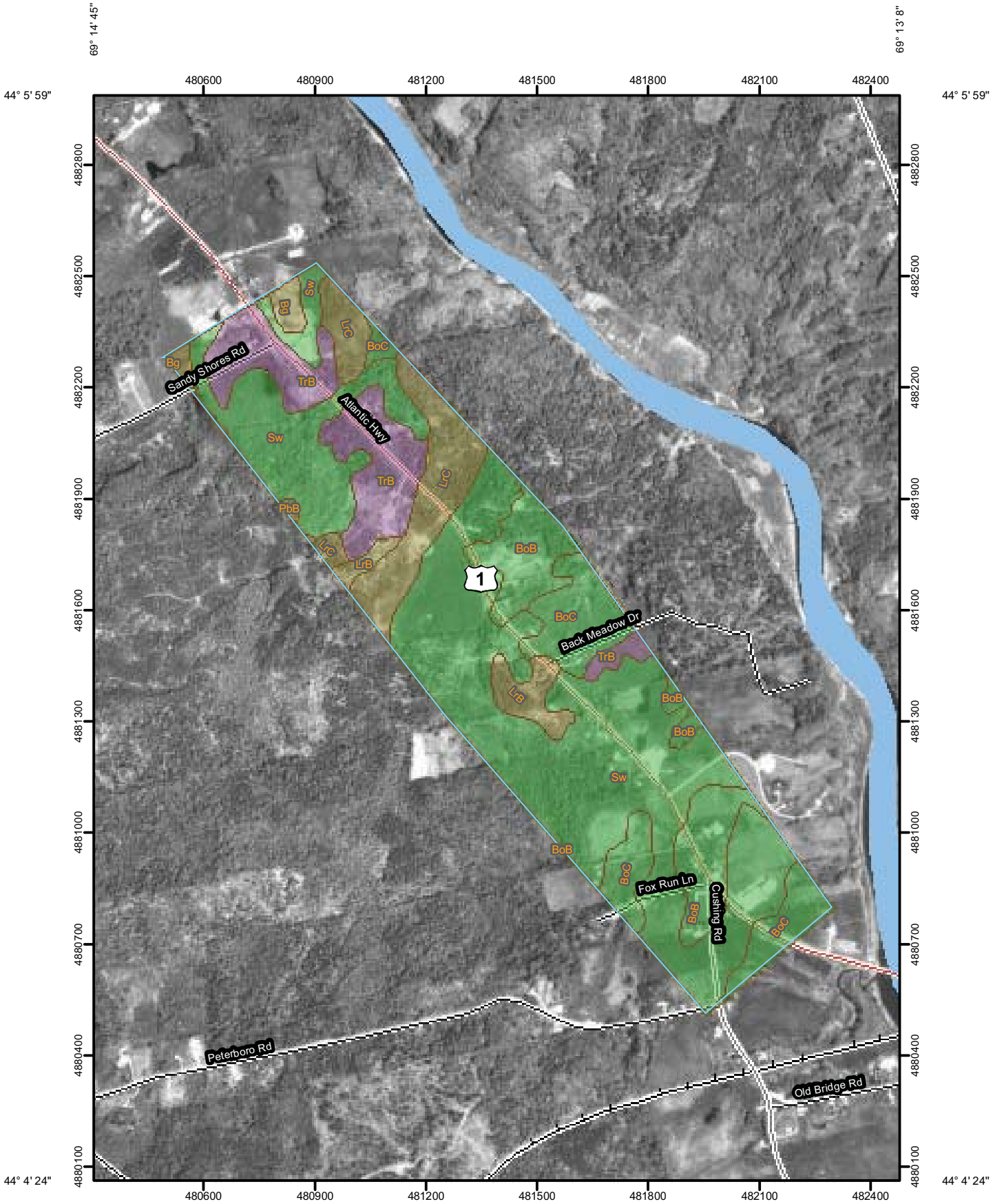
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 17, 2010—Aug 31, 2010

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.

Map Unit Legend

Knox and Lincoln Counties, Maine (ME601)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Bg	Biddeford mucky peat	3.4	2.2%
BoB	Boothbay silt loam, 3 to 8 percent slopes	18.8	12.0%
BoC	Boothbay silt loam, 8 to 15 percent slopes	10.0	6.4%
LrB	Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes	5.5	3.5%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	10.2	6.5%
Sw	Swanville silt loam	80.0	51.1%
TrB	Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes	28.8	18.4%
Totals for Area of Interest		**156.6**	**100.0%**



Map Scale: 1:14,000 if printed on A size (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 500 1,000 2,000 3,000

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: 1:14,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

Date(s) aerial images were photographed: 5/27/1996; 5/7/1996

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)

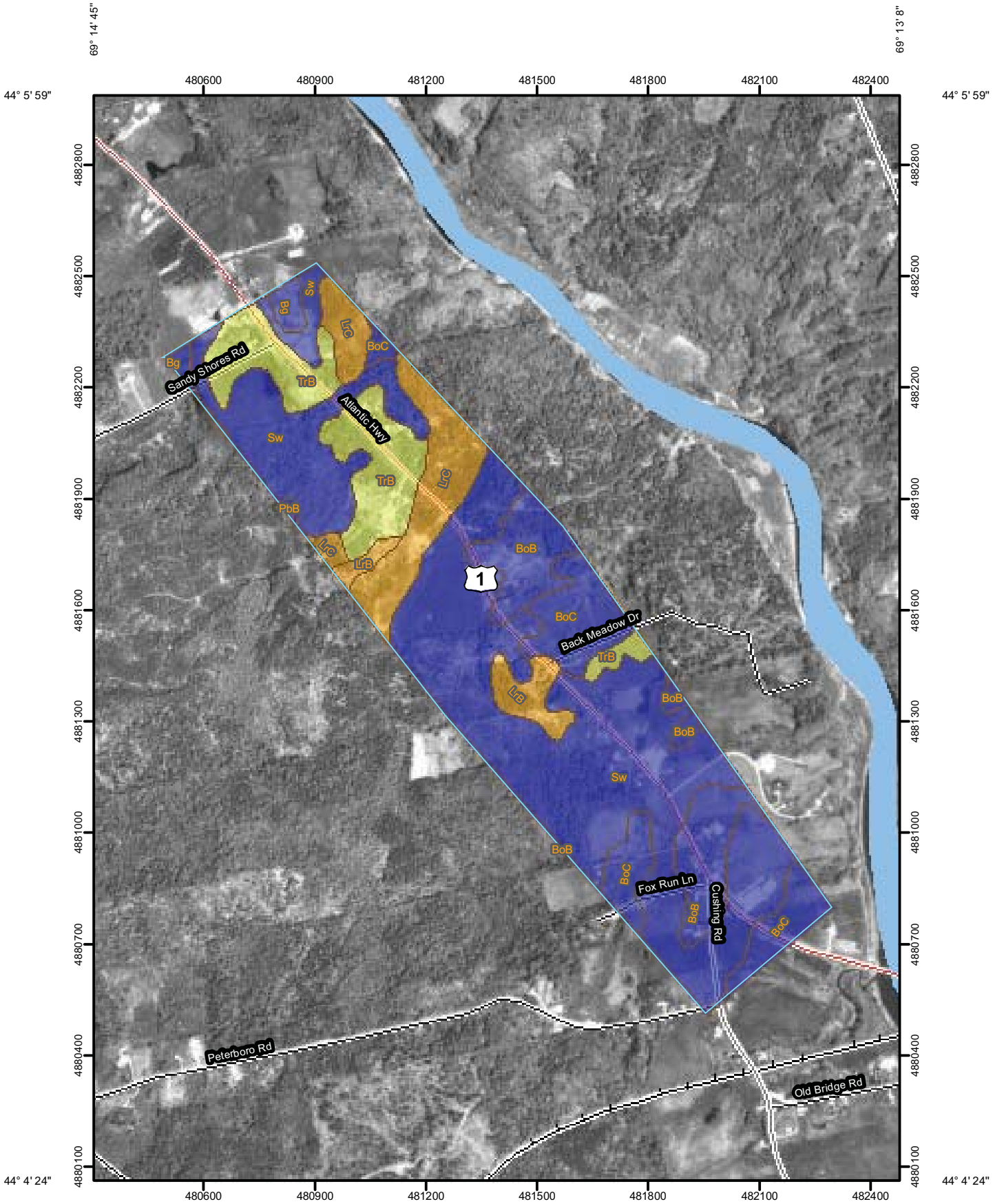
Unified Soil Classification (Surface)— Summary by Map Unit — Knox and Lincoln Counties, Maine				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Bg	Biddeford mucky peat	PT	4.0	1.4%
BoB	Boothbay silt loam, 3 to 8 percent slopes	CL	28.6	10.0%
BoC	Boothbay silt loam, 8 to 15 percent slopes	CL	30.7	10.7%
LrB	Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes	PT	8.8	3.1%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	PT	27.6	9.6%
PbB	Peru very stony fine sandy loam, 3 to 8 percent slopes	PT	0.5	0.2%
Sw	Swanville silt loam	CL	152.6	53.2%
TrB	Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes	ML	34.3	11.9%
Totals for Area of Interest			**287.0**	**100.0%**

Description

The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.



Map Scale: 1:14,000 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 500 1,000 2,000 3,000

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: 1:14,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

Date(s) aerial images were photographed: 5/27/1996; 5/7/1996

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 a Selected Soil Restrictive Layer: Lithic bedrock

Depth to a Selected Soil Restrictive Layer: Lithic bedrock— Summary by Map Unit — Knox and Lincoln Counties, Maine				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
Bg	Biddeford mucky peat	>200	4.0	1.4%
BoB	Boothbay silt loam, 3 to 8 percent slopes	>200	28.6	10.0%
BoC	Boothbay silt loam, 8 to 15 percent slopes	>200	30.7	10.7%
LrB	Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes	46	8.8	3.1%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	46	27.6	9.6%
PbB	Peru very stony fine sandy loam, 3 to 8 percent slopes	>200	0.5	0.2%
Sw	Swanville silt loam	>200	152.6	53.2%
TrB	Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes	79	34.3	11.9%
Totals for Area of Interest			**287.0**	**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 the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

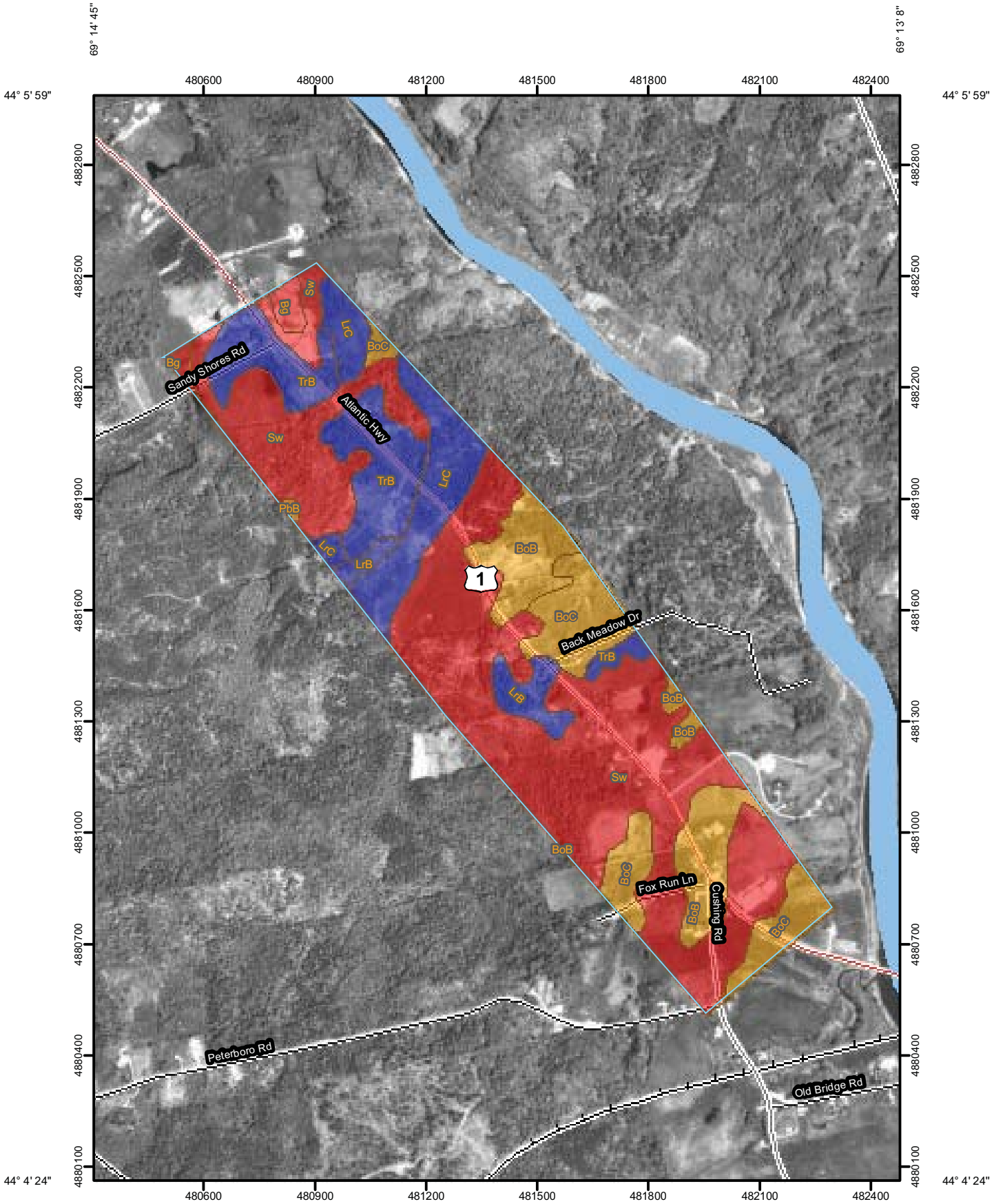
This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative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

Rating Options

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Dominant Component



Map Scale: 1:14,000 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 500 1,000 2,000 3,000

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: 1:14,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

Date(s) aerial images were photographed: 5/27/1996; 5/7/1996

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 Water Table

Depth to Water Table— Summary by Map Unit — Knox and Lincoln Counties, Maine				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
Bg	Biddeford mucky peat	0	4.0	1.4%
BoB	Boothbay silt loam, 3 to 8 percent slopes	46	28.6	10.0%
BoC	Boothbay silt loam, 8 to 15 percent slopes	46	30.7	10.7%
LrB	Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes	>200	8.8	3.1%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	>200	27.6	9.6%
PbB	Peru very stony fine sandy loam, 3 to 8 percent slopes	44	0.5	0.2%
Sw	Swanville silt loam	15	152.6	53.2%
TrB	Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes	>200	34.3	11.9%
Totals for Area of Interest			**287.0**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

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

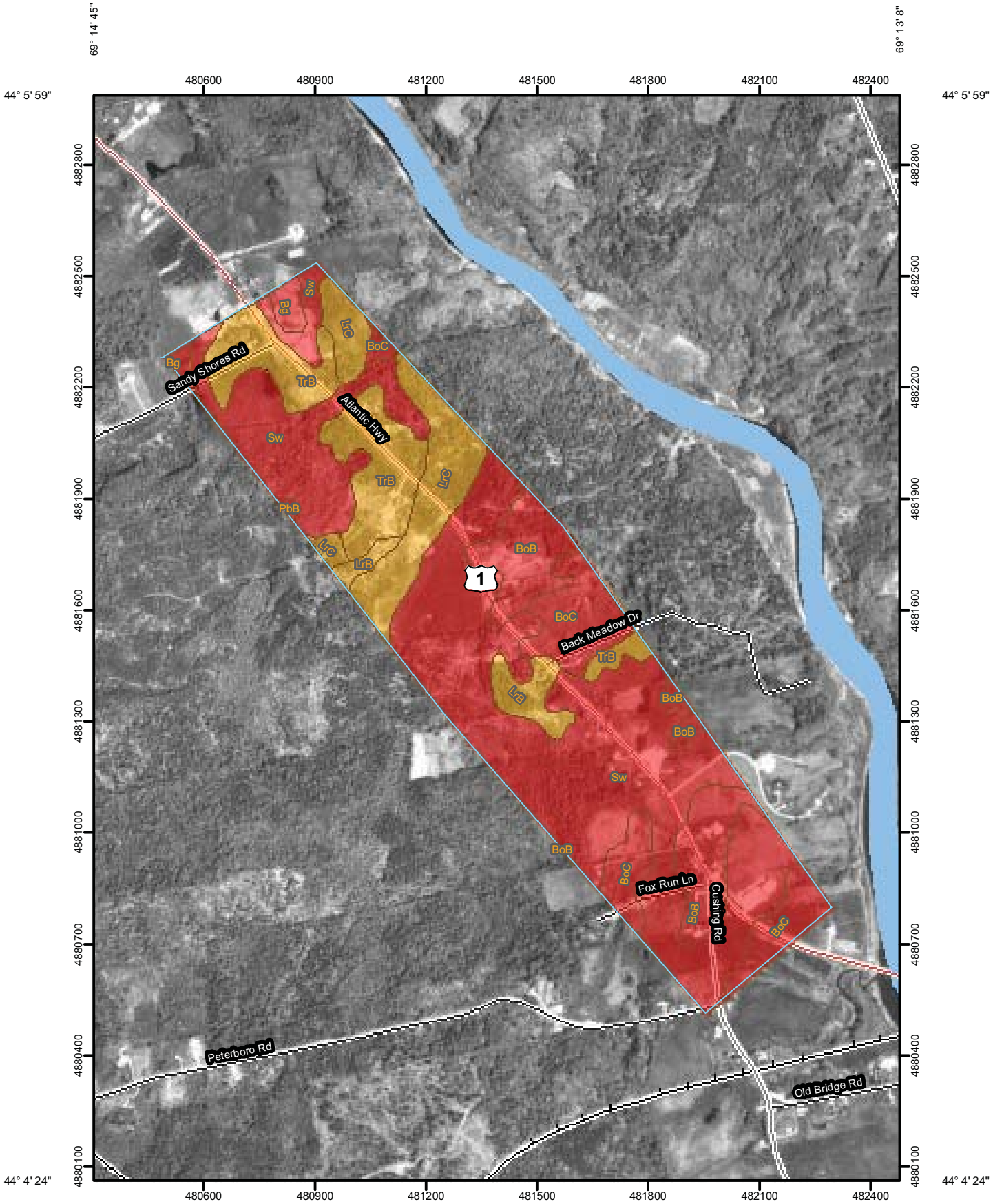
Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January



Map Scale: 1:14,000 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 500 1,000 2,000 3,000

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: 1:14,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

Date(s) aerial images were photographed: 5/27/1996; 5/7/1996

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 — Knox and Lincoln Counties, Maine				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Bg	Biddeford mucky peat	High	4.0	1.4%
BoB	Boothbay silt loam, 3 to 8 percent slopes	High	28.6	10.0%
BoC	Boothbay silt loam, 8 to 15 percent slopes	High	30.7	10.7%
LrB	Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes	Moderate	8.8	3.1%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	Moderate	27.6	9.6%
PbB	Peru very stony fine sandy loam, 3 to 8 percent slopes	High	0.5	0.2%
Sw	Swanville silt loam	High	152.6	53.2%
TrB	Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes	Moderate	34.3	11.9%
Totals for Area of Interest			**287.0**	**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*

Tie-break Rule: Higher

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic group is a group of soils having similar runoff potential under similar storm and cover conditions. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties–Knox and Lincoln Counties, Maine														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Bg—Biddeford mucky peat														
Biddeford	85	D	0-12	Mucky peat	PT	A-8	0	0	100	100	60-100	53-89	0-14	—
			12-16	Silt loam, silty clay loam, silty clay	CL, ML	A-7, A-4, A-6	0	0	100	100	90-100	85-100	25-50	8-20
			16-32	Silty clay, silty clay loam, clay	CL, MH	A-6, A-7	0	0	100	100	95-100	90-100	30-55	10-25
			32-65	Silty clay loam, silty clay, clay	CL, MH	A-6, A-7	0	0	100	100	95-100	90-100	30-55	10-25
BoB—Boothbay silt loam, 3 to 8 percent slopes														
Boothbay	85	C	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	60-90	20-40	3-15
			6-28	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	90-100	65-100	20-40	3-15
			28-65	Silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	90-100	65-100	20-40	3-15

Engineering Properties–Knox and Lincoln Counties, Maine														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
BoC—Boothbay silt loam, 8 to 15 percent slopes														
Boothbay	85	C	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	60-90	20-40	3-15
			6-28	Silty clay loam, silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	65-100	20-40	3-15
			28-65	Silt loam, silty clay loam	ML, CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	65-100	20-40	3-15

Engineering Properties–Knox and Lincoln Counties, Maine														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
LrB—Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes														
Lyman	40	C/D	0-2	Highly decomposed plant material	PT	—	0	0-14	99-100	99-100	60-100	53-89	—	—
			2-9	Fine sandy loam	ML, SM, GM	A-4, A-1, A-2	0	5-20	65-95	60-90	35-80	15-75	15-30	NP-6
			9-18	Loam, silt loam, gravelly fine sandy loam	GM, ML, SM	A-4, A-1, A-2	0	0-20	65-95	60-90	35-85	20-80	15-30	NP-4
			18-22	Bedrock	—	—	0	—	—	—	—	—	—	—
Rock outcrop	25	D	0-4	Bedrock	—	—	—	—	—	—	—	—	—	—
Tunbridge	20	C	0-1	Highly decomposed plant material	PT	—	8-42	0-14	99-100	99-100	60-100	53-89	—	—
			1-3	Fine sandy loam	ML, SM, GM	A-2, A-4	1-5	0-25	55-100	50-95	35-90	20-60	15-20	NP-2
			3-27	Sandy loam, silt loam, gravelly fine sandy loam	ML, SM	A-2, A-4, A-5	0-2	0-15	70-100	60-95	35-95	20-85	15-50	NP-6
			27-32	Sandy loam, silt loam, gravelly fine sandy loam	ML, SM	A-2, A-4	0-2	0-15	70-100	60-95	35-95	20-85	15-20	NP-2
			32-36	Bedrock	—	—	0	—	—	—	—	—	—	—

Engineering Properties–Knox and Lincoln Counties, Maine														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
LrC—Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes														
Lyman	39	C/D	0-2	Highly decomposed plant material	PT	—	0	0-14	99-100	99-100	60-100	53-89	—	—
			2-9	Fine sandy loam	GM, ML, SM	A-1, A-2, A-4	0	5-20	65-95	60-90	35-80	15-75	15-30	NP-6
			9-18	Gravelly fine sandy loam, loam, silt loam	ML, SM, GM	A-4, A-1, A-2	0	0-20	65-95	60-90	35-85	20-80	15-30	NP-4
			18-22	Bedrock	—	—	0	—	—	—	—	—	—	—
Rock outcrop	26	D	0-4	Bedrock	—	—	—	—	—	—	—	—	—	—
Tunbridge	20	C	0-1	Highly decomposed plant material	PT	—	8-42	0-14	99-100	99-100	60-100	53-89	—	—
			1-3	Fine sandy loam	GM, ML, SM	A-2, A-4	1-5	0-25	55-100	50-95	35-90	20-60	15-20	NP-2
			3-27	Sandy loam, silt loam, gravelly fine sandy loam	ML, SM	A-4, A-5, A-2	0-2	0-15	70-100	60-95	35-95	20-85	15-50	NP-6
			27-32	Sandy loam, silt loam, gravelly fine sandy loam	ML, SM	A-2, A-4	0-2	0-15	70-100	60-95	35-95	20-85	15-20	NP-2
			32-36	Bedrock	—	—	0	—	—	—	—	—	—	—

Engineering Properties–Knox and Lincoln Counties, Maine														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*Pct*	*Pct*					*Pct*	
Sw—Swanville silt loam														
Swanville	85	C	0-9	Silt loam	CL, CL-ML, ML	A-6, A-4	0	0	95-100	95-100	85-100	60-90	20-40	3-15
			9-26	Silt loam, silty clay loam, very fine sandy loam	CL-ML, ML, CL	A-6, A-4	0	0	95-100	95-100	85-100	60-100	20-40	3-15
			26-65	Silt loam, silty clay loam	CL-ML, ML, CL	A-4, A-6	0	0	95-100	95-100	90-100	65-100	20-40	3-15
TrB—Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes														
Tunbridge	55	C	0-8	Fine sandy loam	ML, SM	A-2, A-4	0-1	0-5	85-100	80-95	55-95	30-85	15-20	NP-2
			8-26	Gravelly fine sandy loam, sandy loam, silt loam	ML, SM	A-2, A-4, A-5	0-2	0-15	70-100	60-95	35-95	20-85	15-50	NP-6
			26-31	Silt loam, gravelly fine sandy loam, sandy loam	SM, ML	A-2, A-4	0-2	0-15	70-100	60-95	35-95	20-85	15-20	NP-2
			31-35	Bedrock	—	—	0	—	—	—	—	—	—	—
Lyman	30	C/D	0-8	Fine sandy loam	ML, SM	A-1, A-2, A-4	0	0-15	80-95	70-90	40-85	20-80	15-35	NP-6
			8-16	Silt loam, gravelly fine sandy loam, loam	GM, ML, SM	A-4, A-1, A-2	0	0-20	65-95	60-90	35-85	20-80	15-30	NP-4
			16-20	Bedrock	—	—	0	—	—	—	—	—	—	—

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

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. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Report—Soil Features

Soil Features–Knox and Lincoln Counties, Maine									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
Bg—Biddeford mucky peat									
Biddeford		—	—		0	—	High	High	Moderate
BoB—Boothbay silt loam, 3 to 8 percent slopes									
Boothbay		—	—		0	—	High	Moderate	Moderate
BoC—Boothbay silt loam, 8 to 15 percent slopes									
Boothbay		—	—		0	—	High	Moderate	Moderate
LrB—Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes									
Lyman	Lithic bedrock	10-20	—	Indurated	0	—	Moderate	Low	High
Rock outcrop	Lithic bedrock	0	—		0	—	None		
Tunbridge	Lithic bedrock	20-40	—	Indurated	0	—	Moderate	High	High

Soil Features–Knox and Lincoln Counties, Maine									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
LrC—Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes									
Lyman	Lithic bedrock	10-20	—	Indurated	0	—	Moderate	Low	High
Rock outcrop	Lithic bedrock	0	—		0	—	None		
Tunbridge	Lithic bedrock	20-40	—	Indurated	0	—	Moderate	High	High
Sw—Swanville silt loam									
Swanville		—	—		0	—	High	High	Low
TrB—Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes									
Tunbridge	Lithic bedrock	20-40	—	Indurated	0	—	Moderate	High	High
Lyman	Lithic bedrock	10-20	—	Indurated	0	—	Moderate	Low	High

Data Source Information

Soil Survey Area: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Report—Water Features

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

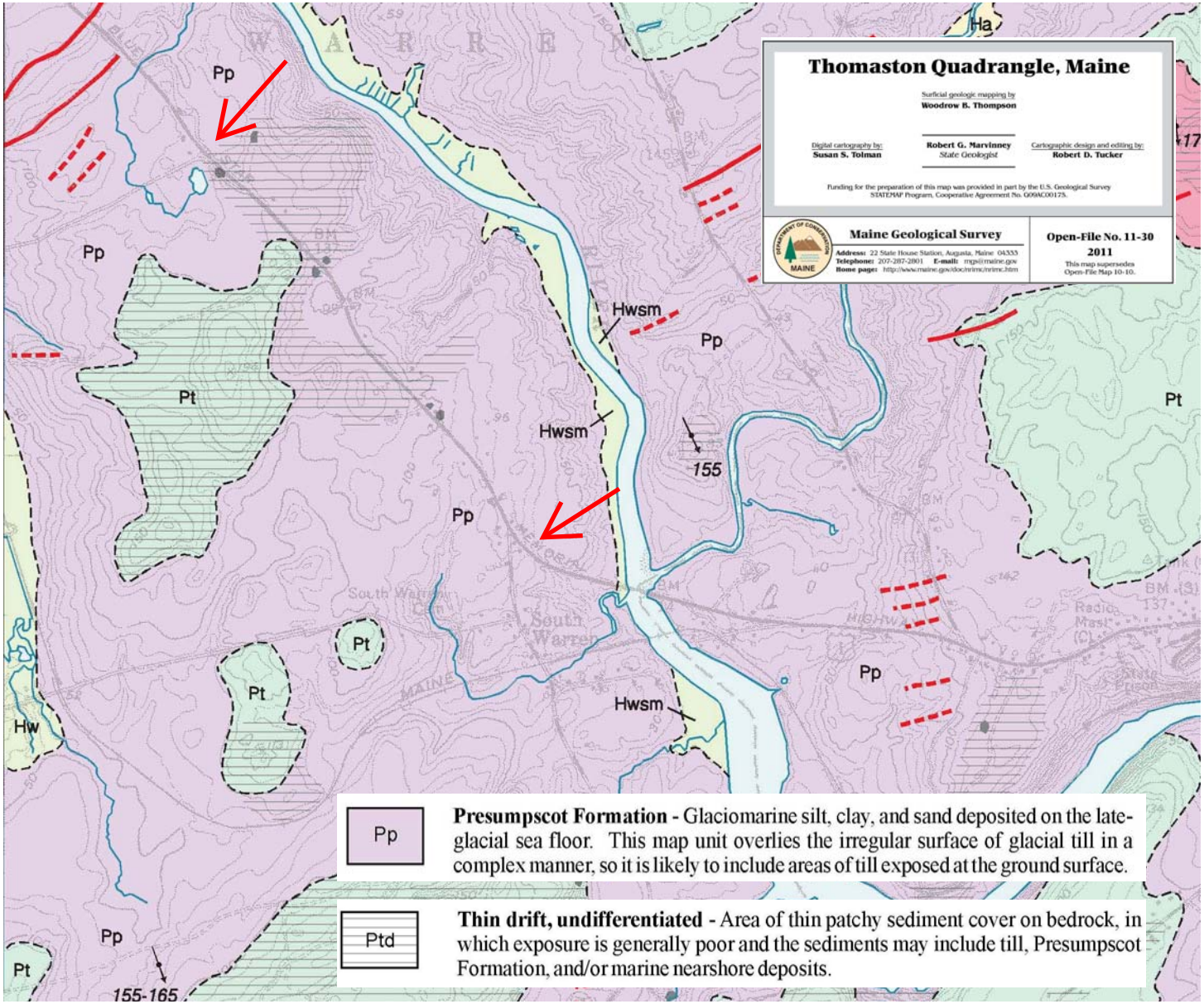
Water Features–Knox and Lincoln Counties, Maine										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
Bg—Biddeford mucky peat										
Biddeford	D	—	January	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			February	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			March	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			April	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			May	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			June	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			July	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			October	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			November	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
			December	0.0	>6.0	0.0-1.0	Long	Frequent	—	None
BoB—Boothbay silt loam, 3 to 8 percent slopes										
Boothbay	C	—	January	1.0-2.5	1.5-3.0	—	—	None	—	None
			February	1.0-2.5	1.5-3.0	—	—	None	—	None
			March	1.0-2.5	1.5-3.0	—	—	None	—	None
			April	1.0-2.5	1.5-3.0	—	—	None	—	None
			May	1.0-2.5	1.5-3.0	—	—	None	—	None
			November	1.0-2.5	1.5-3.0	—	—	None	—	None
			December	1.0-2.5	1.5-3.0	—	—	None	—	None

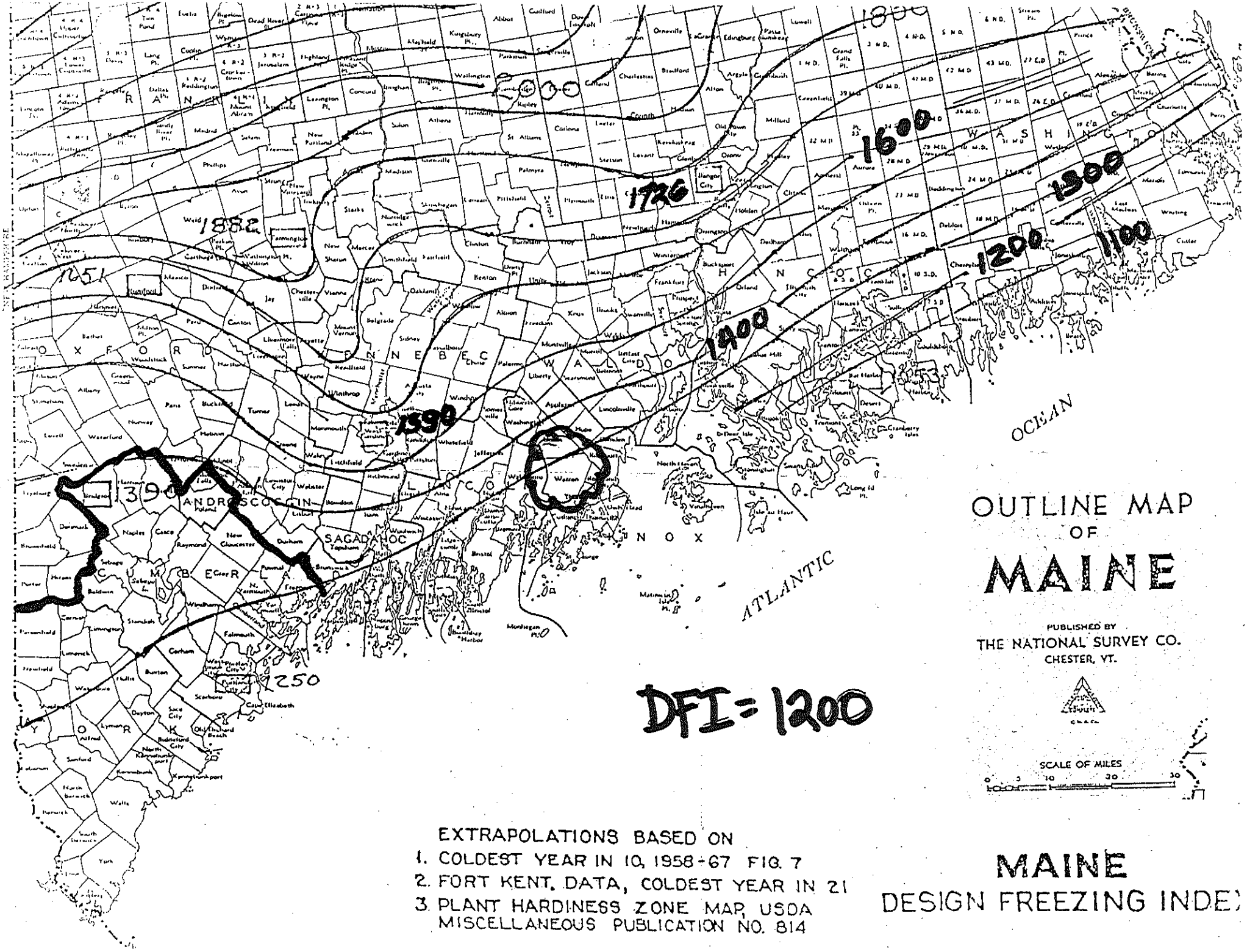
Water Features–Knox and Lincoln Counties, Maine										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
BoC—Boothbay silt loam, 8 to 15 percent slopes										
Boothbay	C	—	January	1.0-2.5	1.5-3.0	—	—	None	—	None
			February	1.0-2.5	1.5-3.0	—	—	None	—	None
			March	1.0-2.5	1.5-3.0	—	—	None	—	None
			April	1.0-2.5	1.5-3.0	—	—	None	—	None
			May	1.0-2.5	1.5-3.0	—	—	None	—	None
			November	1.0-2.5	1.5-3.0	—	—	None	—	None
			December	1.0-2.5	1.5-3.0	—	—	None	—	None
LrB—Lyman-Rock outcrop-Tunbridge complex, 3 to 8 percent slopes										
Lyman	C/D	—	Jan-Dec	—	—	—	—	None	—	None
Rock outcrop	D	—	Jan-Dec	—	—	—	—	None	—	None
Tunbridge	C	—	Jan-Dec	—	—	—	—	None	—	None
LrC—Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes										
Lyman	C/D	—	Jan-Dec	—	—	—	—	None	—	None
Rock outcrop	D	—	Jan-Dec	—	—	—	—	None	—	None
Tunbridge	C	—	Jan-Dec	—	—	—	—	None	—	None

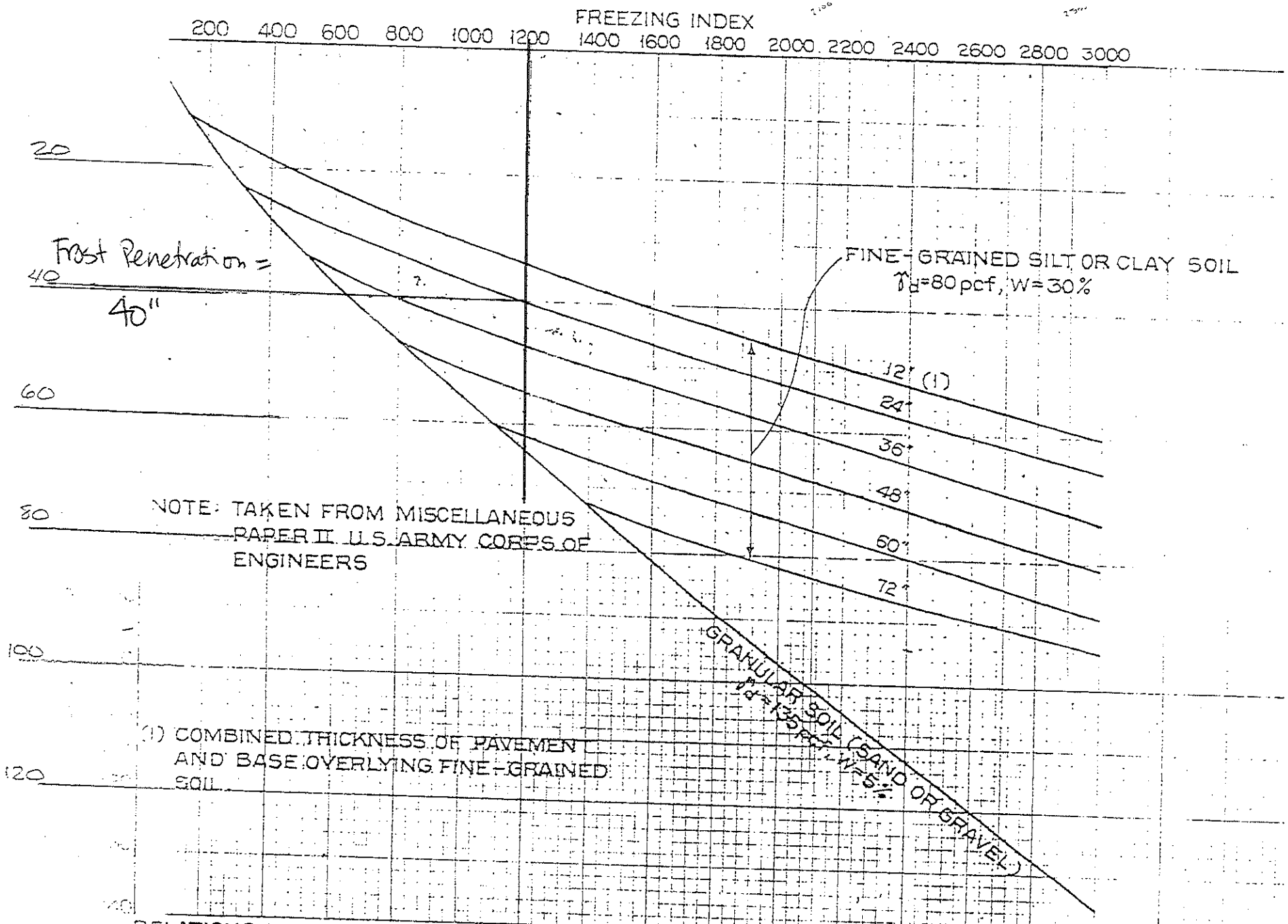
Water Features–Knox and Lincoln Counties, Maine										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
Sw—Swanville silt loam										
Swanville	C	—	January	0.0-1.0	0.5-1.5	—	—	None	—	None
			February	0.0-1.0	0.5-1.5	—	—	None	—	None
			March	0.0-1.0	0.5-1.5	—	—	None	—	None
			April	0.0-1.0	0.5-1.5	—	—	None	—	None
			May	0.0-1.0	0.5-1.5	—	—	None	—	None
			June	0.0-1.0	0.5-1.5	—	—	None	—	None
			October	0.0-1.0	0.5-1.5	—	—	None	—	None
			November	0.0-1.0	0.5-1.5	—	—	None	—	None
			December	0.0-1.0	0.5-1.5	—	—	None	—	None
TrB—Tunbridge-Lyman fine sandy loams, 3 to 8 percent slopes										
Tunbridge	C	—	Jan-Dec	—	—	—	—	None	—	None
Lyman	C/D	—	Jan-Dec	—	—	—	—	None	—	None

Data Source Information

Soil Survey Area: Knox and Lincoln Counties, Maine
Survey Area Data: Version 12, Jul 27, 2009


Thomaston Quadrangle, Maine
Surficial geologic mapping by
Woodrow B. Thompson
Digital cartography by:
Susan S. Tolman
Robert G. Marvinney
State Geologist
Cartographic design and editing by:
Robert D. Tucker
Funding for the preparation of this map was provided in part by the U.S. Geological Survey STATEMAP Program, Cooperative Agreement No. G09AC00125.
Maine Geological Survey
Address: 22 State House Station, Augusta, Maine 04333
Telephone: 207-287-2801 E-mail: mgs@maine.gov
Home page: http://www.maine.gov/doc/nrimc/mrimc.htm
Open-File No. 11-30
2011
This map supersedes Open-File Map 10-10.
Pp
Pt
Hwsm
Hw
Ha
155
155-165
South Warren
Radio Mast
Pp
Presumpscot Formation - Glaciomarine silt, clay, and sand deposited on the late-glacial sea floor. This map unit overlies the irregular surface of glacial till in a complex manner, so it is likely to include areas of till exposed at the ground surface.
Ptd
Thin drift, undifferentiated - Area of thin patchy sediment cover on bedrock, in which exposure is generally poor and the sediments may include till, Presumpscot Formation, and/or marine nearshore deposits.

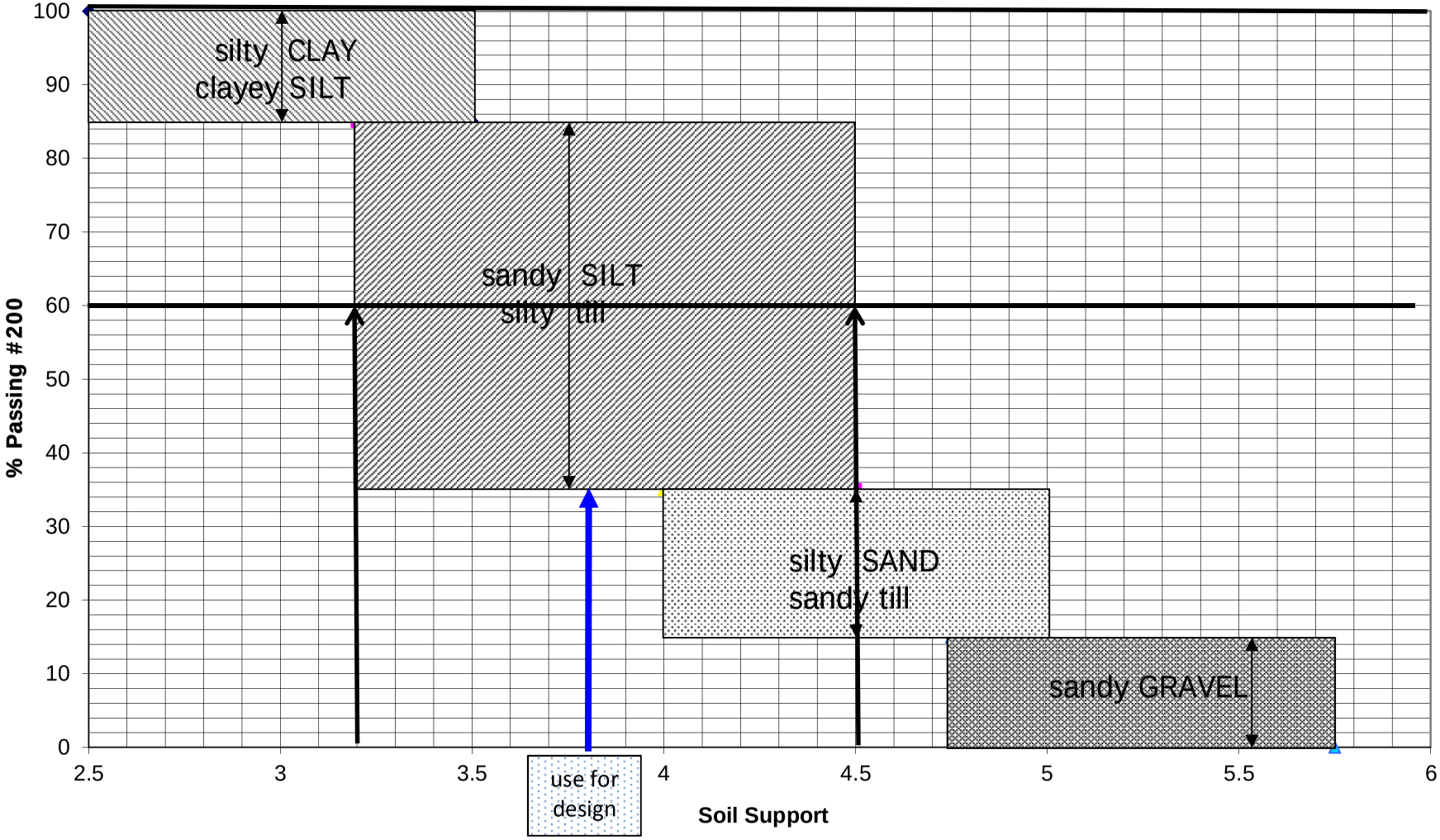

OUTLINE MAP
OF
MAINE
PUBLISHED BY
THE NATIONAL SURVEY CO.
CHESTER, VT.
SCALE OF MILES
0 5 10 20 30
ATLANTIC
OCEAN
DFI = 1200
1800
1600
1300
1200
1100
1400
1590
1726
1888
1651
1250
EXTRAPOLATIONS BASED ON
1. COLDEST YEAR IN 10, 1958-67 FIG. 7
2. FORT KENT, DATA, COLDEST YEAR IN 21
3. PLANT HARDINESS ZONE MAP, USDA
MISCELLANEOUS PUBLICATION NO. 814
MAINE
DESIGN FREEZING INDEX



RELATIONSHIP BETWEEN FREEZING INDEX AND FREEZING TEMPERATURE PENETRATION FOR GRANULAR SOIL UNDERLAIN BY FINE-GRAINED SOIL

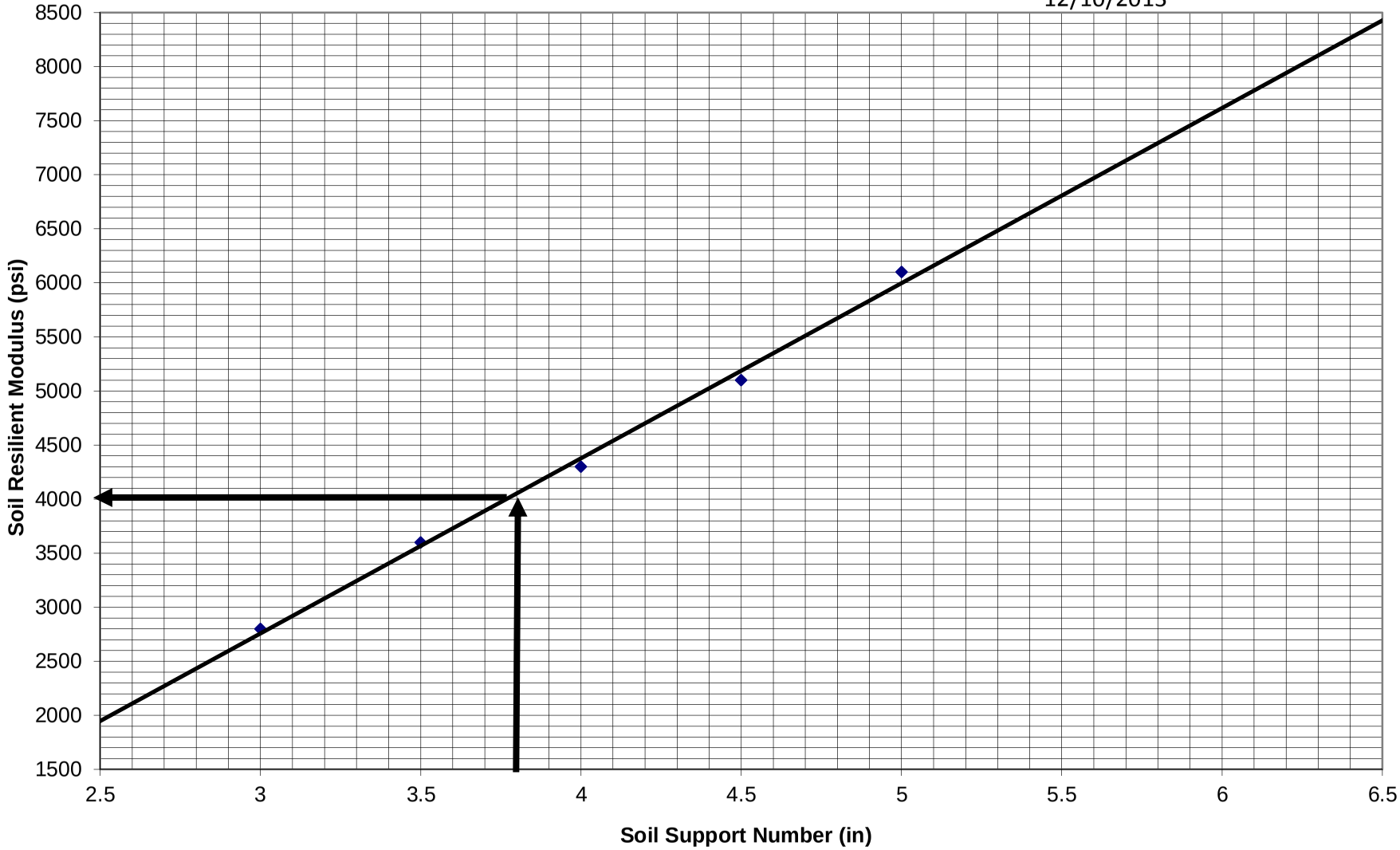
Guidelines for Selection of Soil Support Values for Pavement Design

Warren, Route 1
WIN 17889.00
12/10/2013



Soil Resilient Modulus for DARWin

Warren, Route 1
WIN 17889.00
12/10/2013



30 November 2012

SPECIAL PROVISION
SECTION 203
SHATTER ROCK SUBGRADE

DESCRIPTION

This work shall consist of drilling and blasting rock subgrade in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the plans and Special Details, or as directed by the Resident. Exploratory drilling may be needed to delineate the rock surface before blasting begins, and will be as directed by the Resident.

The area of blasted rock subgrade shall extend sufficiently beyond the beginning and end of cut areas to ensure the shattering of all rock to a depth of 4 feet below subgrade elevation to eliminate water pockets.

After detonation, any rock that protrudes above the subgrade elevation shall be removed. When directed by the Resident, the Contractor shall excavate a trench across the blasted rock to determine if the rock is broken and rearranged to a depth of 4 feet below subgrade. Afterwards, the trench shall be backfilled with the rock removed.

METHOD OF MEASUREMENT

The quantity of Drilling and Blasting of Solid Rock Subgrade to be measured for payment will be the number of square yards of subgrade plan area drilled and detonated in accordance with this Section, measured at subgrade level.

The number of cubic yards of excavation required by the Resident to inspect the depth of shattered and rearranged rock, computed at a maximum width of 30 inches will be measured for payment as Structural Earth Excavation – Drainage and Minor Structures Below Grade.

When Structural Rock Excavation – Drainage and Minor Structures, and Drilling and Blasting of Solid Rock Subgrade occur at the same location, measurement and payment for Structural Rock Excavation - Drainage and Minor Structures will be made for the required trench. This area will not be included in the measurement and payment for Drilling and Blasting of Solid Rock Subgrade.

BASIS OF PAYMENT

The accepted quantities as measured will be paid for at the Contract unit price per square yard for the specified Contract items. Payment will be full compensation for performing the work specified including exploratory drilling and the removal of blasted rock that may swell above subgrade and its disposition on the project as directed by the Resident.

Excavation and backfill required to inspect the depth of broken rock below subgrade will be paid for at the Contract unit price per cubic yard for Structural Rock Excavation – Drainage and Minor Structures.

Pay Item		Pay Unit
203.213	Shatter Solid Rock Subgrade	square yard

SPECIAL PROVISIONS
SECTION 304
AGGREGATE BASE AND SUBBASE COURSE
(Recycled Concrete Aggregate)

Amend Section 304.02 Aggregate by adding the following:

Aggregate Subbase Course - Gravel containing Recycled Concrete Aggregate (RCA) meeting the requirements of Aggregate Subbase Course Gravel, Type D of Section 703.06 may be used in the lower lifts of the total aggregate subbase layer. The maximum total thickness of the Aggregate Subbase Course Gravel containing RCA is 12 in [300 mm].

Aggregate Subbase Course – Gravel, Type D, may contain up to 50 percent by weight Recycled Concrete Aggregate (RCA). When RCA is used, the portion of the resulting blend of gravel and RCA retained on a ½" square mesh sieve shall contain a total of no more than 5 percent by weight of other recycled materials such as brick, concrete masonry block, or asphalt pavement as determined by visual inspection. The final blend of gravel and RCA shall meet all the requirements of Section 703.06 for Type D aggregate.

RCA shall be uniformly blended and substantially free of wood (0.1 percent by weight maximum), metal (0.1 percent by weight maximum), and plaster and gypsum board (0.1 percent by weight maximum). RCA shall also be free of all substances that fall under the category of solid waste or hazardous materials.

304.021 Quality Control for Recycled Concrete Aggregate (RCA) used in Type D aggregate for subbase gravel. The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The Contractor shall not begin placing aggregate until the Department approves the QCP in writing.

The QCP shall address any items that affect the quality of the Type D subbase material including, but not limited to, the following:

a. How the Contractor will proportion the aggregate to ensure that the final blend will contain no more than 50% by weight of RCA and no more than 5% by weight of other recycled materials such as brick, concrete masonry block or asphalt pavement as determined by visual inspection, and no more that 0.1 % by weight each of wood, metal, and plaster and gypsum board.
b. Stockpile management, particularly construction to avoid segregation and cross contamination, especially by any substances that fall under the category of solid waste or hazardous materials.

c. Placement operations, particularly how segregation of the in place material will be minimized.
d. Gradation Quality Control during construction of the stockpile, particularly the quality control methods to ensure passing gradation of the composite blend of material. At a minimum sieve analysis shall be performed once for every 500 CY of production on both the unblended aggregate and the blended material.
e. Examples of quality Control forms during manufacture of the material.
f. Procedure for ensuring that the material is not placed such that any runoff or percolated water will come in contact with any metallic culverts or other structures.

The QCP shall include names of personnel responsible for performing any testing of the material and those responsible for overseeing the manufacturing process. The Contractor shall make all test results available to the Department onsite. The Contractor may utilize innovative equipment or techniques not addressed by the Contract documents for production of the material subject to approval by the Department.

SECTION 203
EXCAVATION AND EMBANKMENT

203.01 Description Under b. Rock Excavation; add the following sentence: "The use of perchlorate is not allowed in blasting operations."

Delete the entire Section 203.041 and replace with the following:
"203.041 Salvage of Existing Hot Mix Asphalt Pavement All existing hot mix asphalt pavement designated to be removed under this contract must be salvaged for utilization. Existing hot mix asphalt pavement material shall not be deposited in any waste area or be placed below subgrade in any embankment.

Methods of utilization may be any of the following:

1. Used as a replacement for untreated aggregate surface course on entrances provided the material contains no particles greater than 50 mm [2 in] in any dimension. Payment will be made under Pay Item 411.09, Untreated Aggregate Surface Course or 411.10, Untreated Aggregate Surface Course, Truck Measure. Material shall be placed, shaped, compacted and stabilized as directed by the Resident.

2. Used as the top 3" of gravel. Recycled Asphalt Pavement (RAP) shall be process to 1½" minus and blending will not be allowed. When this method is utilized, a surcharge will not be required

3. Stockpiled at commercial or approved sites for commercial or MaineDOT use.

4. Other approved methods proposed by the Contractor, and approved by the Resident which will assure proper use of the existing hot mix asphalt pavement.

The cost of salvaging hot mix asphalt material will be included for payment under the applicable pay item, with no additional allowances made, which will be full compensation for removing, temporarily stockpiling, and rehandling, if necessary, and utilizing the material in entrances or other approved uses, or stockpiling at an approved site as described above. The material will also be measured and paid for under the applicable Pay Item if it is reused for aggregate in entrances, or other approved uses."

SECTION 502
STRUCTURAL CONCRETE

502.05 Composition and Proportioning; TABLE #1; NOTE #2; third sentence; Change "…alcohol based saline sealer…" to "alcohol based silane sealer…". Add NOTE #6 to Class S Concrete.

502.0502 Quality Assurance Method A - Rejection by Resident Change the first sentence to read: "For an individual sublot with test results failing to meet the criteria in Table #1, or if the calculated pay factor for Air Content is less than 0.80……"