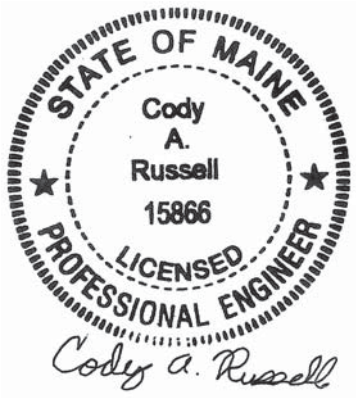
MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE

GEOTECHNICAL DESIGN REPORT

For the Reconstruction of:

ROUTE 1
EAST MACHIAS, MAINE

Prepared by:
Cody Russell, P.E.
Geotechnical Engineer



Reviewed by:
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Washington County
WIN 19198.00

Soils Report 2020-45
Federal No. AC-STP-1919(800)X

November 25, 2020

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1.0 INTRODUCTION

The purpose of this Geotechnical Design Report is to present subsurface information and make geotechnical design and construction recommendations for the reconstruction and rehabilitation of an approximately 1.80-mile portion of Route 1 in East Machias, shown on Sheet 1 – Location Map. The project is needed to make drainage and safety improvements. The scope includes full depth reconstruction for approximately half of the segment, rehabilitation for the remaining portion, drainage improvements, and one (1) large culvert replacement. Route 1 is a Highway Corridor Priority 1 road.

2.0 GEOLOGIC SETTING

According to the Surficial Geology Maps entitled Reconnaissance Surficial Geology of the Machias Bay Quadrangle, Maine, Open File No. 74-5 (1974), Reconnaissance Surficial Geology of the Machias Quadrangle, Maine, Open File 74-4 (1974), and Reconnaissance Surficial Geology of the Gardner Lake Quadrangle, Maine, Open File 82-4 (1982) published by the Maine Geological Survey (MGS), the surficial soils are along the project consist primarily of Presumpscot Formation silty clays with some areas of Till consisting of a sand, silt, clay, and stones. Areas with shallow or exposed bedrock are also present along the project.

According to the MGS map titled Bedrock Geologic Map of Maine (1985) the bedrock along the project is mafic to felsic volcanic rock of the Dennys Formation.

3.0 SUBSURFACE INVESTIGATION

Subsurface conditions at the site were explored by drilling a total of eighteen (18) test borings and 102 probes.

Borings HB-EAMA-101 through HB-EAMA-109 were drilled on September 27, 2012. These borings were drilled to depths ranging from approximately 3.8 to 5.0 feet below ground surface (bgs) using solid stem auger drilling techniques. Boring SB-ESMA-101 and 102 unnamed probes were drilled between August 20 and August 21, 2014. Boring SB-ESMA-101 was drilled to a depth of approximately 27.0 feet bgs using solid stem auger and cased wash boring drilling techniques. The probes were drilled to depths ranging from approximately 1.9 to 9.3 feet bgs using solid stem auger drilling techniques. Borings HB-EAMA-201 through HB-EAMA-208 were drilled on June 19 and 22, 2017. The 200-series borings were drilled to depths ranging from approximately 2.1 to 4.5 feet bgs using solid stem auger drilling techniques. Boring and probe locations are shown on Sheets 2 through 16 Boring Location Plans. Boring Logs and probe information are presented in Appendix A.

Soil samples were obtained off the auger flights in select 100-series and 200-series borings. Soil samples were obtained in boring SB-ESMA-101 at standard 5-foot intervals using Standard Penetration Testing (SPT). The MaineDOT drill rig is equipped with an automatic hammer to drive the split spoon. The MaineDOT calibrated automatic hammer delivers approximately 45

percent more energy during driving than the standard rope and cathead system. All N-values discussed in this report are corrected values (N_{60}) computed by applying an average energy transfer factor of 0.867 to the raw field N-values. Several refusal surfaces were encountered along the project. The exact nature of the refusal surfaces was not determined. No bedrock cores were taken. No soil samples were obtained in the probes.

Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are shown in the Boring Logs in Appendix A. The MaineDOT Geotechnical Team member selected the boring locations, drilling methods, designated type and depth of sampling, reviewed field logs for accuracy and identified field and laboratory testing requirements. A North East Transportation Training and Certification Program (NETTCP) certified subsurface inspector logged the subsurface conditions encountered. The boring and probes were located in the field by taping to site features after completion of the drilling program.

4.0 LABORATORY TESTING

A laboratory testing program was conducted on select soil samples obtained in the test borings to assist in soil classification, evaluation of engineering properties of the soils and geologic assessment of the project site. Laboratory testing consisted of eighteen (18) standard grain size analyses and natural water content and one (1) Atterberg Limits test. The results of the laboratory tests are in Appendix B – Laboratory Test Results. Laboratory test results are also summarized on the boring logs in Appendix A.

5.0 SUBSURFACE CONDITIONS

Subsurface conditions encountered at the test borings and probes along the project generally consisted of pavement and fill soils overlying native sand and silt. The boring locations are shown on Sheets 2 through 16 – Boring Location Plans. The boring logs are in Appendix A – Boring Logs.

5.1 Pavement and Fill Soils

The subsurface investigations found areas of pavement and roadway fill soils along the project. Where present, the pavement thickness ranged from approximately 4 to 9 inches. In some areas 2 to 5 inches of unbound pavement was encountered underlying the intact pavement. The fill soils consisted of:

- Brown, damp to moist, fine to coarse sand, some gravel, trace to some silt, occasional cobble.
- Brown, damp, gravelly fine to coarse sand, trace to little silt, occasional cobble.
- Brown, damp, fine to coarse sandy gravel, trace to some silt, occasional cobble.
- Black brown, moist, gravel, some fine to coarse sand, trace silt.

The thickness of the fill ranged from approximately 0.5 feet to 8.5 feet. One (1) SPT N_{60}-value obtained the in the fill was 29 blows per foot (bpf) indicating that the fill sand is medium dense in consistency.

Water contents from twelve (12) samples obtained within the fill layers range from approximately 1.3% to 6.5%. Grain size analyses conducted on samples of the fill resulted in the soil being classified as an A-1-a A-1-b, or A-2-4 under the AASHTO Soil Classification System and an SM, SW-SM, or GW-GM under the Unified Classification System.

5.2 Native Soils

Along the length of the project the fill is underlain by interbedded layers of native soil consisting of sand, sandy gravel, and silt.

5.2.1 Sand, Silty Sand, and Sandy Gravel – The layers of native granular (cohesionless) soils consist of:

- Brown and light brown, moist to wet, fine to coarse sand, trace to some silt, little to some gravel.
- Light brown and grey, wet, silty fine to coarse sand, trace gravel, trace wood.
- Brown, wet, fine to coarse sandy gravel, some silt.

The thickness of the sand, silty sand, and gravelly sand layers ranged from approximately 1.3 feet to 4.0 feet, but these layers were not fully penetrated in all the explorations. One (1) SPT N_{60}-value obtained the in the silty sand was 6 bpf indicating that the silty sand is loose in consistency.

Water contents from four (4) samples obtained within the native granular (cohesionless) soil layers range from approximately 9.6% to 29.9%. Grain size analyses conducted on four (4) samples of the sand and silty sand resulted in the soil being classified as an A-1-b, A-2-4, or A-4 under the AASHTO Soil Classification System and an SM or SW-SM under the Unified Classification System.

5.2.1 Silt and Sandy Silt – The layers of native cohesive soils consist of:

- Brown and light brown, moist to wet, silt, trace to little fine to coarse sand, trace gravel.
- Light brown, dark brown, and grey, damp to wet, fine to coarse sandy silt, trace to some gravel, trace to some clay, trace to some organics, trace wood.

The thickness of the silt and sandy silt layers ranged from approximately 1.3 feet to 9.0 feet, but these layers were not fully penetrated in all the explorations. Three (3) SPT N_{60}-values obtained the in the sandy silt ranged from 1 to 6 bpf indicating that the sandy silt is very soft to medium stiff in consistency.

Water contents from two (2) samples obtained within the silt and sandy silt range from approximately 16.1% to 22.5%. Grain size analyses conducted on two (2) samples of the silt and

sandy silt resulted in the soil being classified as an A-4 or A-6 under the AASHTO Soil Classification System and CL under the Unified Classification System.

The following table summarizes the results of Atterberg Limits tests done on one (1) sample of the native silt:

Boring No. and Sample No.	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index
HB-EAMA-109 S10	22.5	33	21	12	0.13

Interpretation of these results indicate that the silt has medium plasticity. The silt is overconsolidated meaning it has experienced higher stresses in the past.

5.4 Shallow Refusal Surfaces

Shallow refusal surfaces were encountered at varying depths along the project. Refusal of the drilling tools varied from a depth of approximately 1.9 feet to 9.3 feet bgs. No bedrock cores were taken. The exact nature of the refusal surfaces was not determined in the explorations. The table below summarizes the refusal surfaces encountered.

Approximate Station	Approximate Depth to Refusal (feet bgs)
9+00 to 10+50	4.4 to 7.7
18+00 to 19+50	3.6 to 7.5
33+50	9.3
52+50 to 57+00	1.9 to 7.1
61+50 to 63+00	2.9 to 6.2
70+00	3.8
74+00	3.6 to 4.1
86+50 to 91+00	2.1 to 6.3

5.5 Groundwater

Groundwater levels were observed in one (1) boring and two (2) probes. The measured groundwater levels in the explorations where groundwater was observed ranged from approximately 1.3 to 3.0 feet bgs. The water levels observed are indicated on the boring logs and probe summary sheets in Appendix A. Groundwater levels can be expected to fluctuate subject to seasonal variations, local soil conditions, topography, precipitation, and construction activity.

6.0 GEOTECHNICAL RECOMMENDATIONS

The following sections discuss the geotechnical-related design features of this project. Areas of geotechnical concern are:

- Large Culvert at approximate Station 22+75
- Bedrock Removal

6.1 Large Culvert at approximate Station 22+75

6.1.1 General Information - The existing culvert at approximate Station 22+75 is a 12-inch square granite box culvert. The proposed replacement structure is a 60-inch diameter, 72-foot long Reinforced Concrete Pipe (RCP) with an inlet elevation of approximately 28.0 feet and an outlet elevation of approximately 26.7 feet.

One (1) boring (SB-ESMA-101) was drilled near the existing culvert. The boring locations and the interpretive subsurface profile are shown on Sheet 17 – Boring Location Plan & Interpretive Subsurface Profile with Bedding Requirements. The boring log is provided in Appendix A – Boring Logs.

Boring SB-ESMA-101 was drilled through sand fill and interbedded layers of sandy silt and silty sand to a depth of approximately 27.0 feet bgs without encountering a refusal surface. One (1) SPT N_{60}-values obtained in the fill sand was 29 bpf indicating that the fill is medium dense in consistency. Three (3) SPT N_{60}-values obtained in the sand silt ranged from 1 to 6 bpf indicating that the sandy silt is very soft to medium stiff in consistency.

6.1.2 Construction – The proposed RCP culvert at approximate Station 22+75 shall be constructed in accordance with MaineDOT Standard Specification Section 603 and the Contract Plans.

The proposed structure shall be bedded on a 2-foot thick, geotextile wrapped, geogrid reinforced, crushed stone mat (Culvert Bedding Stone - Standard Specification 703.22, Type C, Pay Item 203.55). The geogrid reinforcement shall meet the requirements of Special Provision 620, attached. The Reinforcement Geotextile shall meet the requirements of MaineDOT Standard Specification 722.01. The full nature of the culvert bearing surface will not become evident until the culvert excavation is made. The soils at the bedding elevation shall be excavated using a smooth-edged backhoe bucket to limit disturbance. Any disturbed soils at the bedding elevation resulting from excavation activities shall be removed by hand prior to placement of the geotextile wrapped, geogrid reinforced, crushed stone mat. All subgrade surfaces should be protected from construction traffic in order to limit disturbance. Groundwater and surface water levels shall be depressed sufficiently to allow work in the dry.

The soil backfill shall consist of Granular Borrow (703.19) with a maximum particle size of 4 inches. The Granular Borrow backfill shall be placed in lifts of 6 to 8 inches loose measure and compacted to the manufacturer's specifications or, in the absence of manufacturer's specifications, to at least 92 percent of the AASHTO T-180 maximum dry density. In no case shall the backfill soil be compacted less than 92 percent of the AASHTO T-180 maximum dry density.

6.2 Settlement

No settlement issues are anticipated for either the roadway or the proposed large culvert structure. The installation of the larger proposed culvert will result in a net unloading of the site soils at the structure location. Placement of fill soils at the location of the existing structure is not anticipated to exceed the past loading condition of the site soils.

6.3 Scour and Riprap

Both the inlet and outlet of the proposed large culvert shall be armored with riprap conforming to MaineDOT Standard Specification Section 703.26 Plain and Hand Laid Riprap. Riprap slopes shall not be steeper than 2H:1V. The riprap on the slopes shall be underlain by a non-woven Class 1 erosion control geotextile that meets the requirements for MaineDOT Standard Specification 722.03 that is underlain by a 1-foot layer of protective aggregate cushion conforming to MaineDOT Standard Specification 703.19 Granular Borrow Material for Underwater Backfill.

6.4 Seismic Design Considerations

In conformance with LRFD Article 3.10.1, seismic analysis is not required for buried structures, except where they cross active faults. There are no known active faults in Maine; therefore, seismic analysis is not required.

6.5 Additional Construction Considerations

Construction of the proposed RCP culvert will require deep soil excavation. Earth support systems will be required if laying back slopes is not feasible. Regardless of the method of excavation, all excavations and earth support systems shall meet all applicable OSHA regulations.

The Contractor shall control groundwater and surface water infiltration using temporary ditches, sumps, granular drainage blankets, stone ditch protection or hand-laid riprap with geotextile underlayment to divert groundwater and surface water to allow construction in the dry.

6.6 Bedrock Removal

Refusal of the drilling tools was encountered in several borings and probes along the project (see Section 5.3). Bedrock removal may be required for drainage and subgrade installation near these shallow refusal locations. Additional shallow bedrock may be encountered during construction at other locations.

Blasting, if required, shall be conducted in accordance with MaineDOT Standard Specifications Sections 105.2.7 and 203. The Contractor is required to conduct pre- and post-blast surveys, as well as blast vibrations monitoring at nearby structures in accordance with industry standards at the time of the blast.

7.0 CLOSURE

This report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed reconstruction of Route 1 in East Machias, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the conclusions and recommendations and to modify the recommendations as appropriate to reflect the changes in design. These analyses and recommendations are based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the recommendations made in this report.

It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and construction considerations presented in this report are properly interpreted and implemented in the design and specifications.

Sheets

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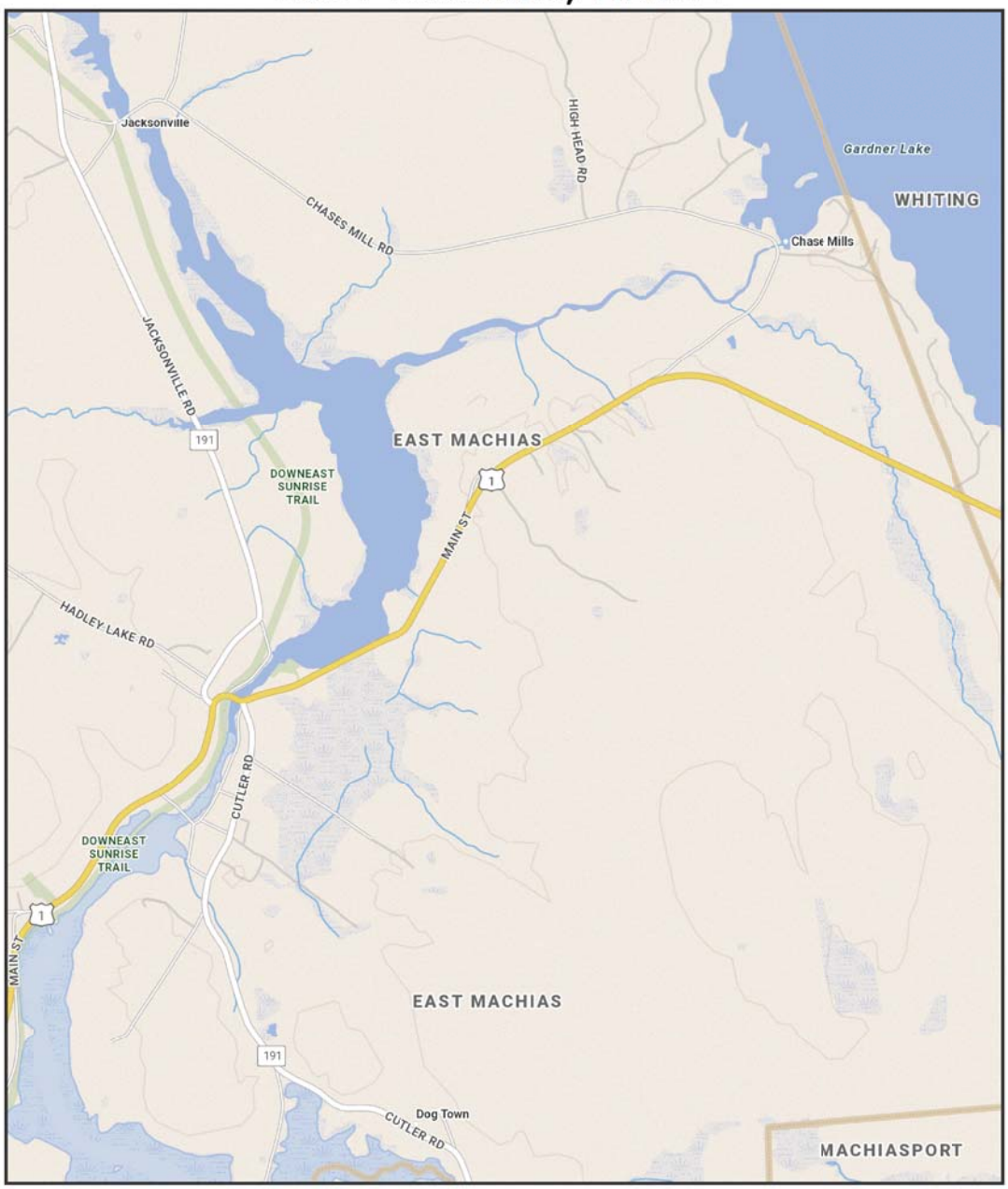
EAST MACHIAS, MAINE



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0.4 Miles

1 inch = 0.45 miles

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SHEET NUMBER 1 OF 17	EAST MACHIAS ROUTE 1 LOCATION MAP	STATE OF MAINE DEPARTMENT OF TRANSPORTATION AC-STP-1919(800)X WIN 19198.00 HIGHWAY PLANS

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STATE OF MAINE
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HIGHWAY PLANS

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EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

SHEET NUMBER

2

OF 17

STA. 8+01.32
LIMIT OF WORK
MATCH EXISTING PAVEMENT
BEGIN PROJECT AC-STP-1919(800)X
BEGIN FULL DEPTH
RECONSTRUCTION

6+61.03
7+00
PC = STA. 7+67.89
S63°02'13.9"E
9.0'
12.0'
18.4'
8+00
R=160'
REMOVE
89°49'15.8"
EXISTING APPROACH
SLAB TO REMAIN
BRIDGE
TRANSITION
TYPE 2
CONCRETE SIDEWALK
ROUTE 1 ℄
STA. 8+47.09 =
ROUTE 191 ℄
STA. 200+00.00
S01°13'03"E
200+00
CB1
ROUTE 191
CUTLER ROAD
15.0'
12.3'

TERMINAL END
SINGLE RAIL

PT = STA. 9+06.45

18" RCP CLASS III
9+00
12'
P-7.2R
N67°20'40.0"E
P-7.1R
10+00
P-8.0NR
11+00
12+00
P-8.0NR
P-4.4R
P-6.1R
6" UD "B"
P-7.7R
CB2
CB3
CB4
CB5
CB6
CB7
12" UD "C"
15" UD "C"
ROUTE 1
CONSTRUCTION ℄
13+00
15" OPTION III
12" OPTION III

POSSIBLE CELLAR
DRAIN
REMOVE ALL BUSHES
REMOVE
PT = STA. 200+68.02
TIMBER RAIL TO REMAIN
RECONSTRUCT CONCRETE WALKWAY
PC = STA. 200+26.01
5'
4"

STA. 200+88.00
LIMIT OF WORK
MATCH EXISTING PAVEMENT

GRADE TO
DRAIN AROUND
BUILDING

FIELD VERIFY
LIMITS OF
LEACH FIELD
PRIOR TO
CONSTRUCTION,
AVOID IMPACTS

PC=STA. 9+87.49
REPLACE
WOOD
STAIRS
GRADE AROUND
EXISTING BUSHES

PROVIDE 3' MIN. CLEARANCE
BETWEEN POLE AND BACK
CURB

FIELD VERIFY LIMITS OF
LEACH FIELD PRIOR TO
CONSTRUCTION. AVOID IMPACTS

PROVIDE 3' MIN. CLEAR
BETWEEN POLE AND B

PT = STA. 12+38.51

CURVE DATA #1
PI = 8+41.86
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Δ = 49°37'06.1" Lt.
R = 160.00'
L = 138.56'
T = 73.96'
E = 16.27'

CURVE DATA #2
PI = 11+13.31
D = 3°57'05.2"
Δ = 9°55'08.7" Rt.
R = 1450.00'
L = 251.02'
T = 125.83'
E = 5.45'

ROUTE 191 (CUTLER ROAD)
CURVE DATA #1
PI = 200+47.23
D = 47°44'47.3"
Δ = 20°03'26.0" Lt.
R = 120.00'
L = 42.01'
T = 21.22'
E = 1.86'

201+00 CONSTRUCTION ℄
S21°16'29.5"E
201+84.82

EDGE OF RIVER
BUSINESS WAREHOUSE 2 STORY
HOUSE 1 STORY
HOUSE 2.5 STORY
SHED WELL HOUSE? 1 STORY
WATER ST
WATER STREET

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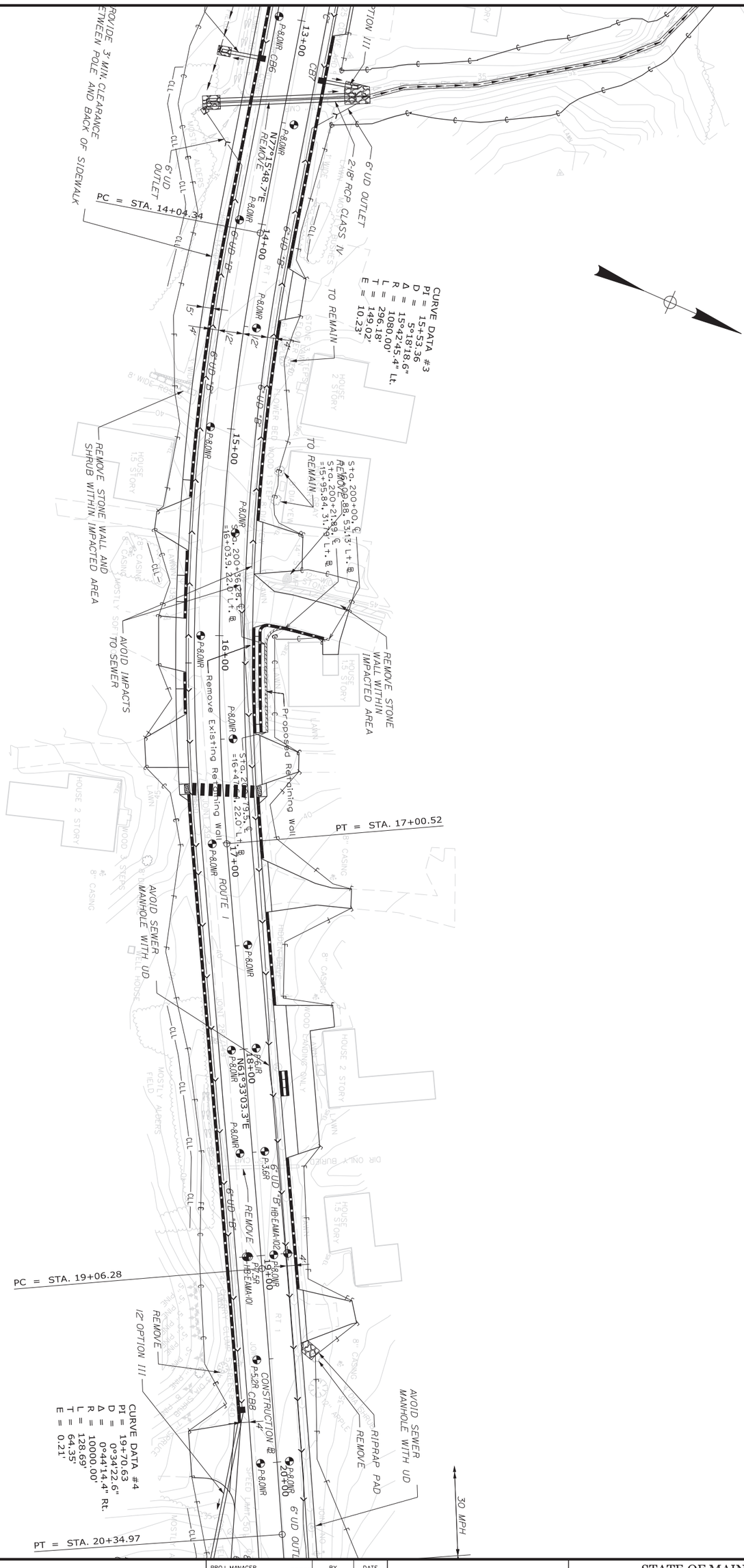

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EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

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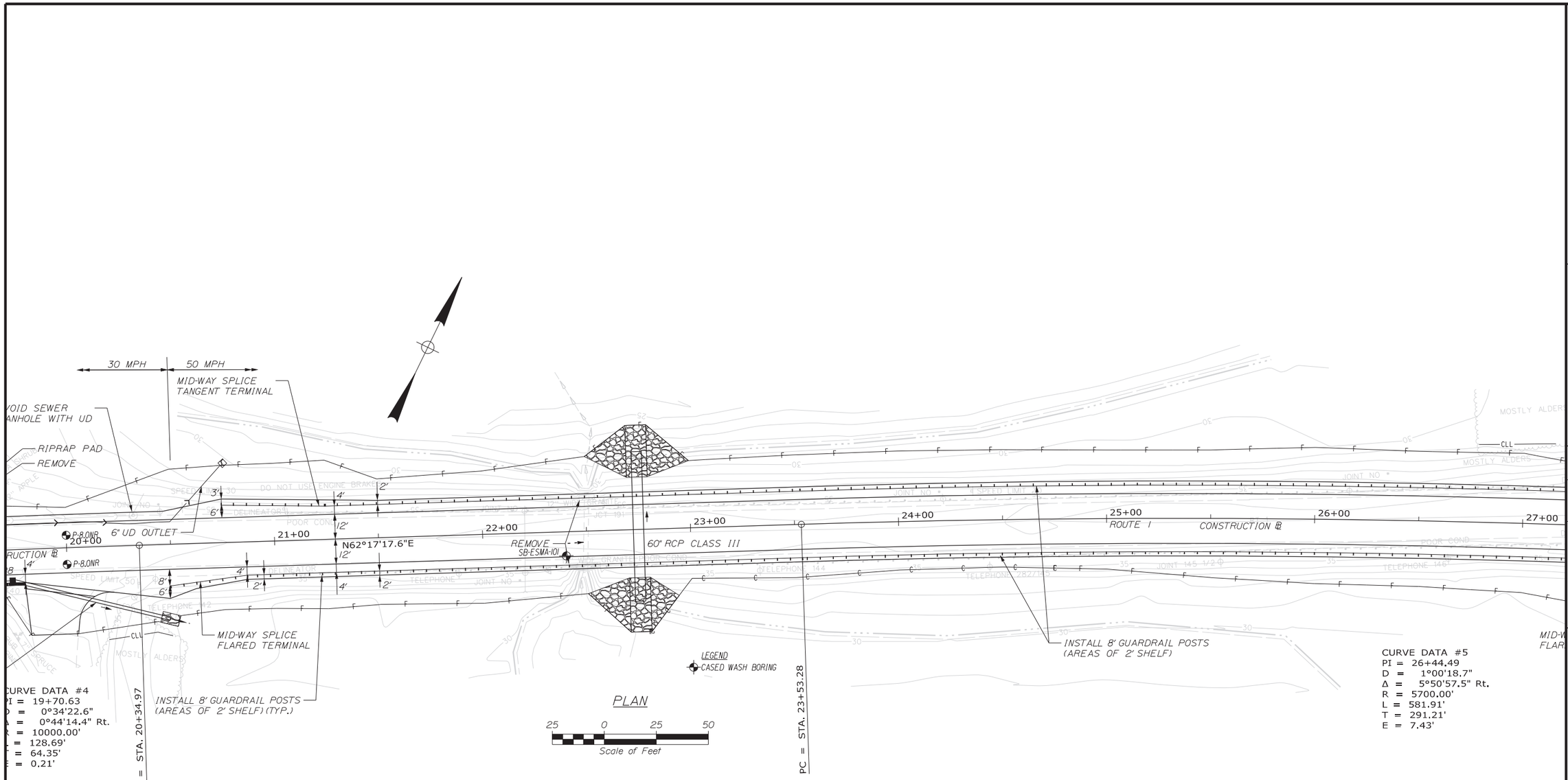

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E = 0.21'

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D = 1°00'18.7"
Δ = 5°50'57.5" Rt.
R = 5700.00'
L = 581.91'
T = 291.21'
E = 7.43'

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EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

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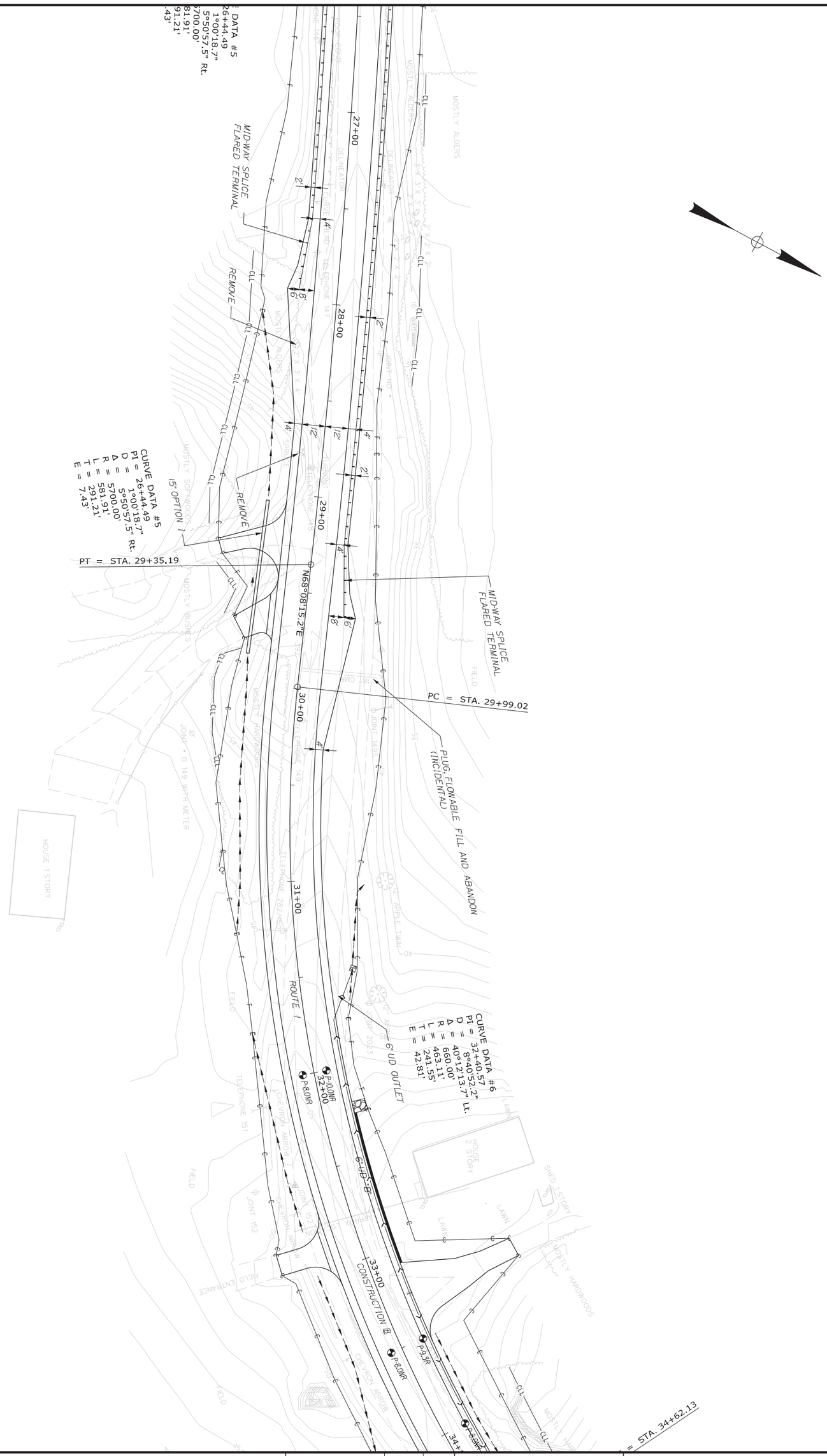

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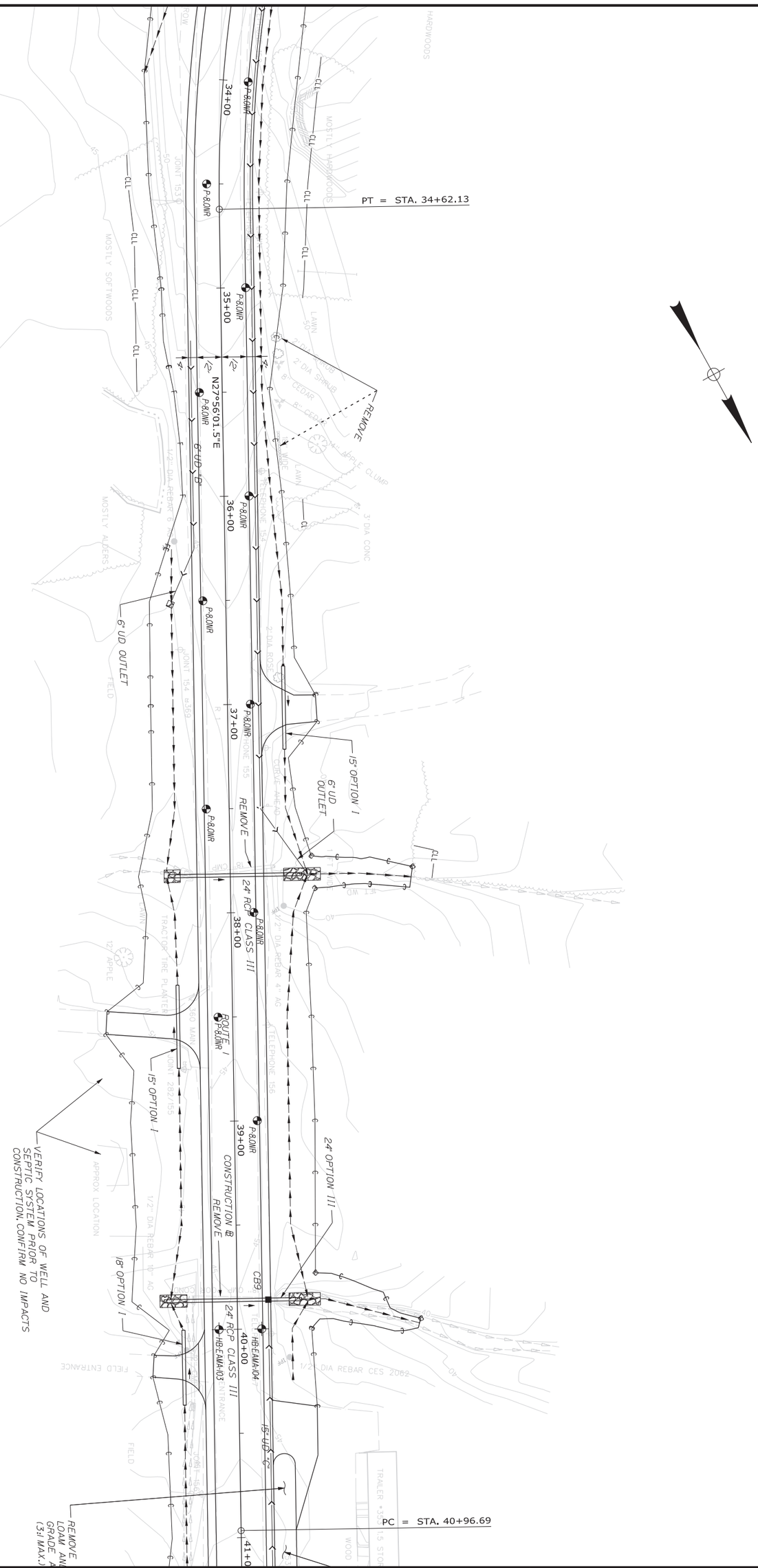

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ROUTE 1

BORING LOCATION PLAN

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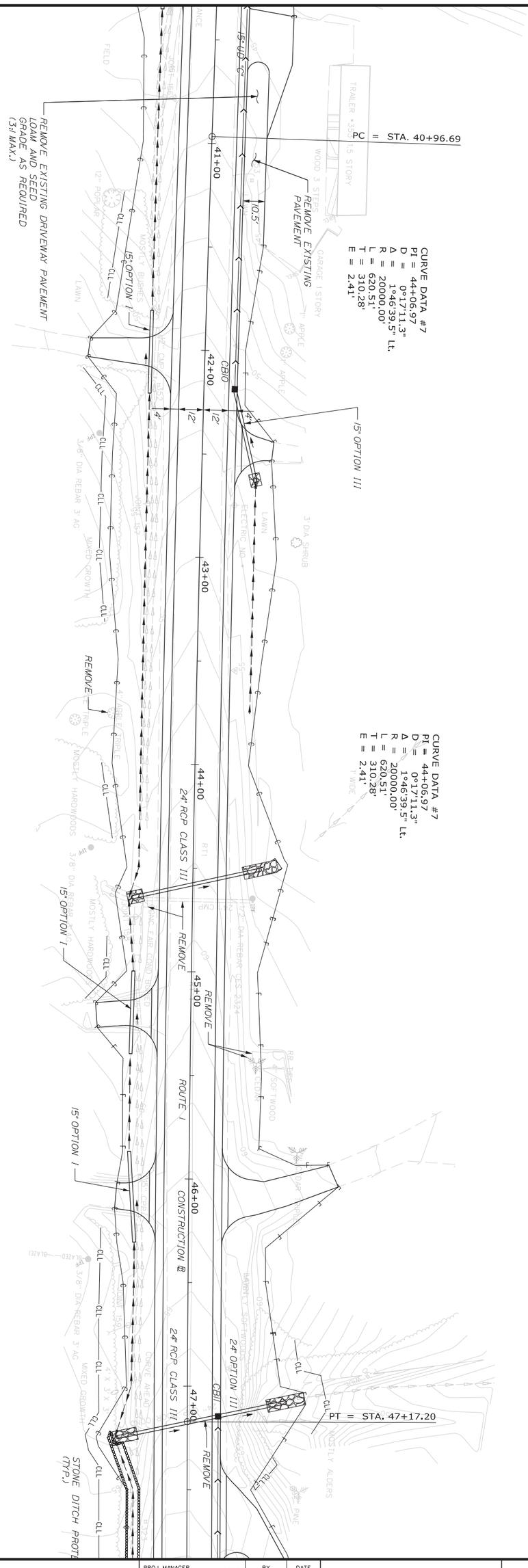

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EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

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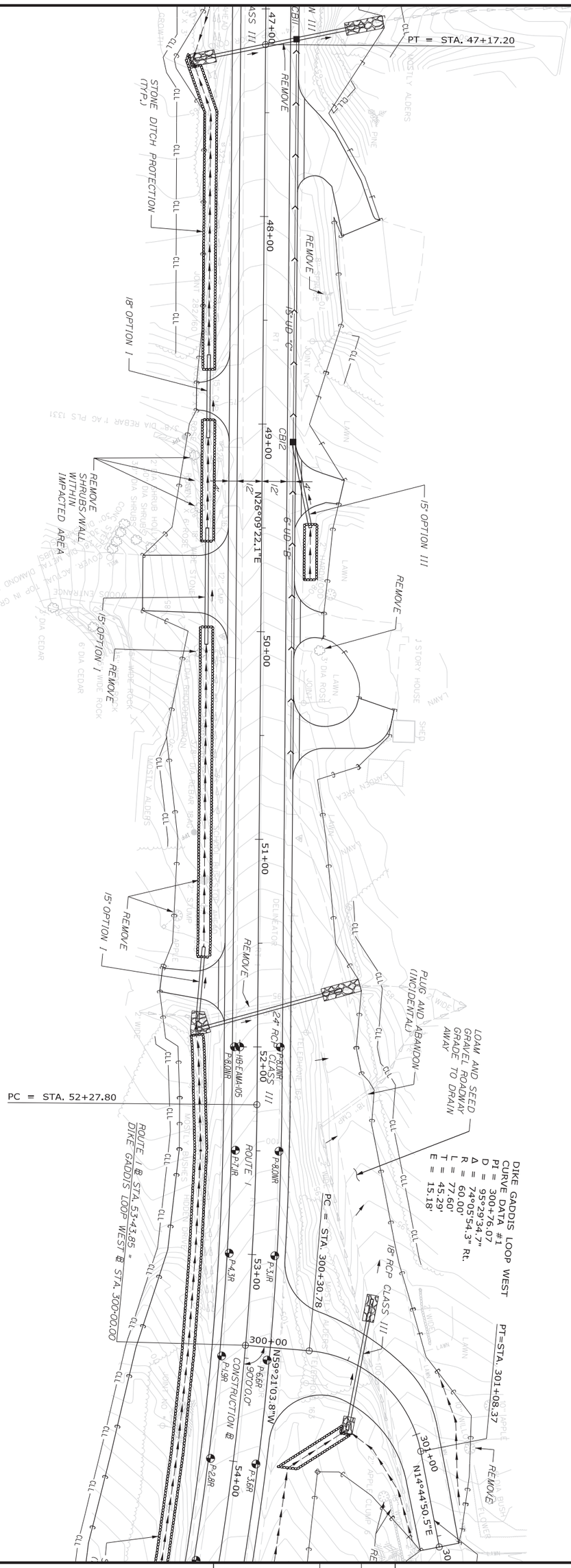

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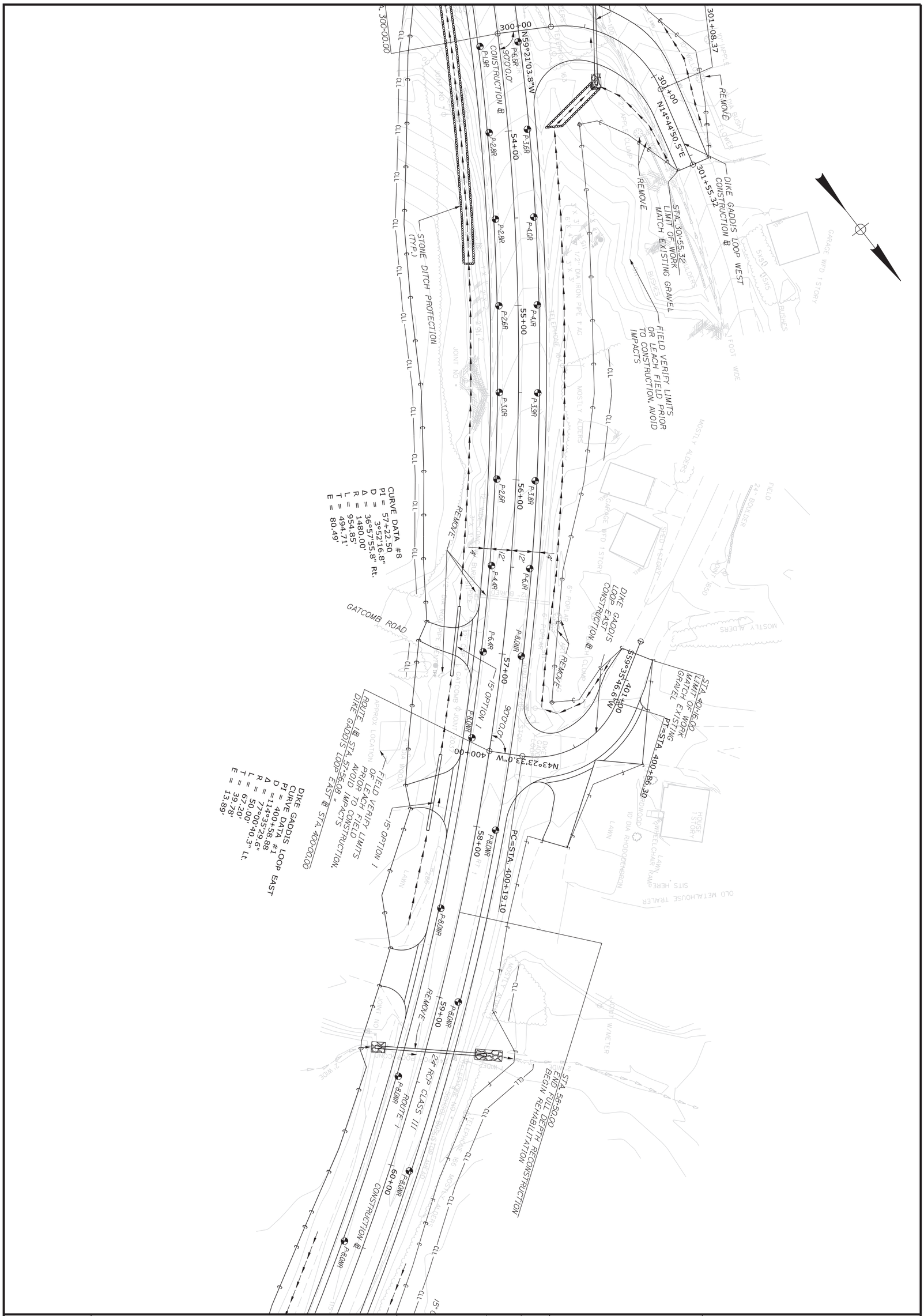

EAST MACHIAS ROUTE 1	PROJ. MANAGER	BY	DATE
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	CHECKED-REVIEWED		
	DESIGN2-DETAILED2	C.RUSSELL	T.WHITE
BORING LOCATION PLAN	DESIGN3-DETAILED3		DEC 2020
	REVISIONS 1		
	REVISIONS 2		
	REVISIONS 3		
	REVISIONS 4		
	FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

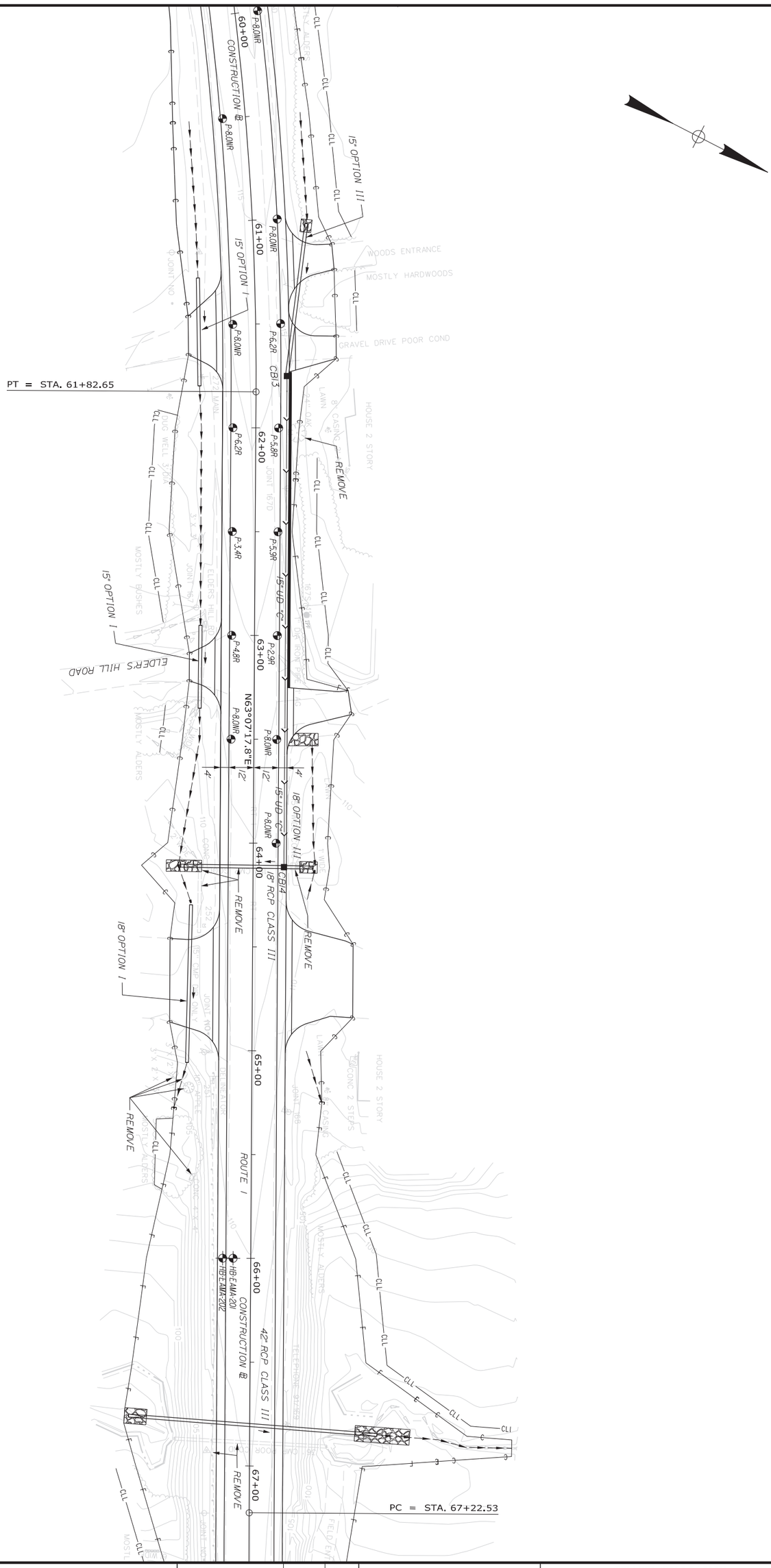
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN
19198.00

HIGHWAY PLANS

SHEET NUMBER 9 OF 17



PROJ. MANAGER	-----	BY	DATE
DESIGN-DETAILED	-----	----------	-----
CHECKED-REVIEWED	-----	-----	-----
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3	----	------	-----
REVISIONS 1	------		------
REVISIONS 2	------		------
REVISIONS 3	------		------
REVISIONS 4	------		------
FIELD CHANGES	------		------

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 10 OF 17

EAST MACHIAS
ROUTE 1

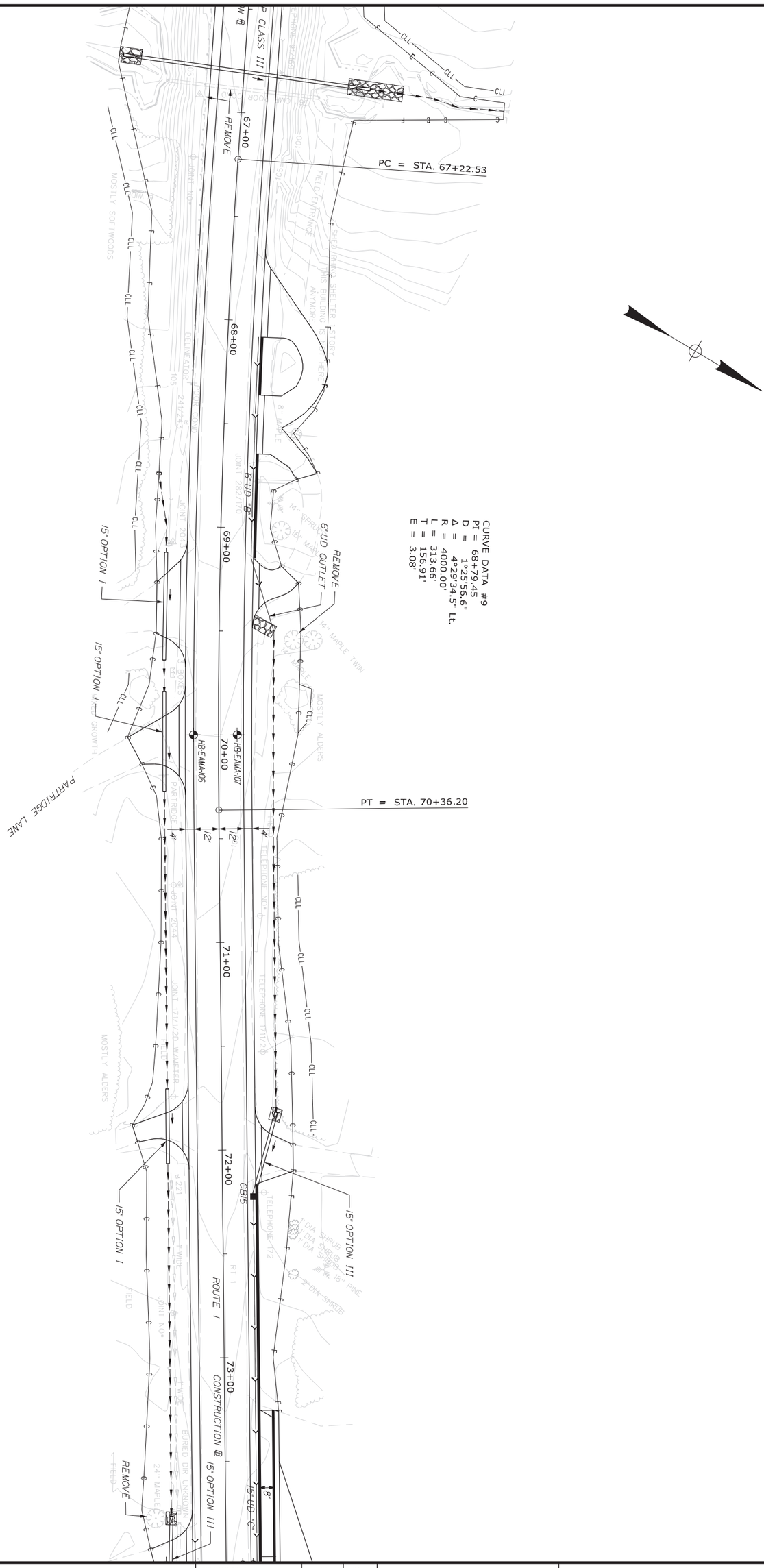
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00

HIGHWAY PLANS



CURVE DATA #9
PI = 68+79.45
D = 1°25'56.6"
Δ = 4°29'34.5" Lt.
R = 4000.00'
L = 313.66'
T = 156.91'
E = 3.08'

PROJ. MANAGER	_____	BY	DATE
DESIGN-DETAILED	_____	_____	_____
CHECKED-REVIEWED	_____	_____	_____
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3	____	_____	_____
REVISIONS 1	_____		_____
REVISIONS 2	_____		_____
REVISIONS 3	_____		_____
REVISIONS 4	_____		_____
FIELD CHANGES	_____		_____

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 11 OF 17

EAST MACHIAS
ROUTE 1

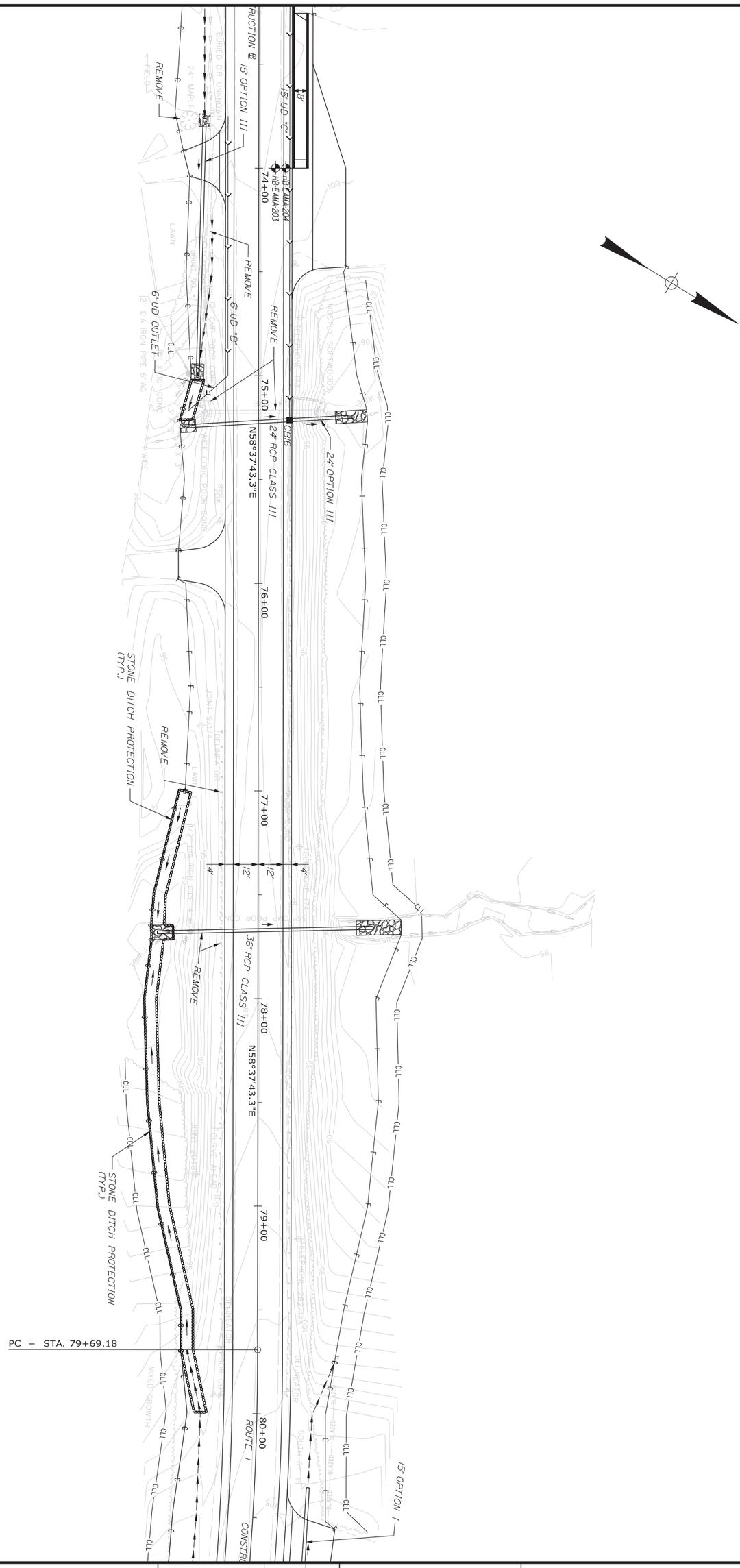
BORING LOCATION PLAN

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00

HIGHWAY PLANS



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED			
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

SHEET NUMBER 12 OF 17

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00 HIGHWAY PLANS

CHASES MILL ROAD
CURVE DATA #1
PI = 600+50.88
D =127°19'26.2"
Δ = 58°19'36.9" Rt.
R = 45.00'
L = 45.81'
T = 25.11'
E = 6.53'

CHASES MILL ROAD
CURVE DATA #2
PI = 602+22.54
D = 20°27'46.0"
Δ = 19°26'53.5" Lt.
R = 280.00'
L = 95.04'
T = 47.98'
E = 4.08'

CURVE DATA #10
PI = 87+54.64
D = 3°57'54.4"
Δ = 57°03'16.0" Rt.
R = 1445.00'
L = 1438.91'
T = 785.46'
E = 199.68'

PC=STA. 600+25.76
PT=STA. 600+71.57
PC = STA. 601+74.55
PT = STA. 602+69.60
601+00 N67°33'17.5"E
N48°06'24.0"E
N9°13'40.6"E
60°33'24.0"
STA. 603+50.00 LIMIT OF WORK
STA. 603+00.00 MATCH EXISTING PAVEMENT
ROUTE 1Ⓒ STA. 82+50.54 = CHASES MILL ROAD Ⓒ STA. 600+00.00
HB-EAMA-205
CBIT
STONE DITCH PROTECTION
MID-WAY SPLICE TANGENT TERMINAL
REMOVE
REMOVE AND RESET
15" OPTION I
12" OPTION III
15" RCP CLASS III
CHASES MILL ROAD
CONSTRUCTION Ⓒ
ROUTE 1
80+00
81+00
82+00
83+00
84+00
85+00
86+00
87+00
600+00
602+00
603+00
604+00
604+28.65
P-8.0NR
P-4.9R
P-3.9R
P-2.4R
P-5.1
4'
3'
6'
12'
10'
8.7'
8.8'

PROJ. MANAGER
DESIGN-DETAILED
CHECKED-REVIEWED
DESIGN2-DETAILED2
DESIGN3-DETAILED3
REVISIONS 1
REVISIONS 2
REVISIONS 3
REVISIONS 4
FIELD CHANGES

BY	DATE
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C.RUSSELL	DEC 2020
T.WHITE	-----
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SIGNATURE

P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN
19198.00

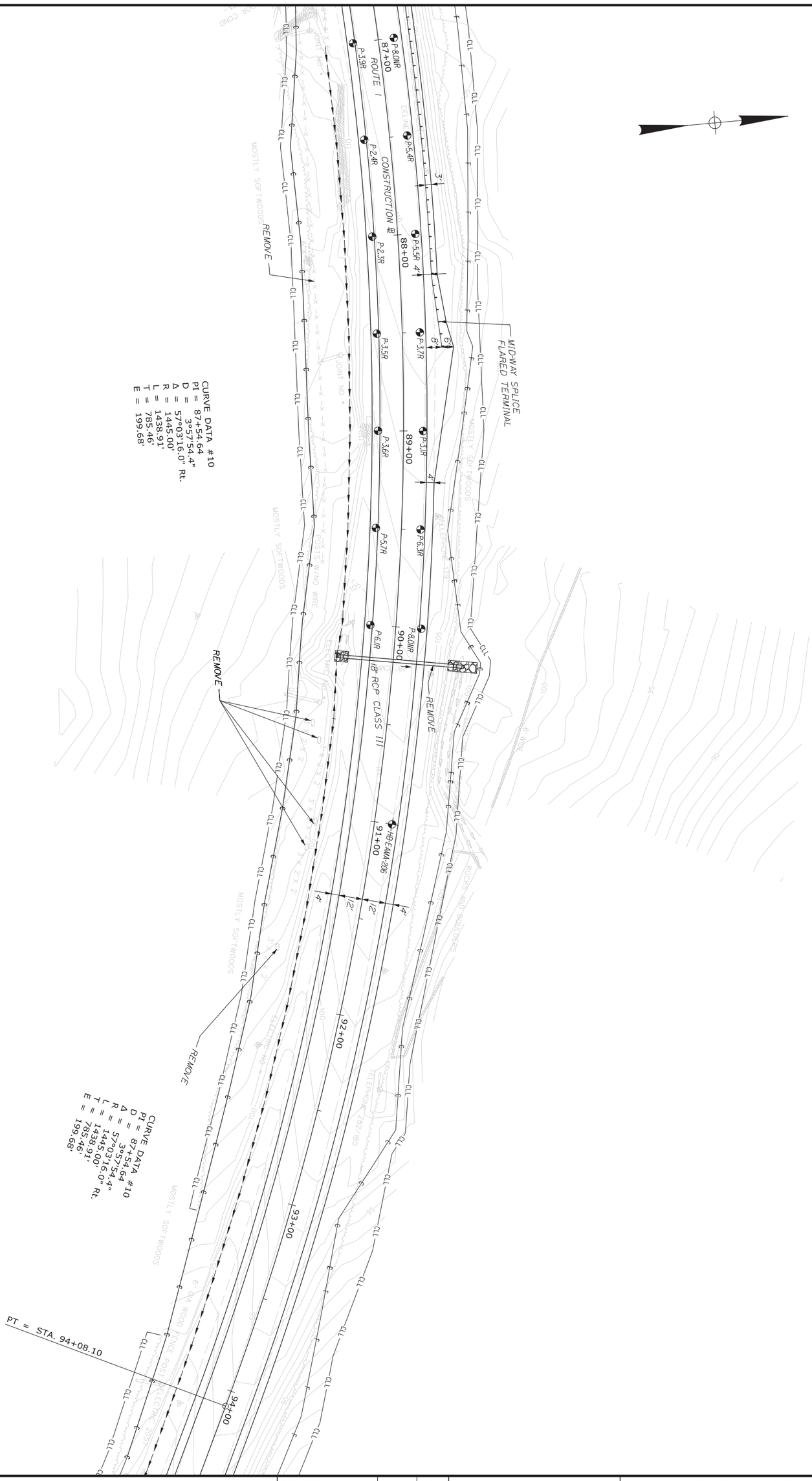
HIGHWAY PLANS

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

SHEET NUMBER
13
OF 17

Filename: ...\00\GEOTECH\MSTA\013_BLP12.dgn Division: GEOTECH Username: Terry.White Date:12/2/2020



SHEET NUMBER 14 OF 17

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

PROJ. MANAGER		BY	DATE
DESIGN-DETAILED			
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

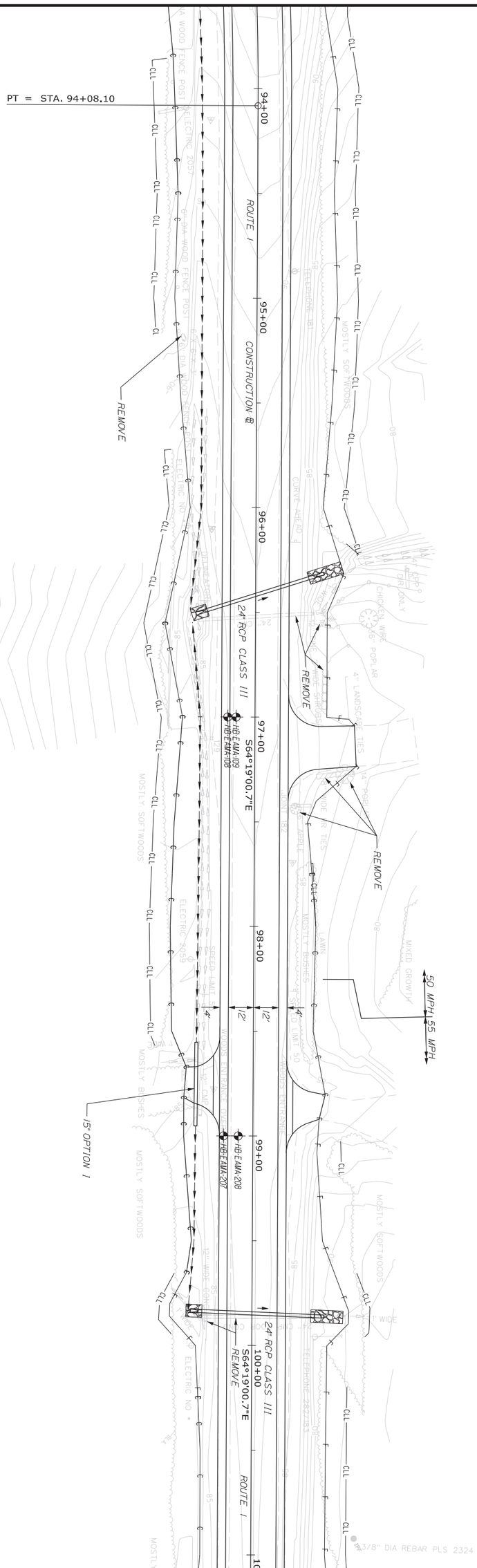
P.E. NUMBER

DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00 HIGHWAY PLANS



PROJ. MANAGER		BY	DATE
DESIGN-DETAILED			
CHECKED-REVIEWED			
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

P.E. NUMBER

DATE

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

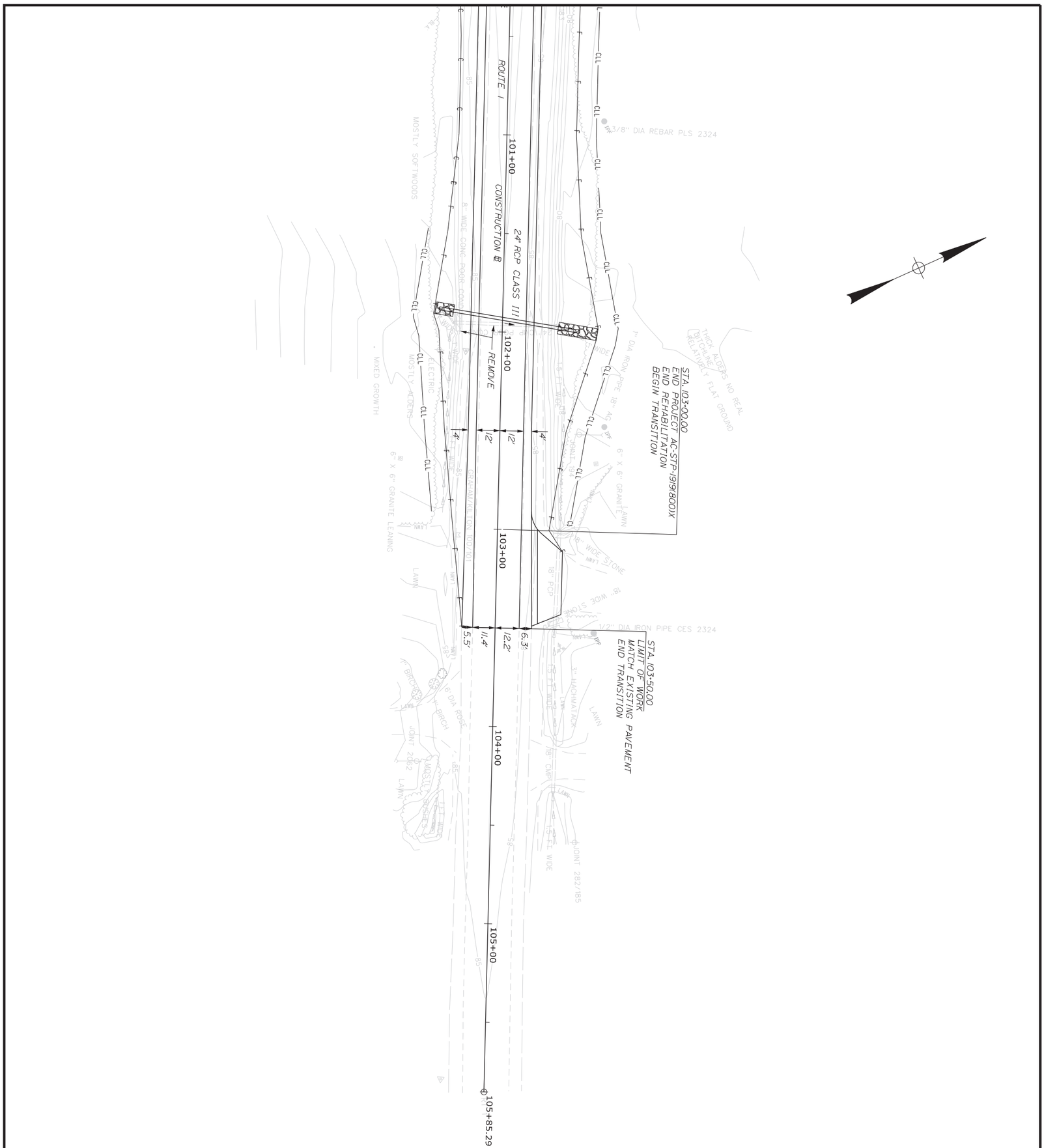
SHEET NUMBER 15 OF 17

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00

HIGHWAY PLANS



PROJ. MANAGER	-----	BY	DATE
DESIGN-DETAILED	-----	----------	-----
CHECKED-REVIEWED	-----	-----	-----
DESIGN2-DETAILED2	C.RUSSELL	T.WHITE	DEC 2020
DESIGN3-DETAILED3	----	------	-----
REVISIONS 1	------		------
REVISIONS 2	------		------
REVISIONS 3	------		------
REVISIONS 4	------		------
FIELD CHANGES	------		------

SIGNATURE

P.E. NUMBER

DATE

SHEET NUMBER 16 OF 17

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN

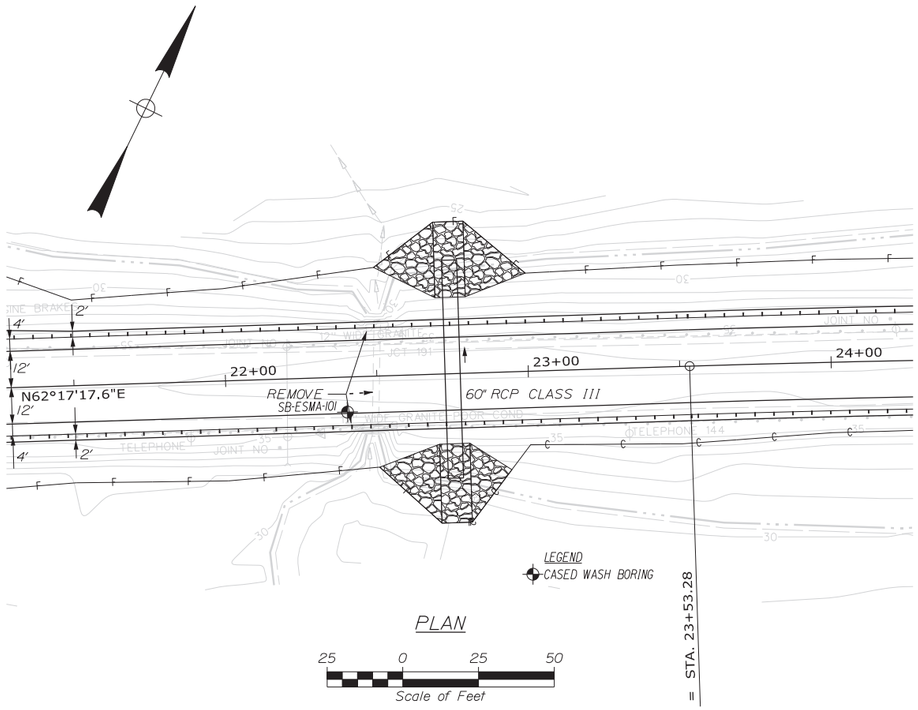
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

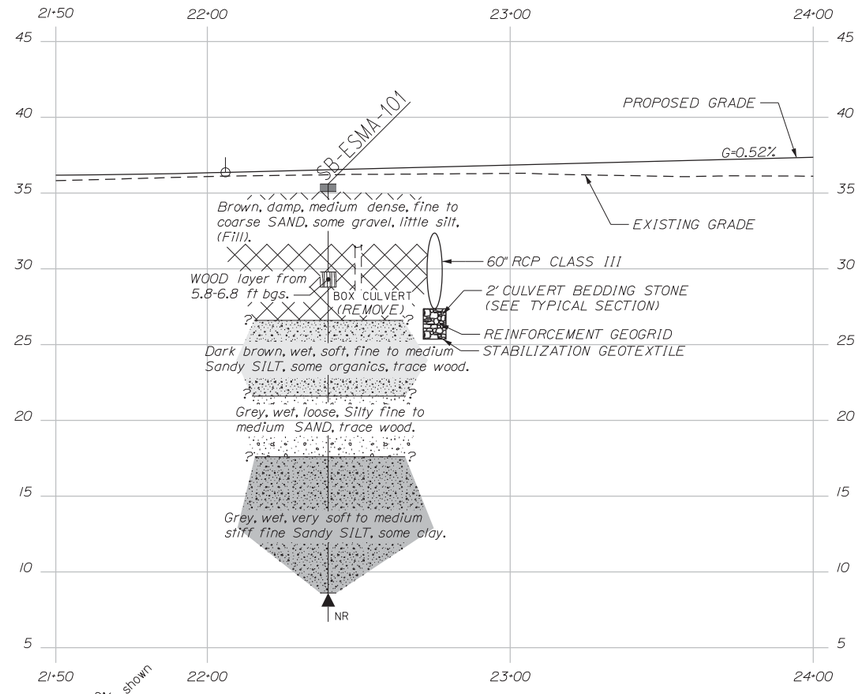
AC-STP-1919(800)X

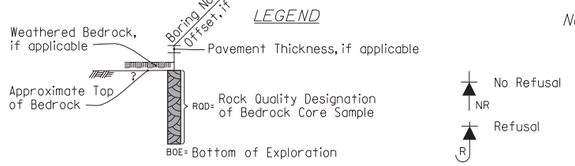
WIN 19198.00

HIGHWAY PLANS

Filename: ...\MSTA\017_BLP&ISP WBR1.dgn Username: Terry.White Division: GEOTECH Date:12/2/2020



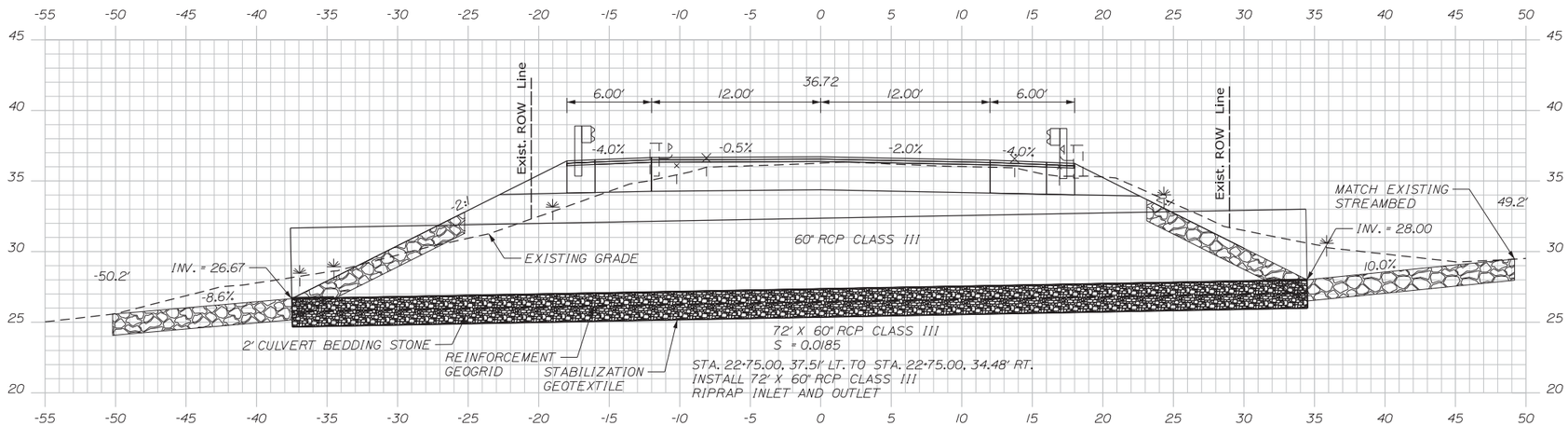




Note: This generalized interpretive soil profile is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and have been developed by interpretations of widely spaced explorations and samples. Actual soil and bedrock transitions may vary and are probably more erratic. For more specific information refer to the exploration logs.

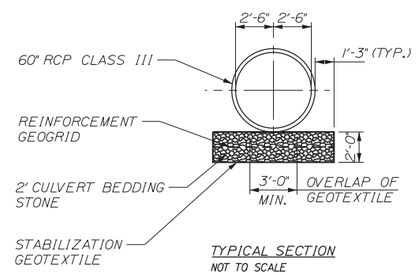
PROFILE

HORIZ 25 0 25 50
VERT 5 0 5 10
SCALE



CROSS SECTION

HORIZ 5 0 5 10
VERT 5 0 5 10
SCALE



TYPICAL SECTION
NOT TO SCALE

CULVERT NOTES:

1. THE PIPE SHALL BE BEDDED ON A 2' THICK GEOTEXTILE WRAPPED CULVERT BEDDING STONE WITH A LAYER OF GEOGRID AT THE CENTER. PAYMENT WILL BE MADE UNDER THE APPROPRIATE CONTRACT ITEMS.
2. STABILIZATION GEOTEXTILE SHALL BE OVERLAPPED A MINIMUM OF 3'.
3. THE REINFORCEMENT GEOGRID SHALL MEET THE REQUIREMENTS OF SPECIAL PROVISION 620.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

AC-STP-1919(800)X

WIN 19198.00

HIGHWAY PLANS

	DATE	BY	SIGNATURE
PROJ. MANAGER	-----	-----	-----
DESIGN-DETAILED	-----	-----	DEC 2020
CHECKED-REVIEWED	-----	C.RUSSELL	T. WHITE
DESIGN2-DETAILED2	-----	-----	-----
DESIGN3-DETAILED3	-----	-----	-----
REVISIONS 1	-----	-----	-----
REVISIONS 2	-----	-----	-----
REVISIONS 3	-----	-----	-----
REVISIONS 4	-----	-----	-----
FIELD CHANGES	-----	-----	-----

P.E. NUMBER

DATE

EAST MACHIAS
ROUTE 1

BORING LOCATION PLAN &
INTERPRETIVE SUBSURFACE PROFILE
WITH BEDDING REQUIREMENTS

SHEET NUMBER

17

OF 17

Appendix A

Boring Logs and Probe Information

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, Gravelly sands, little or no fines
			SP	Poorly-graded sands, Gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.
			OL	Organic silts and organic Silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations (in this order, if applicable):

Color (Munsell color chart)
Moisture (dry, damp, moist, wet)
Density/Consistency (from above right hand side)
Texture (fine, medium, coarse, etc.)
Name (Sand, Silty Sand, Clay, etc., including portions - trace, little, etc.)
Gradation (well-graded, poorly-graded, uniform, etc.)
Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic)
Structure (layering, fractures, cracks, etc.)
Bonding (well, moderately, loosely, etc.,)
Cementation (weak, moderate, or strong)
Geologic Origin (till, marine clay, alluvium, etc.)
Groundwater level

Maine Department of Transportation
Geotechnical Section
Key to Soil and Rock Descriptions and Terms
Field Identification Information

MODIFIED BURMISTER SYSTEM

Descriptive Term	Portion of Total (%)
trace	0 - 10
little	11 - 20
some	21 - 35
adjective (e.g. Sandy, Clayey)	36 - 50

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) Silty or Clayey gravels; and (3) Silty, Clayey or Gravelly sands. Density is rated according to standard penetration resistance (N-value).

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) Gravelly, Sandy or Silty clays; and (3) Clayey silts. Consistency is rated according to undrained shear strength as indicated.

Consistency of Cohesive soils	SPT N-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

$$\text{RQD (\%)} = \frac{\text{sum of the lengths of intact pieces of core* > 4 inches}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Rock Quality Based on RQD

Rock Quality	RQD (%)
Very Poor	≤25
Poor	26 - 50
Fair	51 - 75
Good	76 - 90
Excellent	91 - 100

Desired Rock Observations (in this order, if applicable):

Color (Munsell color chart)
Texture (aphanitic, fine-grained, etc.)
Rock Type (granite, schist, sandstone, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
-dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.)
-spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet)
-tightness (tight, open, or healed)
-infilling (grain size, color, etc.)
Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock quality (very poor, poor, etc.)
ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12
Recovery (inch/inch and percentage)
Rock Core Rate (X.X ft - Y.Y ft (min:sec))

Sample Container Labeling Requirements:

WIN
Bridge Name / Town
Boring Number
Sample Number
Sample Depth
Blow Counts
Sample Recovery
Date
Personnel Initials

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-101
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	37.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	19+00, 7.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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	S1		0.50 - 2.40			SSA	37.6		4" Pavement	
							37.4		0.3	G#244172 A-1-b, SM WC=4.0%
									2" Unbound Pavement.	
	S2		2.40 - 5.00						0.5 Brown, damp, Gravelly fine to coarse SAND, little silt.	
							35.5		2.4 Light brown, wet, Silty fine to coarse SAND, trace gravel.	G#244173 A-4, SM WC=29.9%
5							32.9		5.0 **Bottom of Exploration at 5.0 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Boring No.: HB-EAMA-101

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-102
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	37.5	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	19+00, 13.0 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions: D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer; MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing; WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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						SSA			Brown, damp, Gravelly fine to coarse SAND, little silt.	
							36.5		1.0	
	S3		1.00 - 5.00						Brown, wet, fine to coarse SAND, some silt, some gravel.	G#244174 A-2-4, SM WC=18.9%
5							32.5		5.0	
									Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-103
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	44.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	40+00, 9.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	44.3		7" Pavement — 0.6	
							44.2		2" Unbound Pavement. — 0.8	
							42.9		Brown, damp, Gravelly fine to coarse SAND, little silt. — 2.0	
	S6		2.00 - 5.00						Brown, moist, fine to coarse SAND, some gravel, trace silt.	G#244175 A-1-b, SW-SM WC=21.0%
5							39.9		**Bottom of Exploration at 5.0 feet below ground surface.** NO REFUSAL — 5.0	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-104
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	44.7	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	40+00, 11.5 ft Lt. EOP	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			Brown, damp, Gravelly fine to coarse SAND, little silt.	
							43.2		1.5	
									Brown, moist, fine to coarse SAND, some gravel, trace silt.	
5							39.7		5.0	
									Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.
EOP = Edge of Pavement

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-EAMA-104

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-105
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	96.1	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	52+00, 8.5 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S5		0.75 - 1.30			SSA	95.4		9" Pavement (0.8)	G#267751 A-1-b, SW-SM WC=4.2%
	S4		1.30 - 5.00				94.8		Brown, moist, fine to coarse SAND, some gravel, trace silt. (1.3)	G#267752 A-4, CL WC=16.1%
									Brown, wet, SILT, little fine to coarse sand, trace gravel.	
5							91.1		(5.0) **Bottom of Exploration at 5.0 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-106
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	105.9	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	70+00, 12.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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	S7		0.00 - 2.40			SSA			Brown, moist, fine to coarse SAND, some gravel, trace silt.	G#267753 A-1-b, SW-SM WC=3.6%
	S8		2.40 - 5.00				103.5		2.4	
									Light brown, moist, fine to coarse SAND, some silt, little gravel.	G#267754 A-2-4, SM WC=9.6%
5							100.9		5.0	
									Bottom of Exploration at 5.0 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Boring No.: HB-EAMA-106

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-107
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	105.6	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	70+00, 9.0 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	104.9		8" PAVEMENT.	
									0.7	
									Brown, moist, fine to coarse SAND, some gravel, trace silt.	
							103.1		2.5	
									Light brown, wet, fine to coarse SAND, some silt, little gravel.	
							101.8		3.8	
									Bottom of Exploration at 3.8 feet below ground surface. REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-108
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	87.0	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	97+00, 13.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample
S = Sample off Auger Flights
B = Bucket Sample off Auger Flights
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MV = Unsuccessful Field Vane Shear Test Attempt
V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-value = Raw Field SPT N-value
T_v = Pocket Torvane Shear Strength (psf)
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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	86.1		Brown, moist, fine to coarse SAND, some gravel, trace silt. 0.9	
									Light brown, moist, SILT, trace fine to coarse sand, trace gravel.	
5							82.0		5.0 **Bottom of Exploration at 5.0 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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Boring No.: HB-EAMA-108

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-109
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	87.2	**Auger ID/OD:**	5" Dia.
Operator:	Enos/Giles/Daggett	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	9/27/12-9/27/12	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	97+00, 9.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions: D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer; MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing; WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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	S9		0.79 - 2.20			SSA	86.6		7" Pavement — 0.6	G#267755 A-1-b, SM WC=6.5%
							86.4		2½" Unbound Pavement. — 0.8	G#267756 A-6, CL WC=22.5% LL=33 PL=21 PI=12
	S10		2.20 - 5.00				85.0		Brown, damp, fine to coarse SAND, some gravel, little silt. — 2.2	
									Light brown, moist, SILT, trace fine to coarse sand, trace gravel.	
5							82.2		**Bottom of Exploration at 5.0 feet below ground surface.** NO REFUSAL — 5.0	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: East Machias River Pond Strut
Location: East Machias, Maine

Boring No.: SB-ESMA-101
WIN: 19198.00

Driller:	MaineDOT	**Elevation (ft.)**	35.6	**Auger ID/OD:**	5" Solid Stem
Operator:	Giles/Daggett/Giles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/21/2014; 07:30-10:50	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	22+39.9, 11.6 ft Rt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor: 0.867		**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	35.1		6" PAVEMENT. 0.5	
										Brown, damp, fine to coarse SAND, some gravel, little silt.	
5	1D	24/14	5.00 - 7.00	10/7/13/6	20	29	27			Augered through wood from 5.8-6.8 ft bgs.	
							408				
							8				
							20				
							13	26.6		9.0	
10	2D	24/10	10.00 - 12.00	1/1/1/1	2	3	8			Dark brown, wet, soft, fine to medium Sandy SILT, some organics, trace wood.	
							16				
							11				
							12				
							13	21.6		14.0	
15	3D	24/12	15.00 - 17.00	2/2/2/2	4	6	22			Grey, wet, loose, Silty fine to medium SAND, trace wood.	
							25				
							29				
							30	17.6		18.0	
							32				
20	4D	24/24	20.00 - 22.00	1/1/WOH/1	1	1	35			Grey, wet, very soft, fine Sandy SILT, some clay.	
							29				
							32				
							29				
25							35				

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: East Machias River Pond Strut
Location: East Machias, Maine

Boring No.: SB-ESMA-101
WIN: 19198.00

Driller:	MaineDOT	**Elevation (ft.)**	35.6	**Auger ID/OD:**	5" Solid Stem
Operator:	Giles/Daggett/Giles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	8/21/2014; 07:30-10:50	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	22+39.9, 11.6 ft Rt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.867	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	5D	24/24	25.00 - 27.00	1/1/3/5	4	6				Grey, wet, medium stiff, fine Sandy SILT, some clay.	
								8.6		27.0	
										Bottom of Exploration at 27.0 feet below ground surface. NO REFUSAL	
30											
35											
40											
45											
50											

Remarks:

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-201
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	109.8	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James/Rick	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder/A. Bickford	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/19/2017-6/19/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	66+00, 8.5 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions: D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer; MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing; WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B1		0.42 - 2.40			SSA	109.4		5" Pavement	
									0.4	G#270096 A-1-a, GW-GM WC=1.9%
									Brown, damp, fine to coarse Sandy GRAVEL, trace silt, occasional cobble.	
							107.4		2.4	
									Brown, wet, fine to coarse Sandy GRAVEL, some silt.	
							105.3		4.5	
5									**Bottom of Exploration at 4.5 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-202
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	109.6	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James/Rick	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder/A. Bickford	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/19/2017-6/19/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	66+00, 13.5 ft Rt. Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B2		0.00 - 2.40			SSA			Brown, damp, fine to coarse SAND, some gravel, trace silt, occasional cobble.	G#270097 A-1-b, SW-SM WC=2.4%
							107.2		2.4	
									Brown, wet, fine to coarse Sandy GRAVEL, some silt.	
5							105.1		4.5	
									Bottom of Exploration at 4.5 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-203
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	100.7	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James/Rick	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder/A. Bickford	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/19/2017-6/19/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	74+00, 8.0 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B3		0.67 - 2.80			SSA	100.2		5.5" Pavement (0.5)	G#270098 A-1-a, SW-SM WC=1.7%
							100.0		Unbound Pavement. (0.7)	
									Brown, moist, Gravelly fine to coarse SAND, trace silt, occasional cobble.	
							97.9		Light brown, wet, fine to coarse Sandy SILT, trace gravel. (2.8)	
							96.6		(4.1)	
5									**Bottom of Exploration at 4.1 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

Boring No.: HB-EAMA-203

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-204
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	100.5	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James/Rick	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder/A. Bickford	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/19/2017-6/19/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	74+00, 13.0 ft Lt. Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B4		0.00 - 2.00			SSA			Brown, moist, fine to coarse SAND, some silt, some gravel, occasional cobble.	G#270099 A-2-4, SM WC=5.8%
							98.5		2.0
									Light brown, wet, fine to coarse Sandy SILT, some gravel.
							96.9		3.6
									Bottom of Exploration at 3.6 feet below ground surface. REFUSAL
5									
10									
15									
20									
25									

Remarks:

Offsets are from Existing Roadway CL.

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-205
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	107.2	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James/Rick	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder/A. Bickford	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/19/2017-6/19/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	82+00, 10.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	2.0 ft bgs.

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B5		0.67 - 2.20			SSA	106.8		5" Pavement. (0.4)	G#270100 A-1-a, GW-GM WC=2.1%
							106.5		Unbound Pavement. (0.7)	
							105.0		Black brown, moist, GRAVEL, some fine to coarse sand, trace silt. (2.2)	
									Bottom of Exploration at 2.2 feet below ground surface. NO REFUSAL Rig broke down.	
5										
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-206
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	103.9	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/22/2017-6/22/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	91+00, 9.0 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample
S = Sample off Auger Flights
B = Bucket Sample off Auger Flights
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MV = Unsuccessful Field Vane Shear Test Attempt
V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-value = Raw Field SPT N-value
T_v = Pocket Torvane Shear Strength (psf)
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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B6		0.58 - 2.10			SSA	103.3		7" Pavement. (0.6)	G#270176 A-1-b, SW-SM WC=1.3%
									Brown, damp, Gravelly fine to coarse SAND, trace silt.	
							101.8		(2.1) **Bottom of Exploration at 2.1 feet below ground surface.** REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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Boring No.: HB-EAMA-206

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-207
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	86.0	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/22/2017-6/22/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	99+00, 14.0 ft Rt. Shoulder	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B7		0.00 - 2.00			SSA			Brown, damp, fine to coarse SAND, some gravel, trace silt, occasional cobble.	G#270177 A-1-b, SW-SM WC=2.0%
							84.0		2.0	
									Grey, wet, fine to medium Sandy SILT, little clay.	
							82.0		4.0	
5									**Bottom of Exploration at 4.0 feet below ground surface.** NO REFUSAL	
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Reconstruction of a 1.80 mile portion of Route 1
Location: East Machias, Maine

Boring No.: HB-EAMA-208
WIN: 19198.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	86.4	**Auger ID/OD:**	10" Dia.
Operator:	Travis/James	**Datum:**	NAVD 88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	6/22/2017-6/22/2017	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	99+00, 7.0 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions: D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer; MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing; WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_v = Pocket Torvane Shear Strength (psf); 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 Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	B8		0.67 - 2.70			SSA	86.1		4" Pavement.	
							85.7		0.3 Unbound Pavement.	G#270178 A-1-a, SW-SM WC=3.5%
									0.7 Brown, moist, Gravelly fine to coarse SAND, trace silt, occasional cobble.	
							83.7		2.7 Grey, damp, fine to medium Sandy SILT, trace clay.	
							82.4		4.0 **Bottom of Exploration at 4.0 feet below ground surface.** NO REFUSAL	
5										
10										
15										
20										
25										

Remarks:

Offsets are from Existing Roadway CL.

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

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

State of Maine - Department of Transportation

Power Auger Probe Summary Sheet

Town(s): East Machias Work Number: 19198.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 8/20/2014
9+00	6.0 Lt.		4.4			
9+00	14.0 Rt.		6.1			
9+50	6.0 Lt.		7.2			
9+50	9.0 Rt.		7.7			
10+00	6.0 Lt.		7.1			
10+00	7.0 Rt.		6.1			
10+50	6.0 Lt.			8.0		
10+50	7.0 Rt.		4.4			
11+00	7.0 Rt.			8.0		
11+50	6.0 Lt.			8.0		
12+00	12.0 Rt.			8.0	1.3	
12+50	6.0 Lt.			8.0		
13+00	11.0 Rt.			8.0		
13+50	6.0 Lt.			8.0		
14+00	11.0 Rt.			8.0		
14+50	6.0 Lt.			8.0		
15+00	10.0 Rt.			8.0		
15+50	6.0 Lt.			8.0		
16+00	9.0 Rt.			8.0		
16+50	6.0 Lt.			8.0		
17+00	7.0 Rt.			8.0		
17+50	6.0 Lt.			8.0		
18+00	6.0 Lt.		6.1			
18+00	6.0 Rt.			8.0		
18+50	6.0 Lt.		3.6			
18+50	6.0 Rt.			8.0		
19+00	6.0 Lt.			8.0		
19+00	6.0 Rt.		7.5			
19+50	6.0 Rt.		5.2			
20+00	6.0 Lt.			8.0		
20+00	8.0 Rt.			8.0		
32+00	6.5 Lt.			10.0	3.0	
32+00	6.0 Rt.			8.0		
33+50	12.0 Lt.		9.3			
33+50	6.0 Rt.			8.0		
34+00	12.0 Lt.			8.0		
34+50	6.0 Rt.			8.0		
35+00	12.0 Lt.			8.0		
35+50	11.0 Rt.			8.0		
36+00	12.0 Lt.			8.0		
36+50	11.0 Rt.			8.0		
37+00	11.0 Lt.			8.0		
37+50	11.0 Rt.			8.0		
38+00	11.0 Lt.			8.0		
38+50	7.0 Rt.			8.0		
39+00	11.0 Lt.			8.0		

MaineDOT Drill Crew
Logged By: C. Giles
Drill Rig: CME 45C

5" Solid Stem Auger

State of Maine - Department of Transportation

Power Auger Probe Summary Sheet

Town(s): East Machias Work Number: 19198.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 8/21/2014
52+00	11.0 Lt.			8.0		
52+00	11.0 Rt.			8.0		
52+50	11.0 Lt.			8.0		
52+50	10.0 Rt.		7.1			
53+00	11.0 Lt.		3.1			
53+00	11.0 Rt.		4.3			
53+50	11.0 Lt.		6.6			
53+50	11.0 Rt.		1.9			
54+00	11.0 Lt.		3.6			
54+00	11.0 Rt.		2.8			
54+50	11.0 Lt.		4.0			
54+50	11.0 Rt.		2.8			
55+00	11.0 Lt.		4.1			
55+00	11.0 Rt.		2.6			
55+50	11.0 Lt.		3.9			
55+50	11.0 Rt.		3.0			
56+00	11.0 Lt.		3.8			
56+00	11.0 Rt.		2.6			
56+50	11.0 Lt.		6.1			
56+50	11.0 Rt.		4.4			
57+00	11.0 Lt.			8.0		
57+00	11.0 Rt.		6.4			
57+50	11.0 Rt.			8.0		
58+00	11.0 Lt.			8.0		
58+50	11.0 Rt.			8.0		
59+00	11.0 Lt.			8.0		
59+50	11.0 Rt.			8.0		
60+00	11.0 Lt.			8.0		
60+50	11.0 Rt.			8.0		
61+00	12.0 Lt.			8.0		
61+50	11.0 Lt.		6.2			
61+50	11.0 Rt.			8.0		
62+00	11.0 Lt.		5.8			
62+00	11.0 Rt.		6.2			
62+50	11.0 Lt.		5.9			
62+50	11.0 Rt.		3.4			
63+00	11.0 Lt.		2.9			
63+00	11.0 Rt.		4.8			
63+50	11.0 Lt.			8.0		
63+50	11.0 Rt.			8.0		
64+00	11.0 Lt.			8.0		
86+50	13.0 Rt.		4.9			
87+00	8.0 Lt.			8.0		
87+00	13.0 Rt.		3.9			
87+50	9.0 Lt.		5.4			
87+50	13.0 Rt.		2.4			

MaineDOT Drill Crew
Logged By: C. Giles
Drill Rig: CME 45C

5" Solid Stem Auger

State of Maine - Department of Transportation

Power Auger Probe Summary Sheet

Town(s): East Machias Work Number: 19198.00

Station (Feet)	Offset (Feet)	Weathered Rock (Feet)	Refusal (Feet)	No Refusal (Feet)	Water Depth (Ft.)	Comments / Date 8/21/2014
88+00	9.0 Lt.		5.5			
88+00	13.0 Rt.		2.3			
88+50	9.0 Lt.		3.7			
88+50	13.0 Rt.		3.5			
89+00	10.0 Lt.		3.1			
89+00	13.0 Rt.		3.6			
89+50	10.0 Lt.		6.3			
89+50	13.0 Rt.		5.7			
90+00	13.0 Lt.			8.0		
90+00	13.0 Rt.		6.1			

MaineDOT Drill Crew
Logged By: C. Giles
Drill Rig: CME 45C

5" Solid Stem Auger

Appendix B

Laboratory Test Results

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): East Machias Work Number: 19198.00

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C.	% Passing 200 Sieve		Classification		
									Unified	AASHTO	Frost
HB-EAMA-101, S1	19+00	7.0 Rt.	0.50-2.4	244172	1	4.0	13.7		SM	A-1-b	II
HB-EAMA-101, S2	19+00	7.0 Rt.	2.4-5.0	244173	1	29.9	43.7		SM	A-4	III
HB-EAMA-102, S3	19+00	13.0 Lt.	1.0-5.0	244174	1	18.9	29.2		SM	A-2-4	II
HB-EAMA-103, S6	40+00	9.0 Rt.	2.0-5.0	244175	2	21.0	9.3		SW-SM	A-1-b	0
HB-EAMA-105, S5	52+00	8.5 Rt.	0.75-1.3	267751	2	4.2	9.4		SW-SM	A-1-b	0
HB-EAMA-105, S4	52+00	8.5 Rt.	1.3-5.0	267752	2	16.1	86.0		CL	A-4	IV
HB-EAMA-106, S7	70+00	12.0 Rt.	0.0-2.4	267753	2	3.6	10.2		SW-SM	A-1-b	0
HB-EAMA-106, S8	70+00	12.0 Rt.	2.4-5.0	267754	2	9.6	33.4		SM	A-2-4	II
HB-EAMA-109, S9	97+00	9.0 Rt.	0.79-2.2	267755	3	6.5	12.8		SM	A-1-b	II
HB-EAMA-109, S10	97+00	9.0 Rt.	2.2-5.0	267756	3	22.5	93.6		CL	A-6	III
							L.L.	P.I.			
HB-EAMA-109, S10	97+00	9.0 Rt.	2.2-5.0	267756	3	22.5	33	12	CL	A-6	III
HB-EAMA-201, B1	66+00	8.5 Rt.	0.42-2.4	270096	4	1.9	7.2		GW-GM	A-1-a	0
HB-EAMA-202, B2	66+00	13.5 RT.	0.0-2.4	270097	4	2.4	9.5		SW-SM	A-1-b	0
HB-EAMA-203, B3	74+00	8.0 Lt.	0.67-2.8	270098	4	1.7	7.1		SW-SM	A-1-a	0
HB-EAMA-204, B4	74+00	13.0 Lt.	0.0-2.0	270099	4	5.8	31.7		SM	A-2-4	II
HB-EAMA-205, B5	82+00	10.0 Rt.	0.67-2.2	270100	5	2.1	5.5		GW-GM	A-1-a	0
HB-EAMA-206, B6	91+00	9.0 Lt.	0.58-2.1	270176	5	1.3	6.2		SW-SM	A-1-b	0
HB-EAMA-207, B7	99+00	14.0 Rt.	0.0-2.0	270177	5	2.0	11.4		SW-SM	A-1-b	0
HB-EAMA-208, B8	99+00	7.0 Rt.	0.67-2.7	270178	5	3.5	7.7		SW-SM	A-1-a	0

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MDOT and Corps of Engineers Classification Systems.

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

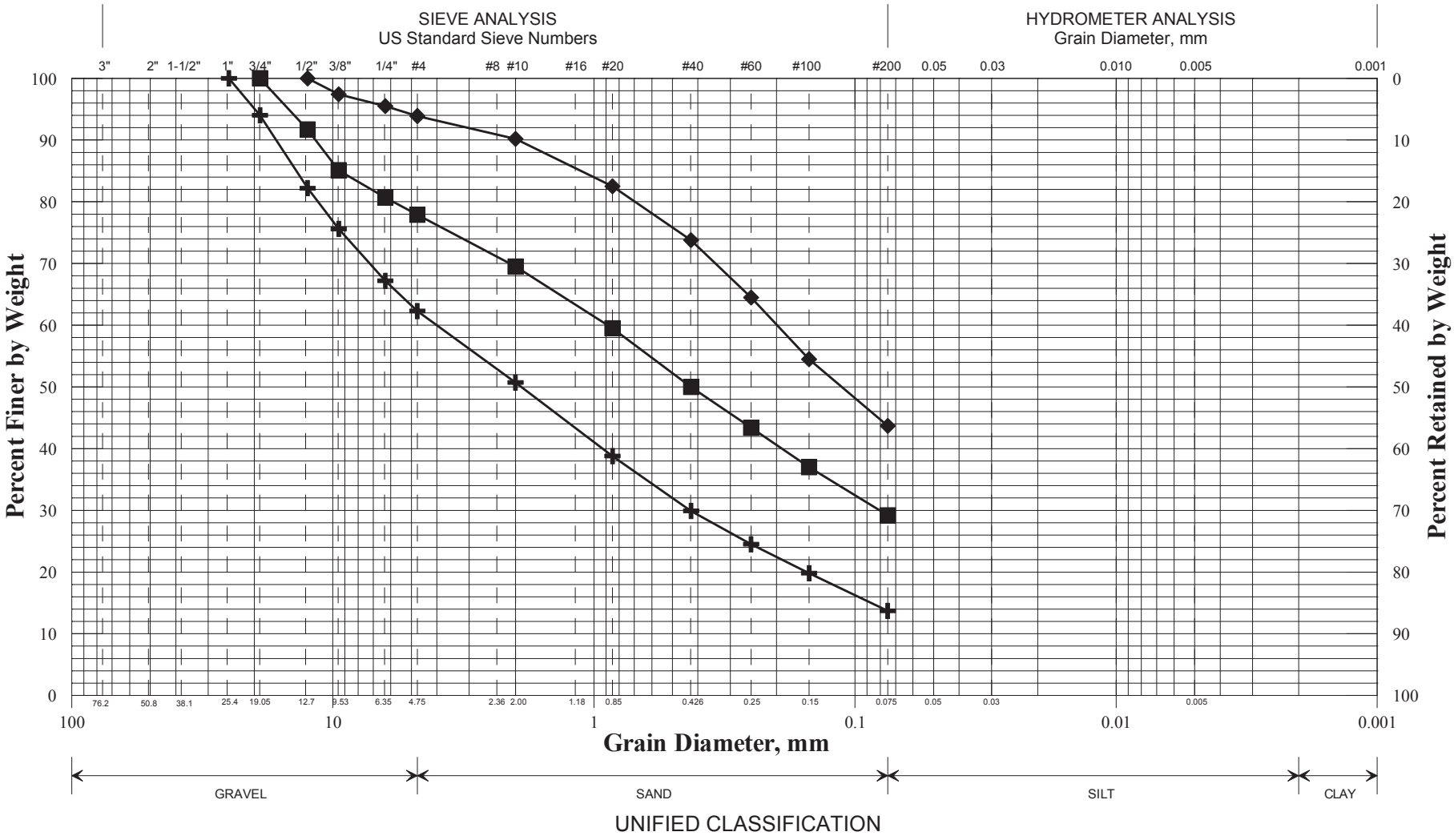
WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

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

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

State of Maine Department of Transportation

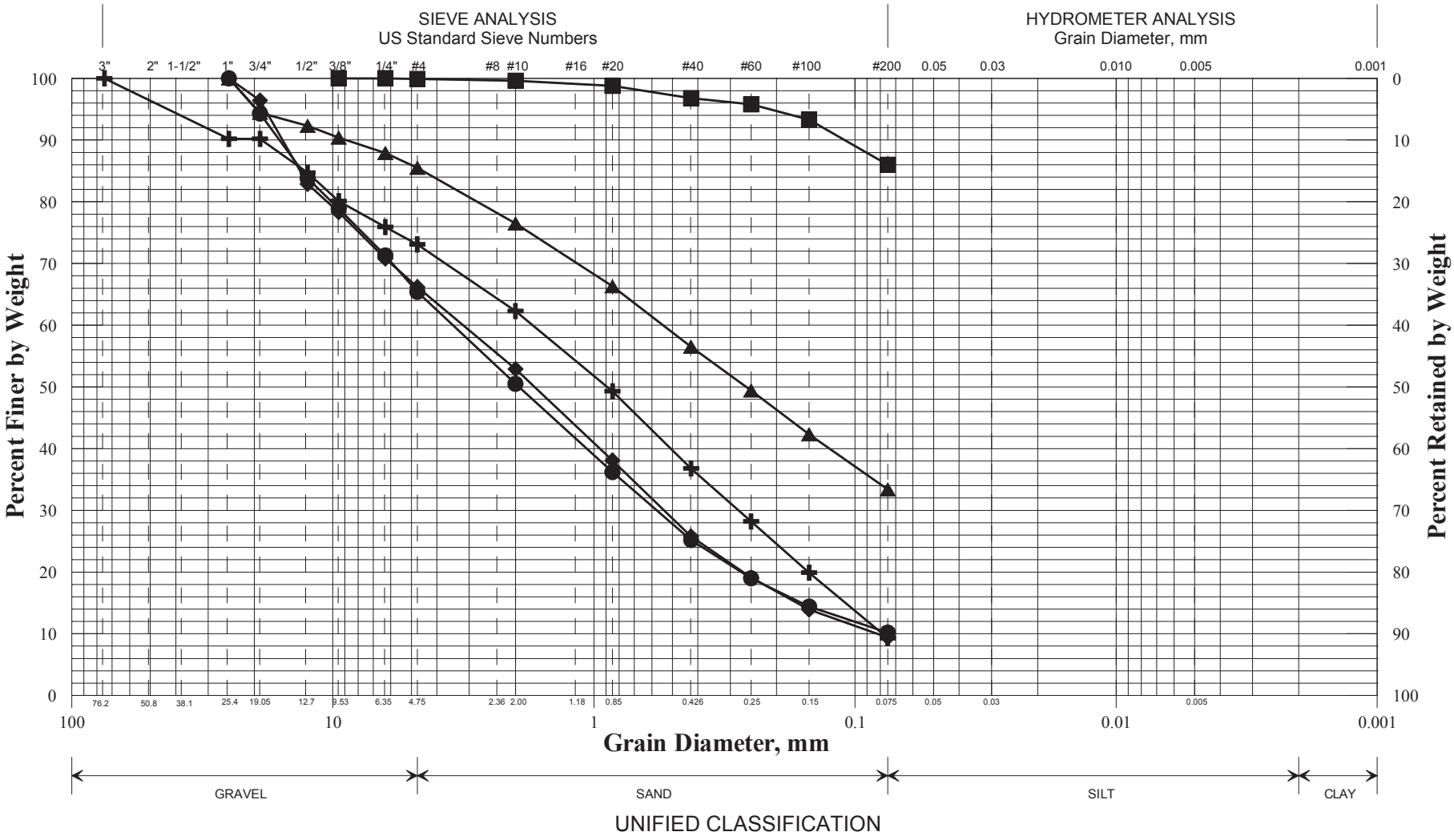
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-EAMA-101/S1	19+00	7.0 RT	0.5-2.4	Gravelly SAND, little silt.	4.0			
◆	HB-EAMA-101/S2	19+00	7.0 RT	2.4-5.0	Silty SAND, trace gravel.	29.9			
■	HB-EAMA-102/S3	19+00	13.0 LT	1.0-5.0	SAND, some silt, some gravel.	18.9			
●									
▲									
✖									

WIN
019198.00
Town
East Machias
Reported by/Date
WHITE, TERRY A 10/16/2012

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-EAMA-103/S6	40+00	9.0 RT	2.0-5.0	SAND, some gravel, trace silt.	21.0			
◆	HB-EAMA-105/S5	52+00	8.5 RT	0.75-1.3	SAND, some gravel, trace silt.	4.2			
■	HB-EAMA-105/S4	52+00	8.5 RT	1.3-5.0	SILT, little sand, trace gravel.	16.1			
●	HB-EAMA-106/S7	70+00	12.0 RT	0.0-2.4	SAND, some gravel, trace silt.	3.6			
▲	HB-EAMA-106/S8	70+00	12.0 RT	2.4-5.0	SAND, some silt, little gravel.	9.6			
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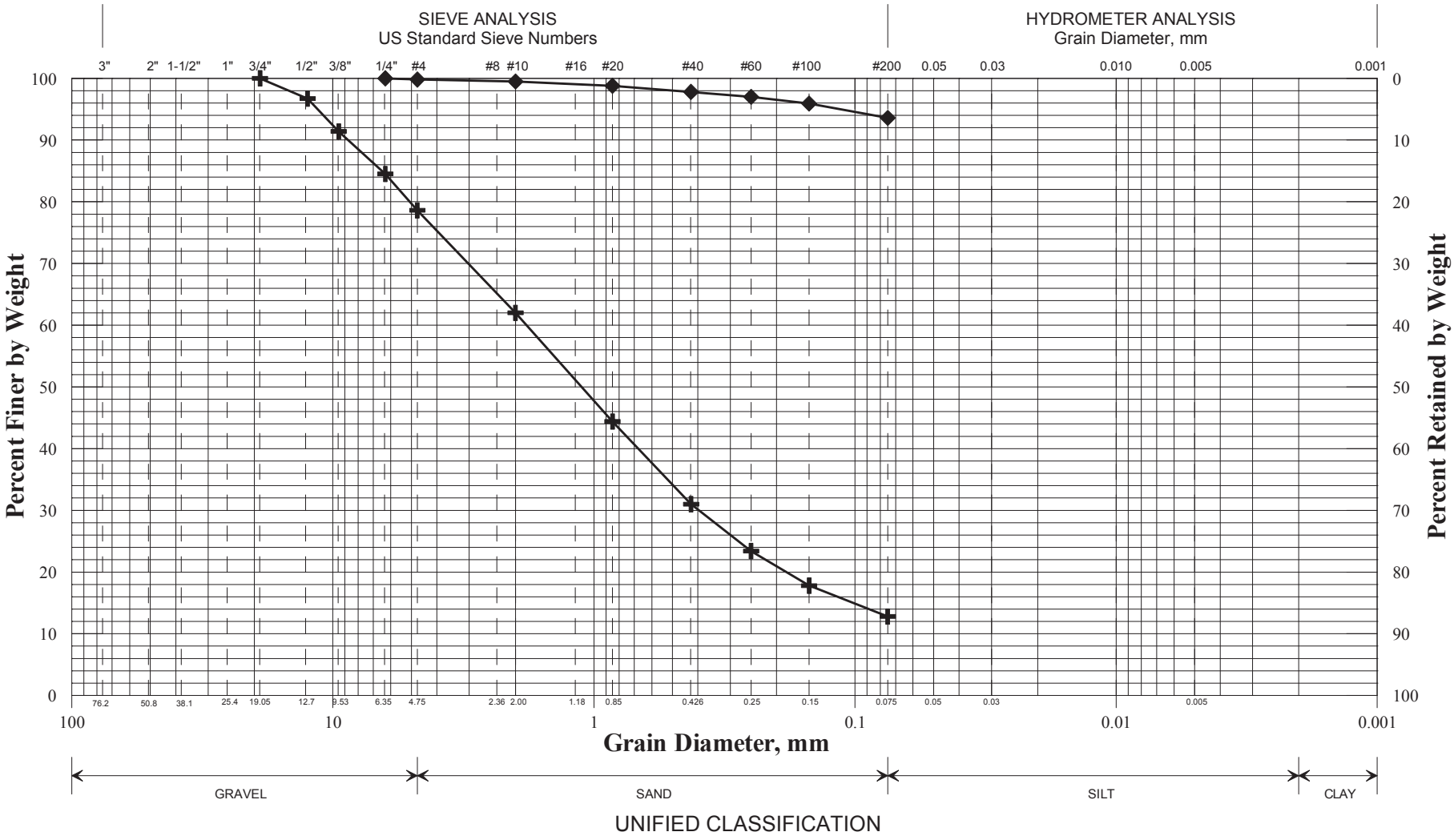
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-EAMA-109/S9	97+00	9.0 RT	0.79-2.2	SAND, some gravel, little silt.	6.5			
◆	HB-EAMA-109/S10	97+00	9.0 RT	2.2-5.0	SILT, trace sand, trace gravel.	22.5	33	21	12
■									
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Town
East Machias
Reported by/Date
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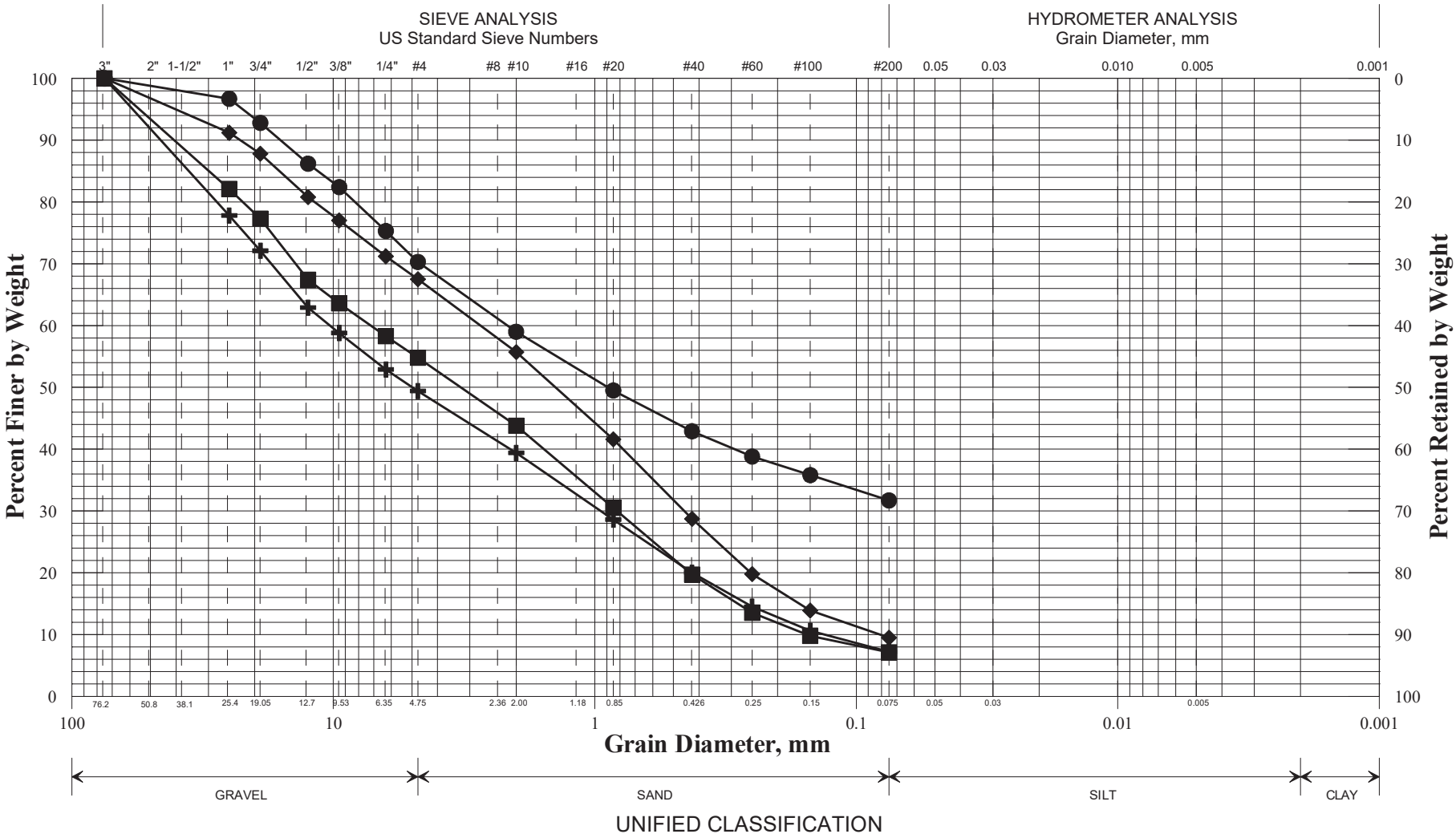
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-EAMA-201/B1	66+00	8.5 RT	0.42-2.4	Sandy GRAVEL, trace silt.	1.9			
◆	HB-EAMA-202/B2	66+00	13.5 RT	0.0-2.4	SAND, some gravel, trace silt.	2.4			
■	HB-EAMA-203/B3	74+00	8.0 LT	0.67-2.8	Gravelly SAND, trace silt.	1.7			
●	HB-EAMA-204/B4	74+00	13.0 LT	0.0-2.0	SAND, some silt, some gravel.	5.8			
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WIN
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Town
East Machias
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WHITE, TERRY A 7/12/2017

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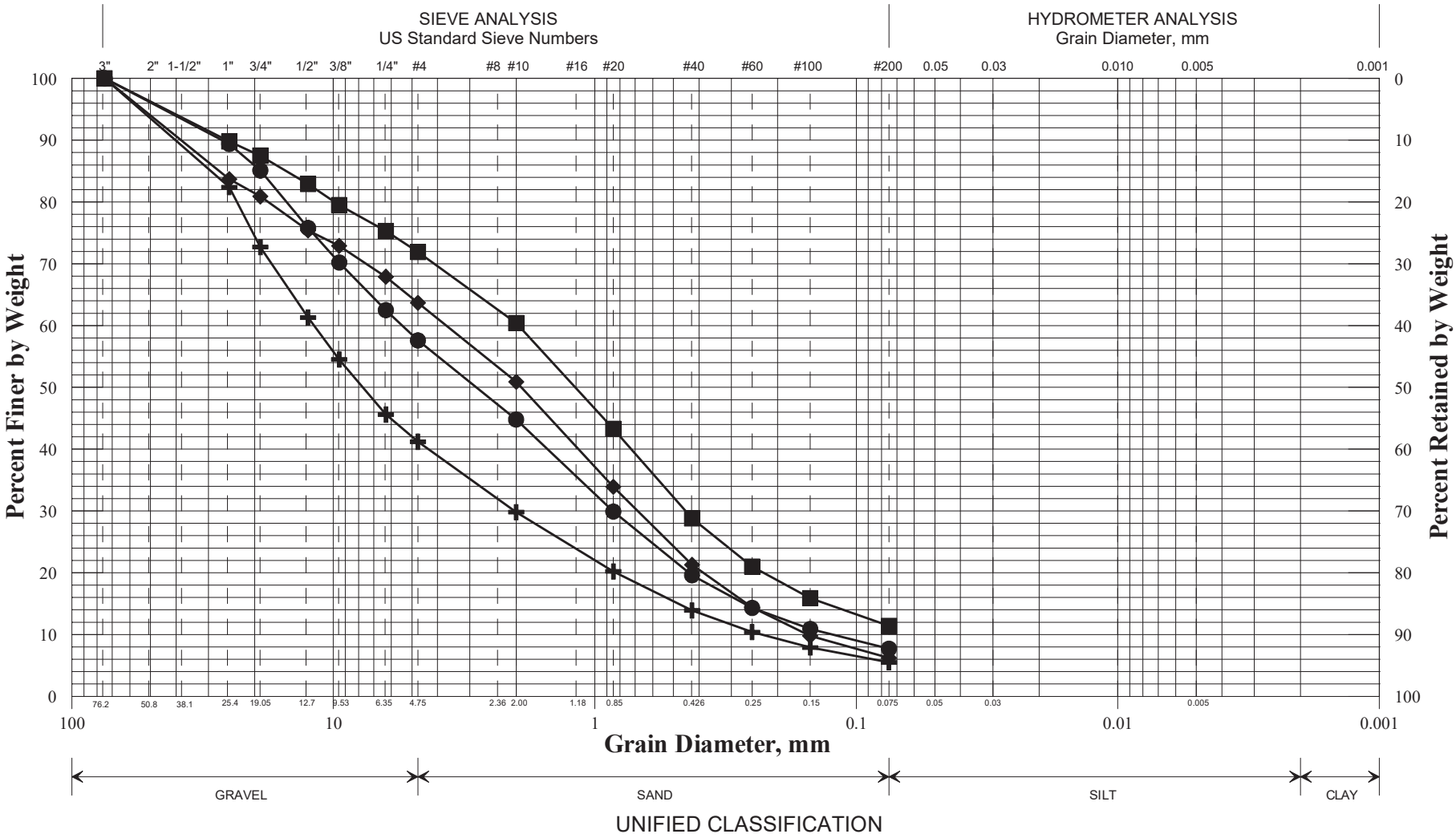
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-EAMA-205/B5	82+00	10.0 RT	0.67-2.2	GRAVEL, some sand, trace silt.	2.1			
◆	HB-EAMA-206/B6	91+00	9.0 LT	0.58-2.1	Gravelly SAND, trace silt.	1.3			
■	HB-EAMA-207/B7	99+00	14.0 RT	0.0-2.0	SAND, some gravel, trace silt.	2.0			
●	HB-EAMA-208/B8	99+00	7.0 RT	0.67-2.7	Gravelly SAND, trace silt.	3.5			
▲									
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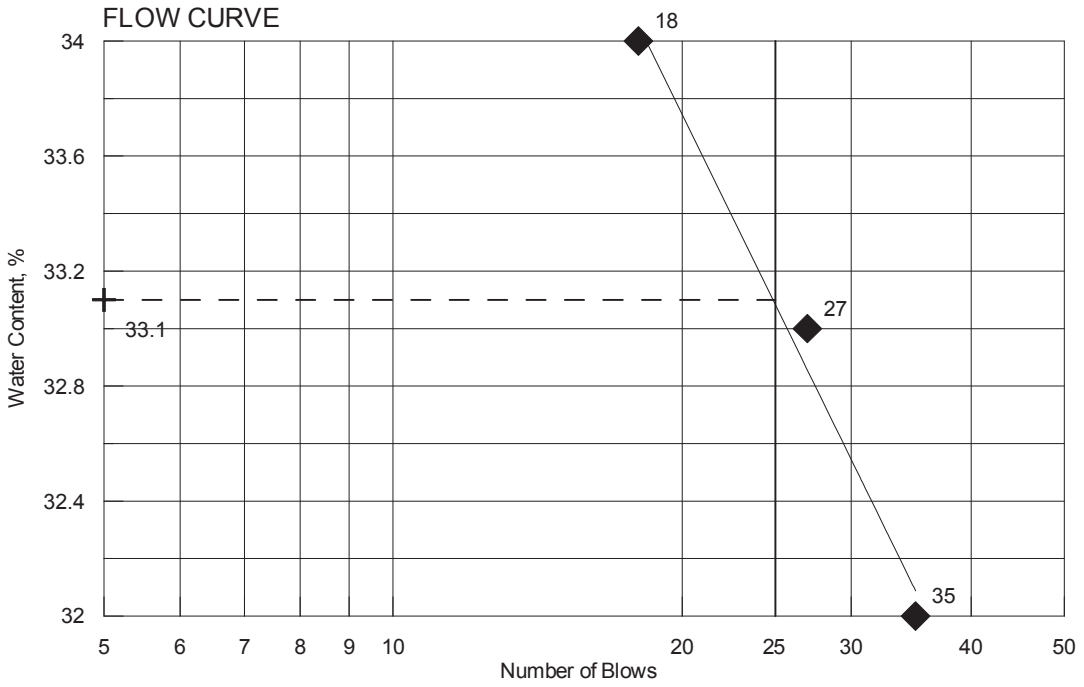
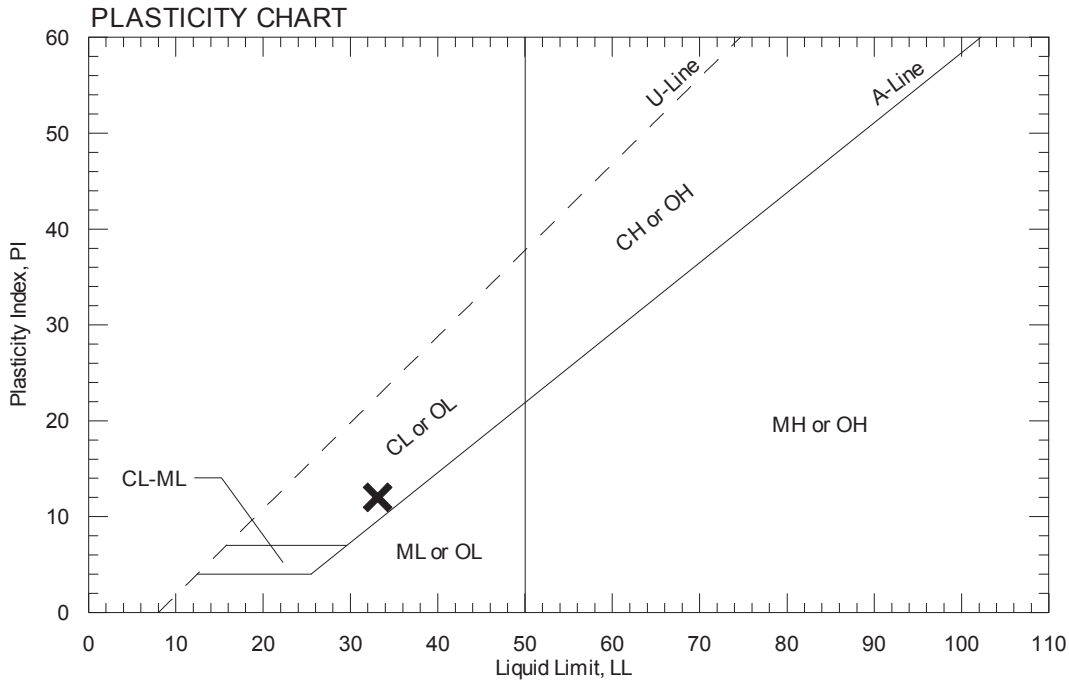
WIN
019198.00
Town
East Machias
Reported by/Date
WHITE, TERRY A 7/12/2017

TOWN	East Machias	Reference No.	267756
WIN	019198.00	Water Content, %	22.5
Sampled	9/27/2012	Liquid Limit @ 25 blows (T 89), %	33
Boring No./Sample No.	HB-EAMA-109/S10	Plastic Limit (T 90), %	21
Station	97+00	Plasticity Index (T 90), %	12
Depth	2.2-5.0	Tested By	BBURR





Appendix C

Special Provision

SPECIAL PROVISION
SECTION 620 – GEOTEXTILES
(Reinforcement Geogrid)

Amend Standard Specification 620 – GEOTEXTILES to include the following:

620.01 Description This work shall consist of furnishing and installing Reinforcement Geogrid within the Culvert Bedding Stone in accordance with these specifications and in reasonably close conformity with the lines, grades, and dimensions shown on the plans or as directed by the Resident.

620.02 Material Reinforcement Geogrid shall consist of a regular network of integrally connected, polymeric tensile elements with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil, aggregate or other material. The Reinforcement Geogrid structure shall be dimensionally stable to retain its geometry under construction stresses and shall have high resistance to damage during construction, ultraviolet degradation, and all forms of chemical and biological degradation encountered in the soil being reinforced.

The Reinforcement Geogrid shall meet or exceed the Minimum Average Roll Values (MARV) of the properties in Table 1. Acceptable manufacturers for Reinforcement Geogrids must be approved by the Resident.

Table 1 - Physical Property Requirements
(Biaxial Reinforcement Geogrid)

Reinforcement Geogrid Mechanical Property	Test Method	Minimum Average Roll Value (MARV)[1]
Tensile strength at 5% Strain MD or XD	ASTM D 6637	1,200 lb/ft
Rib Junction Strength	GRI-GG2	1,000 lb/ft in both directions
Aperture Openings		Between 0.75 and 3 inches
Percent Open Area		50 to 80%

[1] Values are minimum average roll values determined in accordance with ASTM D 4759

A biaxial Reinforcement Geogrid shall be used in this application.

620.03 Placement Reinforcement Geogrid shall be installed, in accordance with the manufacturer's recommendations, unless otherwise modified by this Special Provision. The Reinforcement Geogrid shall be placed within the layers of Crushed Stone Bedding at the proper elevation and alignment as shown on the Plans or as directed by the Resident.

1. The Reinforcement Geogrid shall be placed in continuous longitudinal strips. Splicing along the length will not be allowed. Reinforcement Geogrid shall be oriented such that the roll length runs either parallel or perpendicular to the construction centerline. The Contractor shall verify correct orientation of the Reinforcement Geogrid.

2. Reinforcement Geogrid may be temporarily secured in-place with staples, pins, sand bags or backfill as required by fill properties, fill placement procedures, or weather conditions, or as directed by the Resident.

3. Coverage of less than 100 percent shall not be allowed.

4. The Reinforcement Geogrid shall be lightly anchored and pulled taut to reduce any slack as directed by the Resident.

5. Fill shall not be dumped directly onto the Reinforcement Geogrid. It shall be dumped at the edge of the Reinforcement Geogrid or on a previous course of fill with a minimum compacted depth of 8 inches.

6. The Reinforcement Geogrid shall be covered with fill materials within 7 days of placement to protect against unnecessary exposure.

7. Fill may then be pushed onto the Reinforcement Geogrid using a track mounted bulldozer. At no time shall construction equipment be allowed directly onto the Reinforcement Geogrid. Track mounted equipment shall be allowed on previous courses of fill with a minimum compacted depth of 8 inches. Smooth drum roller compaction equipment shall be allowed on previous courses of fill with a minimum compacted depth of 8 inches and spread fill with a minimum depth of 12 inches, loose measure. At no time shall rubber tired or sheeps-foot rollers be allowed onto the reinforced fill. Turning of vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the Reinforcement Geogrid. Sudden breaking and sharp turning shall be avoided. Equipment speeds over 10 MPH shall not be allowed.

8. Placement, spreading, and compaction of soil on top of the Reinforcement Geogrid shall advance from one end of the Reinforcement Geogrid and move towards the other. Care shall be taken to minimize the development of wrinkles and to ensure that the Reinforcement Geogrid doesn't move from its position during fill placement. A spotter shall observe all fill placement operations to ensure the Reinforcement Geogrid does not slip, achieves the minimum coverage specified on the Plans, and is not damaged by the work.

9. Fill shall be compacted as specified in (1) the Standard Specifications or (2) to at least 90 percent of the maximum dry density determined in accordance with AASHTO T-180, whichever is greater. Density testing shall be made at a minimum frequency of one (1) test per lift or as otherwise specified in the Standard Specifications. Care shall be taken not to drive test apparatus through the Reinforcement Geogrid tensile elements.

10. All rutting formed during construction shall be filled with new Culvert Bedding Stone. In no case shall rutting be filled by blading down

620.04 Overlap Adjacent rolls of Reinforcement Geogrid shall be overlapped a minimum of 1 foot.

620.05 Seams Seams along adjacent lengths of Reinforcement Geogrid shall be tied together with hog rings or cable ties every 3 to 6 feet.

620.06 Certification Prior to construction the Contractor shall submit to the Resident the Manufacturer’s certification that the Reinforcement Geogrid supplied has been evaluated in full compliance with this Specification and is fit for long-term, critical soil reinforcement applications.

The Contractor's submittal package shall include, but not be limited to, actual tests for tension/creep, durability/aging, construction damage, and quality control tensile testing.

620.08 Shipment, Storage, Protection, and Repair of Fabric The Contractor shall check the Reinforcement Geogrid upon delivery to ensure that the proper material has been received. Each Reinforcement Geogrid roll shall be shipped in a protective bag and clearly marked with roll number, lot number, geogrid style and principle strength direction. During all periods of shipment and storage, the Reinforcement Geogrid shall be protected from temperatures greater than 140°F and all deleterious materials that might otherwise become affixed to the Reinforcement Geogrid and effect its performance. The manufacturer's recommendations shall be followed with regard to protection from direct sunlight. The Reinforcement Geogrid shall be stored off the ground in a clean, dry environment out of the pathway of construction equipment.

Any Reinforcement Geogrid damage shall be repaired or replaced in accordance with the manufacturer's recommendations. The Contractor shall replace any Reinforcement Geogrid damaged during installation at no additional cost to the Department.

620.09 Method of Measurement Reinforcement Geogrid will be measured by the number of Square Yards of surface area installed. Overlaps for connections, splices, patches, and repairs of damaged Reinforcement Geogrid, etc. are incidental to this Pay Item.

620.10 Basis of Payment Reinforcement Geogrid placement will be paid for per Square Yard in-place which shall be full compensation for all off-loading, inspection, storage, labor, materials, equipment, tools and any incidentals to complete the installation.

Payment will be made under:

Pay Item	Pay Unit
620.65 Reinforcement Geogrid	Square Yard