Maine Department of Transportation
Highway/Bridge Program
Geotechnical Section
Augusta, ME

Geotechnical Design Report

for the Reconstruction of:

Route 202/11/17/100
Western Avenue
Augusta, Maine

Prepared by:
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Geotechnical Design Engineer

Kennebec County
WIN 4270.10

Soils Report No. 2013-19

May 20, 2013

Table of Contents

1.0 Introduction 1

1.1 Project Overview 1

1.2 Summary of Recommendations 1

2.0 Site and Subsurface Conditions 2

2.1 General Site Conditions 2

2.2 Mapped Soils Data 2

2.3 Subsurface Investigation 3

2.4 Existing Pavement 3

2.5 Native Soils 4

2.6 Subsurface Bedrock 4

2.7 Groundwater 5

3.0 Design Recommendations 5

3.1 Embankment Fills and Slopes 5

3.2 Cut Slopes 5

3.3 Retaining Walls 5

3.4 Bedrock Excavation 6

3.3 Pavement Design 6

3.4 Groundwater 6

3.5 Frost Action 7

4.0 Construction Considerations 7

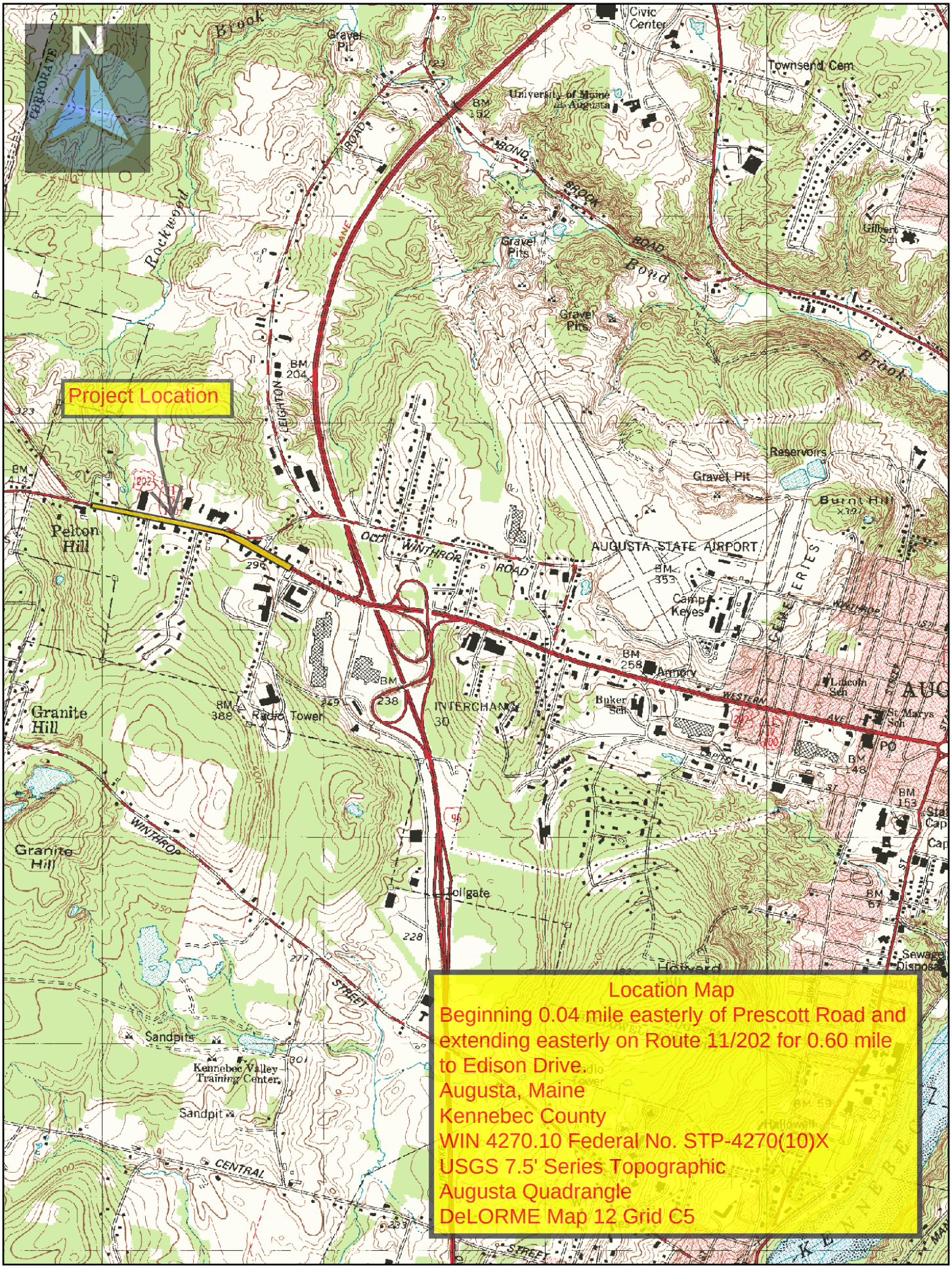
5.0 Closure 7

Appendix A
- Project Geoplans
- 1965 Plans
- 1936 Plans

Appendix B
- Soils Maps

Appendix C
- Boring Logs
- Laboratory Testing Data
- GPR Summary and notes

Appendix D
- Calculations



Map Scale 1:24000

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

1.0 Introduction

1.1 Project Overview

Maine DOT proposes to rehabilitate and widen a portion of Western Avenue (Route 202/11/17/100) in the City of Augusta. The project starts at the intersection of Prescott Road and extends 0.6 miles easterly, ending at the intersection of Edison Drive. The project includes rebuilding several intersections and adding a lane in each direction: the rebuilt highway will have two lanes in each direction with center turn lanes and islands.

An existing 3-foot wide by 4-foot high box culvert will be repaired and extended as part of this project. Existing Portland Cement Concrete (PCC) pavement will be removed and a new closed drainage system will be installed. Retaining walls will be constructed to minimize Right-of-Way impacts to abutting properties from widening this highway.

This report describes existing conditions and design details for this project.

1.2 Summary of Recommendations

Portland Cement Concrete pavement should be completely removed to allow changes in horizontal and vertical alignment.

Existing subbase materials do not meet MaineDOT specification for base and subbase materials. These materials are appropriate for use as borrow, but they should not be reused as gravel in this project.

Small Landscape block walls meeting the requirements of Special Provision 635 are appropriate for use on this project where retaining walls are needed.

2.0 Site and Subsurface Conditions

2.1 General Site Conditions

This portion of Route 201 in Augusta serves an area of business development, with car dealerships and smaller commercial developments on both sides of the highway. Much of the highway in this area has been rebuilt since original construction. The current project begins at the intersection of Prescott Road and extends easterly for a distance of 0.6 miles to Edison Drive. This section of highway was originally built in 1936 with Portland Cement Concrete (PCC) pavement over variable gravel base. Plans for reconstruction of the eastern portion of the project show that PCC pavement was removed as part of that project, however the concrete pavement is still in place for much of the project area. This highway has been widened and paved many times over the years, but it has never been built using appropriate aggregate materials across the full width of the section.

As-built plans from 1936 show PCC pavement 30-feet wide, although the transverse section on these plans is shown as 20-feet wide. Plans from 1965 also exist for reconstruction beginning 300 feet east of Smith Street and extending easterly. The scope for the current project includes complete reconstruction to include shoulders, sidewalks in some sections and a center turn lane from the intersection of Smith Street at Station 115+50 to Station 120+00 where a median island will begin. Most widening will take place on the Right (south) side of the roadway.

Original 1936 plans, plans for the 1965 reconstruction and current plans for this project are included as Appendix A to this report.

Closed drainage will be constructed, and retaining walls will be needed to limit impacts to abutting properties. A three-foot wide by four-foot high concrete box culvert carries Rockwood Brook under the highway. This culvert is hydraulically adequate, but the invert is deteriorated and fish passage is limited by high velocities. The culvert will need to be extended as part of this project, and the invert will require repair.

Native soils include sandy silts and silty sands. Some outcrops or large boulders are visible near the roadway and shallow refusals were encountered in several explorations.

2.2 Mapped Soils Data

The Maine Geologic Survey (MGS) Surficial Geology map for the Augusta Quadrangle shows native soils to be glacial Till in the area surrounding this project. Till soils are described as “Loose to very compact, poorly sorted, massive to weakly stratified mixture of sand, silt, and gravel-size rock debris deposited by glacial ice. Locally includes lenses of waterlaid sand and gravel. Boulders commonly present on ground surface.” No shallow bedrock is indicated at the roadway on this map, although areas of shallow bedrock are shown near the project.

Natural Resources Conservation Services (NRCS) maps include information on soils for the five feet below the surface; deeper soils are not discussed. Shallow bedrock is not shown on maps surrounding this roadway. Most soil units in this area are anticipated to be predominantly sand with as much as 35% silt and clay size particles.

The MGS Map of Bedrock Geology, Augusta Quadrangle, shows the bedrock in this area to be primarily Devonian granite, including several varieties of granite.

Portions of these soils maps that show this project are included in Appendix B to this report.

2.3 Subsurface Investigation

The preliminary subsurface investigation for this project was conducted in December, 2011 and included twelve solid stem auger borings. Boring locations were limited by underground and overhead utilities. Samples were taken off the auger flights for most explorations, however SPT testing was done in boring HB-AUG-103. These borings were extended to a depth of 7-feet unless refusal was encountered. An additional boring, HB-AUG-201 was done in January 2012 near the proposed culvert extension on the south side of the highway using SPT testing and split spoon sampling. Borings were also done in April, 1998, for preliminary scoping of a project in this area, with samples taken from the auger flights. Grain size analysis was done on thirteen samples from this project. No Falling Weight Deflectometer (FWD) testing was done because existing concrete pavement distorts the deflection basins provided by the falling weight. Ground Penetrating Radar (GPR) was done by MaineDOT to help determine the limits of existing concrete pavement. Depth to bedrock was also investigated using GPR.

Boring logs, laboratory testing data and the GPR summary are included as Appendix C to this report.

2.4 Existing Pavement

Ground Penetrating Radar was used to determine the width of the original concrete pavement section and the stations and location of concrete under the roadway. Portland Cement Concrete pavement was encountered from Station 97+00 to Station 114+00. The original PCC pavement section appears to have been 30-feet wide. At Station 97+00, the left edge of the concrete appeared to be 16 feet left of the existing centerline and the right edge appeared to be 14 feet right of the existing centerline. At Station 114+00, the left edge shows in GPR as 26.8 feet Left and the right edge shows at 3.2 feet Right. It appears that the roadway alignment must have shifted substantially since construction of the original concrete pavement. The GPR did not show reflections of PCC pavement beyond Station 114+00. The concrete edge summary is included in Appendix C.

The existing HMA pavement is in poor condition. No concrete pavement cores were taken and the condition of the PCC pavement is not known.

2.5 Native Soils

According to geologic mapping by MGS and NRCS, native soils in this area are predominantly sandy soils with varying amounts of silt. Our borings confirm this. The soils near the surface are generally medium dense. Soils near the roadway surface are gravelly sands with small amounts of silt, while soils with higher fines appear below the original roadway construction.

Table 1 shows the thickness and describes the subgrade soils encountered in borings for this project.

Table 1 – Existing Conditions

Station	Offset (ft)	HMA	PCC	Refusal	Subgrade soils
101+43	29 LT			14.3 ft	Silty SAND
103+00	3.7 RT	7 in		1 ft	
103+00	16.7 LT	7 in			SAND, some gravel, trace silt, wet clay at 3.1 feet
105+39	27.8 RT			8.1 ft	Wet, medium dense SAND, some gravel, little silt
106+24	10 RT			10.5 ft	Grey-brown sandy SILT
107+00	12 RT	7 in	7 in		Gravelly SAND, silty fine sand at 3 feet
108+16	50 LT				Brown sandy SILT
109+00	10.4 RT	7 in	7 in		Gravelly SAND, trace silt
110+50	7.8 RT	7 in	7 in	4.5 ft	Gravelly SAND, trace silt
111+00	7.0 RT	7 in	7 in		Fine SAND, little gravel, little silt
111+75	34.7 LT	6.5 in	6.5 in	4.5 ft	Gravelly SAND, trace silt
112+00	5.3 RT	7 in	7 in		Fine SAND, little gravel, little silt, silty SAND and 3 feet
113+60	1.4 RT	7 in		7.3 ft	Fine SAND, little gravel, little silt
113+95	50 LT			12.7 ft	Brown silty SAND with cobbles
115+00	7.8 RT	6.5 in		7.2 ft	Gravelly SAND, trace silt
116+00	25.5 LT	7 in		4.1 ft	Gravelly SAND, trace silt
119+78	55 LT			12.5 ft	Moist grey-brown sandy SILT
121+00	25 LT	7 in			Gravelly SAND, trace silt

2.6 Subsurface Bedrock

Shallow bedrock was encountered in many explorations for this project, and GPR testing was done to determine the depth to bedrock between borings. No bedrock cores were taken. GPR was done by MaineDOT from Station 110+00 to Station 110+88 and Station 114+80 to Station 115+78, both approximately 38-feet Left of the proposed centerline. The bedrock surface reflection appeared to be fairly uniform, with average depth of approximately 4.7-feet in area surrounding Station 110+50 and 4.2-feet in the area surrounding 115+00. These depths are consistent with refusals encountered in the borings, however GPR data is very sensitive to interpretation, and these depths should

be considered an estimate of depth to top of bedrock. Auger refusals are shown on Table 1.

2.7 Groundwater

Groundwater was encountered at Station 105+39, 27.8 feet Right, at a depth of 6.5 feet below the ground surface. No well was installed, and soils are described as wet at the surface. Groundwater may be closer to the surface than the boring log indicates – if the boring had been open for an extended period of time, a higher water level might have been apparent. This boring was near the proposed location of the culvert inlet extension. Wet soils were encountered at a depth of 10-feet at Station 101+43 in the 1998 boring; this may indicate subsurface flow patterns. Seasonal variations in depth to groundwater can be anticipated.

3.0 Design Recommendations

Deep cuts and fills are not required for this project. Proposed changes in the vertical alignment will require a maximum fill at the centerline of approximately 2-feet at Station 104+00. Cuts of up to five-feet will be required to widen the Right side of the road. The curb line on the Left side will remain close to its present location, with most new construction for turning lanes and center concrete islands on the Right side of the existing highway.

3.1 Embankment Fills and Slopes

Sliver fills will be placed on the Left side of the highway between Station 104+75 and Rockwood Brook to create a finished 2:1 slope. These small fills should be keyed into the existing slope to ensure that a slip plane is not created where benching is not required.

Substantial sections of new embankment will be constructed on the Right side of the highway between Station 104+00 and 106+50. Embankment fills on the Right will be approximately 5-feet high, with smaller fills on the Left side in this area. Stability is not a concern with these fill areas.

3.2 Cut Slopes

Soil cut slopes will be required in several places along this project for construction of shoulders and ditches, and where retaining walls will be required.

From Station 101+25 to 102+50, Right, 3-foot deep cuts will be required to provide a ditch along the proposed roadway. Sandy soils in this area can be expected in this area, and no stability problems are anticipated in these 2h:1v cuts.

3.3 Retaining Walls

Retaining walls will be required to minimize impacts to abutting properties. Retaining walls will be built from Station 110+05.75 Right to Station 111+36.86 Right, and from

Station 112+50 Right to Station 115+59.01 Right. Retaining walls will also be needed as headwalls and wingwalls for the culvert extension at Station 105+20.

The retaining walls used between Station 110+05 and Station 115+60 should meet the requirements of Special Provision 635, Small Wet-Cast Landscape Block Wall. The appearance of this type of block wall is appropriate to meet the Department's need for aesthetically pleasing low walls in this commercial area of the City. Dry-cast block walls will not be allowed on this project. MaineDOT has Special Provisions for block types that would be appropriate for the retaining walls used for wingwalls and headwalls at Station 105+20.

All retaining walls and wingwalls used on this project will be supplier-designed as required by the Special Provisions. Calculations are included in Appendix D. The following values should be used in the design of these walls:

Backfill ϕ	34°	
Subgrade δ	17°	mass concrete against silty sand
Factored bearing resistance		
Wingwalls and headwalls	3 ksf	for the Strength Limit State
Retaining Walls	5 ksf	for the Service Limit State

3.4 Bedrock Excavation

Bedrock excavation is anticipated for construction of underdrain in this project, and may be required for retaining walls and in isolated areas for construction of the pavement section. Bedrock refusal was encountered within 8-feet of the existing ground surface in many explorations throughout this project. The bedrock surface is not expected to be at a constant depth below ground surface, and no rock cores were taken. Final rock excavation quantities will be determined in the field.

3.3 Pavement Design

A Resilient Modulus of 3700 psi should be used to calculate the pavement structural section for this highway. This was determined from standard correlations using MDOT design charts and was based primarily on the fines content of the soils at pavement subgrade.

3.4 Groundwater

Free groundwater was not detected at shallow depths when this project was drilled in December, 2011, although wet soils are described in the boring logs. The boring at Station 105+39, 27.8 Right, drilled January 17, 2012, encountered groundwater at a depth of 6.5 feet below ground surface. Although this depth is well below the proposed culver invert, it is expected that groundwater elevation will be subject to seasonal variation. Groundwater may be a consideration during construction of the culvert extension.

3.5 Frost Action

The Design Freezing Index for Augusta is 1350 Fahrenheit degree-days. The freezing index can be used to calculate the depth of frost under the pavement section. Frost depth below a roadway depends on the Freezing index, grain size distribution of the subgrade soils, and the thickness of the pavement section. The design depth of frost in Augusta for a 30 inch total pavement section with a granular subgrade is 42 inches. Any lenses of water trapped above this depth will freeze and potentially distort the pavement section.

4.0 Construction Considerations

Dewatering of soils at the inlet and outlet may be required for construction in the dry of the wingwalls to be built for the culvert extension at Station 105+12.

5.0 Closure

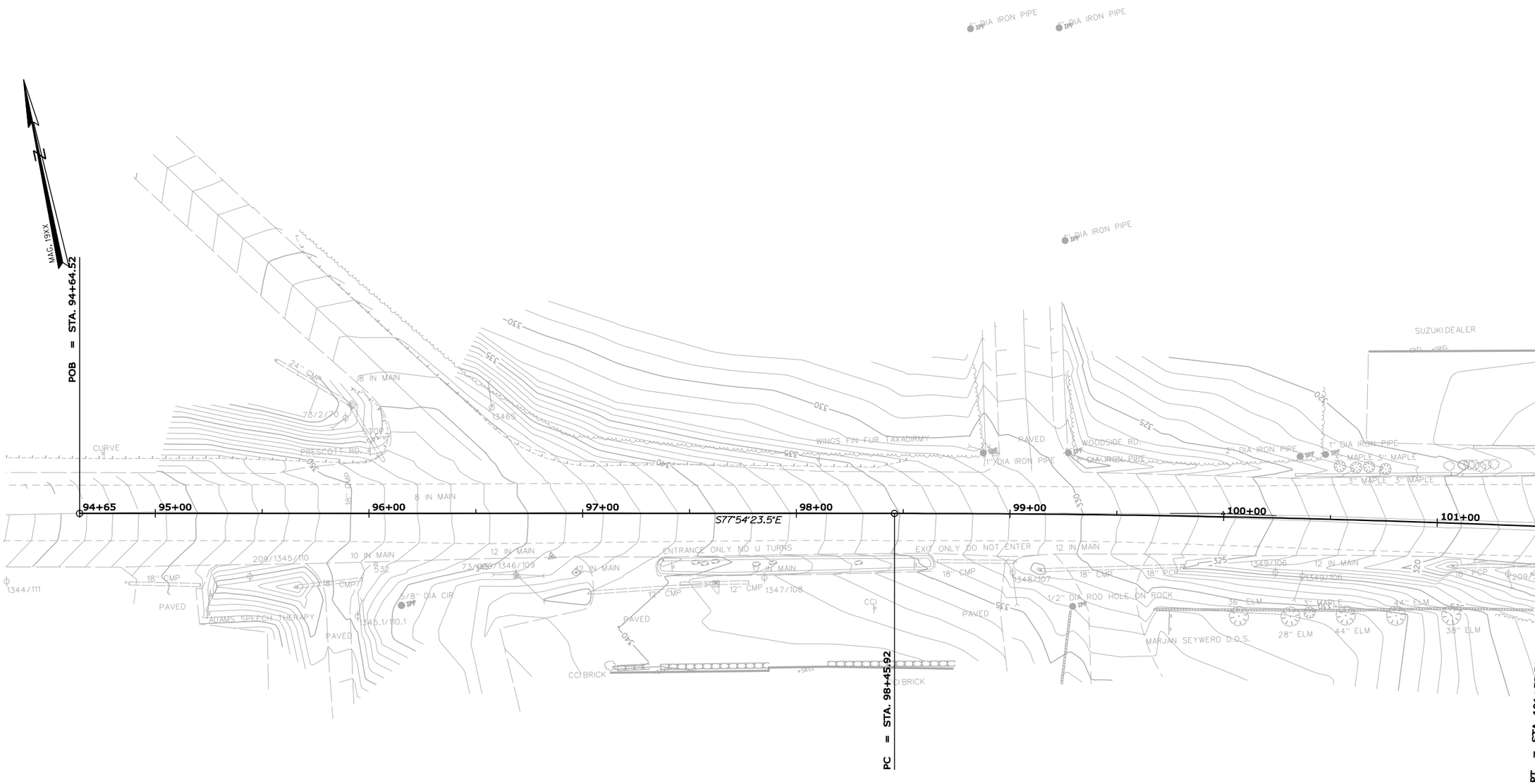
This report has been prepared for the use of the MaineDOT Highway Program for specific application to the proposed reconstruction of Western Avenue (Route 202/11/17/100) between Prescott Road and Edison Drive in Augusta. No other intended use or warranty is implied. In the event that any changes in the 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 recommendation as appropriate to reflect the changes in design. Further, the analyses and recommendations are based in part upon limited soil explorations at discrete locations 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.

Appendix A

Geoplans

1965 As-Built Plans

1936 As-Built Plans



LEGEND

SOLID/HOLLOW STEM AUGERS W/DESCRIPTIONS

SOLID STEM AUGER

CURVE DATA

PI = 99+99.78
D = 0° - 45' - 50.2"
Δ = 2° - 21' - 01.7" Rt.
R = 7500.00'
L = 307.68'
T = 153.86'
E = 1.58'

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-4270(10)X

WIN 4270.10

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.BRESKIN	APR 2012
CHECKED-REVIEWED		
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

P.E. NUMBER

DATE

AUGUSTA
ROUTE 202

GEOPLANS

SHEET NUMBER

1

OF 5

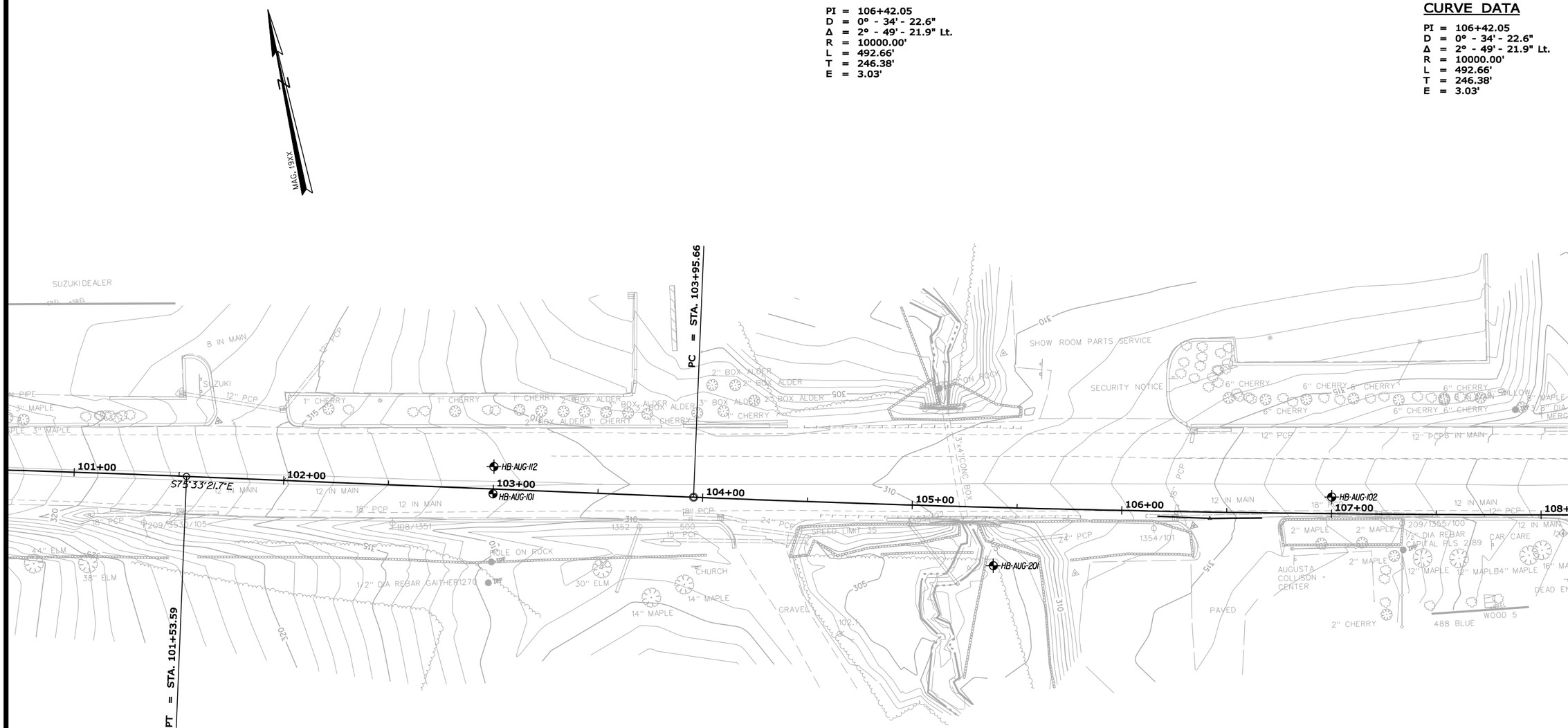
Filename: ...\GEOTECH\MSTA\001_Geoplan1.dgn Division: GEOTECH Username: terry.white Date:4/3/2012

CURVE DATA

PI = 106+42.05
D = 0° - 34' - 22.6"
Δ = 2° - 49' - 21.9" Lt.
R = 10000.00'
L = 492.66'
T = 246.38'
E = 3.03'

CURVE DATA

PI = 106+42.05
D = 0° - 34' - 22.6"
Δ = 2° - 49' - 21.9" Lt.
R = 10000.00'
L = 492.66'
T = 246.38'
E = 3.03'



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-4270(10)X

WIN 4270.10

HIGHWAY PLANS

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

SIGNATURE

P.E. NUMBER

DATE

AUGUSTA
ROUTE 202

GEOPLANS

SHEET NUMBER

2

OF 5

Filename: ...\geotech\msta\002_Geoplan2.dgn Division: GEOTECH Username: terry.white Date:4/3/2012

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

SIGNATURE

P.E. NUMBER

DATE

AUGUSTA
ROUTE 202

GEOPLANS

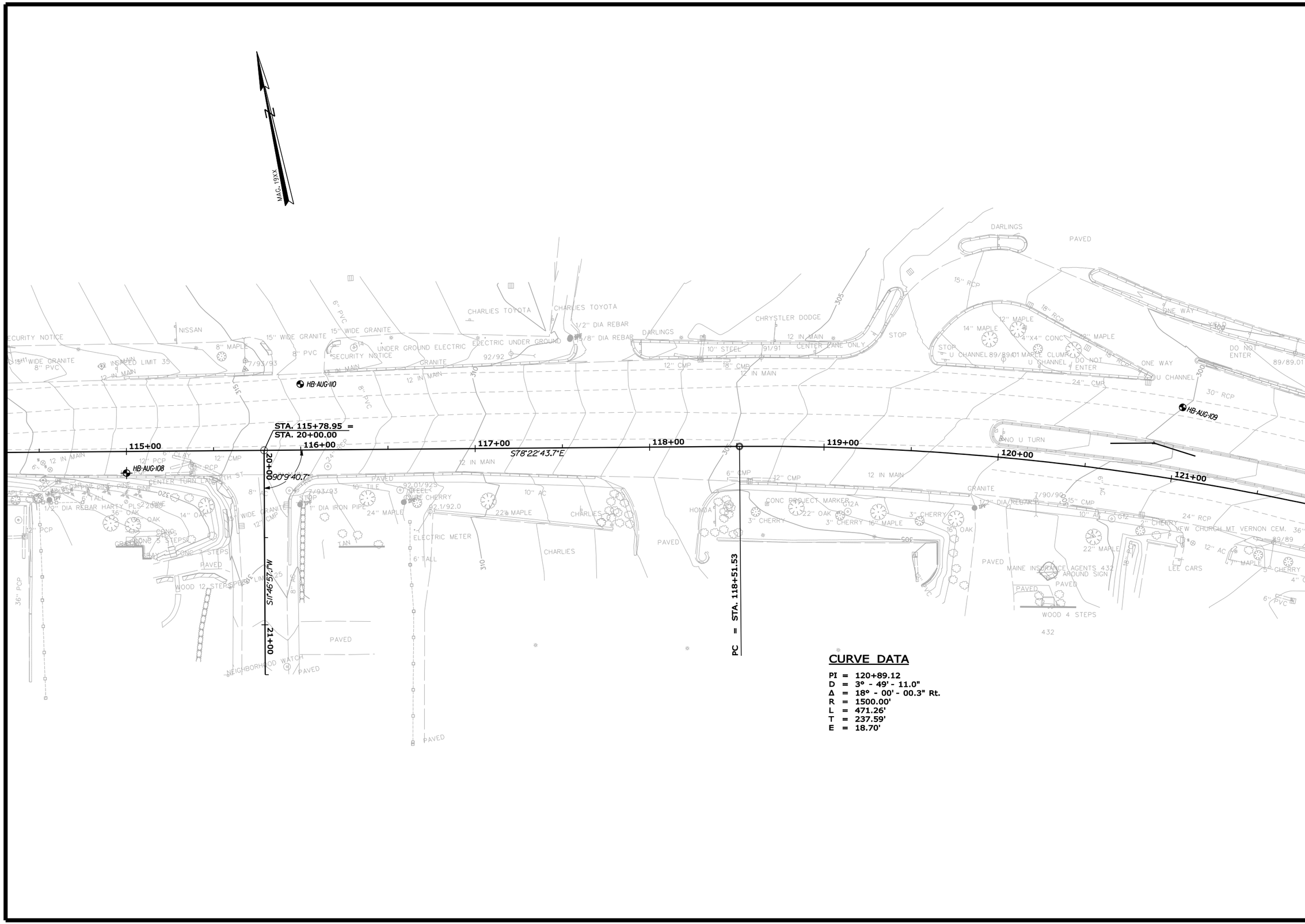
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-4270(10)X

WIN
4270.10

HIGHWAY PLANS

SHEET NUMBER
3
OF 5



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R = 1500.00'
L = 471.26'
T = 237.59'
E = 18.70'

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-4270(10)X

WIN 4270.10

HIGHWAY PLANS

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

SIGNATURE

P.E. NUMBER

DATE

AUGUSTA
ROUTE 202

GEOPLANS

SHEET NUMBER

4

OF 5

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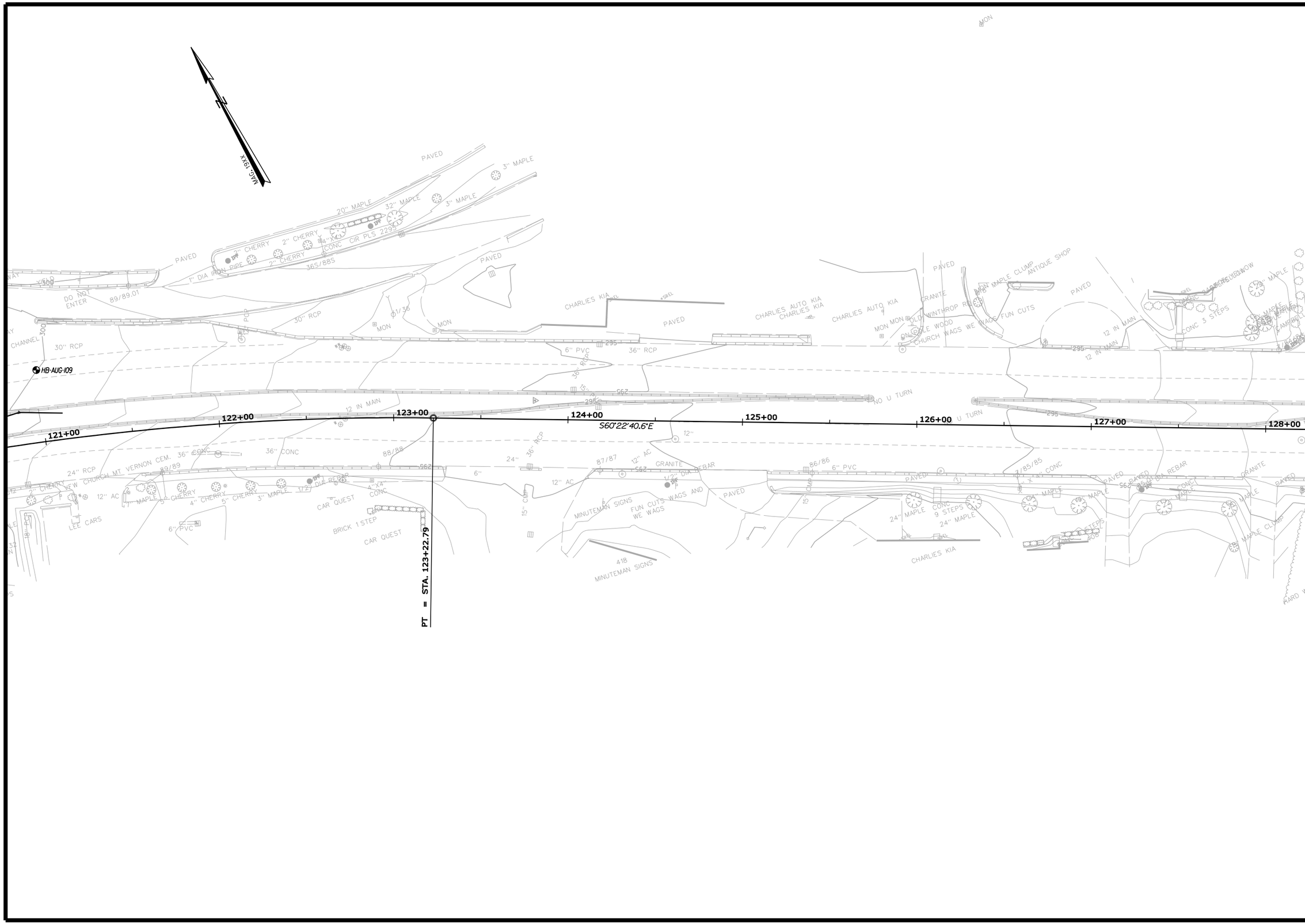

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STP-4270(10)X

WIN 4270.10

HIGHWAY PLANS

	BY	DATE
PROJ. MANAGER		
DESIGN-DETAILED	K.BRESKIN	APR 2012
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DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE

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DATE

AUGUSTA
ROUTE 202

GEOPLANS

SHEET NUMBER

5

OF 5

Filename: ...\geotech\msta\005_Geoplan5.dgn Division: GEOTECH Username: terry.white Date:4/3/2012

B.P.R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	U-015-1(14)	1	~~119~~ 123

AUGUSTA

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLANS

AUGUSTA
KENNEBEC COUNTY

MAINE FEDERAL AID URBAN
PROJECT NO. U-015-1(14)

TOTAL LENGTH 0.473 MILES

SCALES
- PLAN 1 IN. = 25 FT.
- PROFILE HOR. 1 IN. = 25 FT. / VER. 1 IN. = 5 FT. ---OR AS SHOWN
- CROSS SECTIONS 1 IN. = 5 FT. ---OR AS SHOWN

A GRADING, DRAINAGE, BASE AND PAVEMENT PROJECT

CONVENTIONAL SIGNS

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

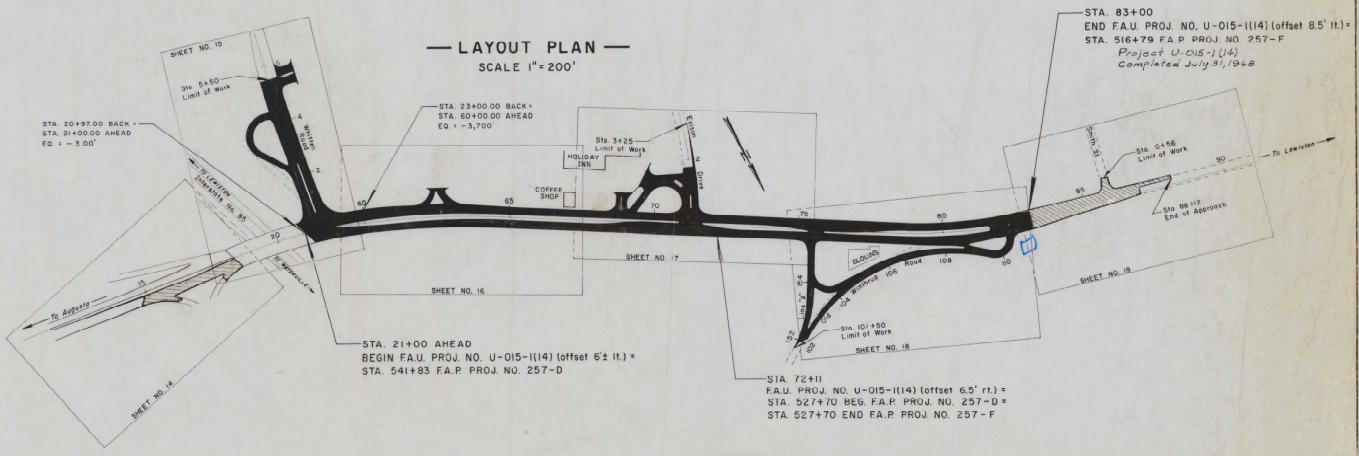
Microfilm #3 on Reel 154

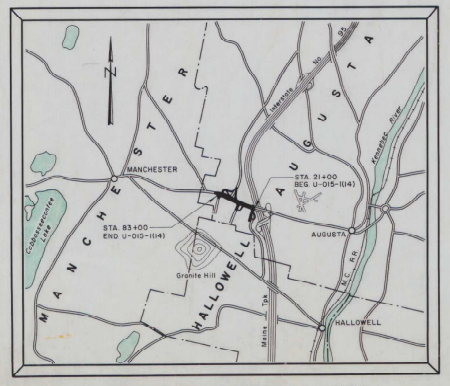
INDEX OF SHEETS

SHEET NO.	1	TITLE PAGE
SHEET NO.	2 & 3	TYPICAL SECTIONS
SHEET NO.	4 & 5	QUANTITIES
SHEET NO.	6 - 13	STANDARD DETAILS
SHEET NO.	14 - 27	PLAN AND PROFILE
SHEET NO.	28 - 109	CROSS-SECTIONS
SHEET NO.	110 - 119D	SPECIAL DETAILS

Sheets 111-119A,C & D Not

— LAYOUT PLAN —
SCALE 1" = 200'





A PORTION OF KENNEBEC COUNTY
SCALE 1 inch = 1 mile

— TRAFFIC DATA —

A.D.T. --- 1966 --- 10,760
A.D.T. --- 1986 --- 15,065
D.H.V. ---------- 1,507
T. --------- 10 %
D. -------- 65 %
V. -------- 53 M.P.H.

NOTE:
All Work Contemplated Under This Contract To Be Governed By And In Conformity With The Standard Specifications (revisions of June 1965) And Supplementals Thereto, Except As Modified On The Plans And In The Special Provisions.

APPROVED: MAINE STATE HIGHWAY COMMISSION	DATE
David A. Stevens, CHAIRMAN	OCTOBER 13, 1965
Carl M. Stilphen	OCTOBER 13, 1965
Bertrand G. Rackett	OCTOBER 13, 1965
Benjamin Hughes, CHIEF ENGINEER	OCTOBER 13, 1965

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
REGION 1

APPROVED:

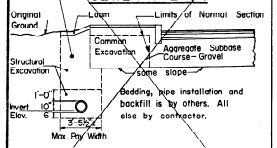
DIVISION ENGINEER DATE

S. P. R. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	U-015-1(14)	2	119

3" HOT BITUMINOUS PAVEMENT*
3" PLANT MIX BITUMINOUS BASE COURSE*

Backfill by contractor. Payment incidental to structural excavation.

SEWER TRENCH



Bedding, pipe installation and backfill is by others. All else by contractor.

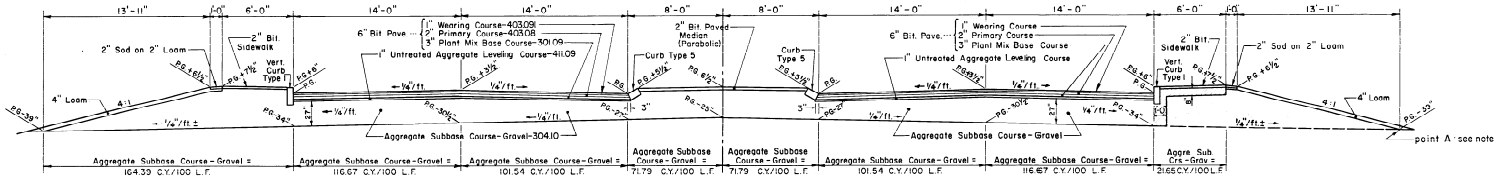
Cut and fill quantities, in ovals on sections, exclude areas enclosed by dotted lines which are extra for sewer. Size of these extra areas is shown, for each component, on sections.
For plan location see Sheet Nos. 115–117.

WATER LINE TRENCH

Contractor shall excavate to 6" below 12" pipe as shown on the cross sections. Bedding, pipe installation, and backfill to subgrade, will be by others.
For plan location see Sheet Nos. 114–117.

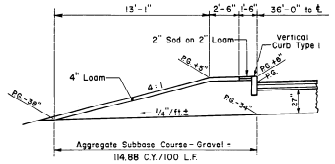
TELEPHONE DUCT TRENCH

Excavation, duct installation and backfill to subgrade is entirely by others.



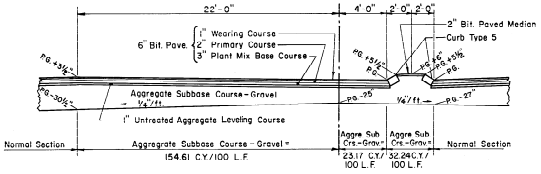
NORMAL

STA. 66+00 TO 67+00 AND ELSEWHERE, WITH MODIFICATIONS, AS INDICATED ON THE CROSS SECTIONS



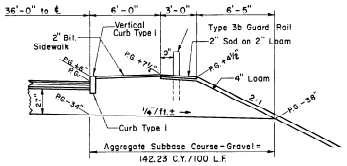
SHOULDER-WITHOUT SIDEWALK

FOR DETAILS NOT SHOWN SEE NORMAL SECTION



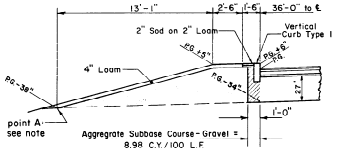
NARROW MEDIAN

STA. 69+75 TO 70+85 LEFT OF ℄
STA. 75+90 TO 76+57 AS SHOWN



SIDEWALK WITH GUARD RAIL

NOTE: If existing ground is below point A and below nearly all the dashed line, the shaded and cross-hatched areas will be aggregate subbase course-gravel, otherwise only the cross-hatched areas will be aggregate subbase course-gravel.



BOX-WITHOUT SIDEWALK

BITUMINOUS PAVEMENT DATA

DESCRIPTION	GRADATION	ITEM NO.	ASPHALT CONTENT = %	THICKNESS INCHES	NUMBER LAYERS	NOTES
Wearing Course	C-1	403.091	6.0 – 7.5	1	1	1, 2
Primary Course	C	403.08	5.0 – 6.5	2	1	1, 2
Plant Mix Base Course	B	301.09	4.8 – 6.0	3	2	1, 2
Sidewalk	C 2	608.09	6.2 – 7.5	2	2	1, 2, 3, 5
Levelling Course	B	403.07	4.8 – 6.5	Variable	–	1, 2, 4
Levelling Course	E	403.12	6.5 – 9.0	Variable	–	1, 2
Drives, Medians, Paved Downsouts and Misc. Locations	C-2	403.082	6.2 – 7.5	2	2	1, 2, 3, 5
Plant Mixed Surface Treatment	F	403.13	6.2 – 7.5	5/8 +	1	1, 2, 4

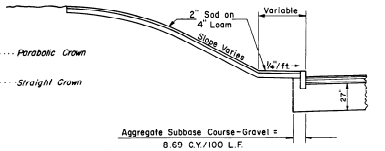
NOTES:
1. The bituminous binder material for the mixture shall be Penetration Grade (85–100) Asphalt Cement
2. The Asphalt Contents listed are to serve as a guide only and are not specifications.
3. Gradation C mixture may be used for the first layer at drives and sidewalks, with payment made under pertinent items 608.09 or 403.082.
4. The delineation of levelling course as Gradation B (item 403.07) or Gradation E (item 403.12) or Gradation F (item 403.13) shall be as shown on the typical sections and cross sections (Sheets 28–32)
5. At paved drives which have sidewalks on both sides, the bituminous pavement between the extended back and front lines of the sidewalk (shaded portion of sketch) shall be paid for under item no. 403.082

*NOTE: The pavement and base depths as shown on the plans are intended to be nominal.

NOTE: In calculating unit volumes of "aggregate subbase course - gravel", curbing was assumed as being of the following sizes:
Type I: 6" x 18" rectangle
Type 3a: 6½" high, 7½" wide, parabolic
Type 5: 6½" x 12" rectangle

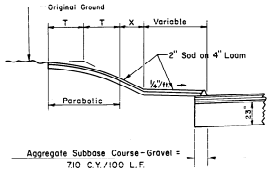
NOTE: CROWNS FOR NORMAL SECTIONS FOR PAVEMENT WIDTHS ONLY.

Top 3" Hot Bit. Pavement
Top 3" Plant Mix Base Crse.
Top 1" Untreated Aggre. Leveling Crse. } Parabolic Crown
Top of Aggre. Sub. Crse. – Gravel ····· Straight Crown

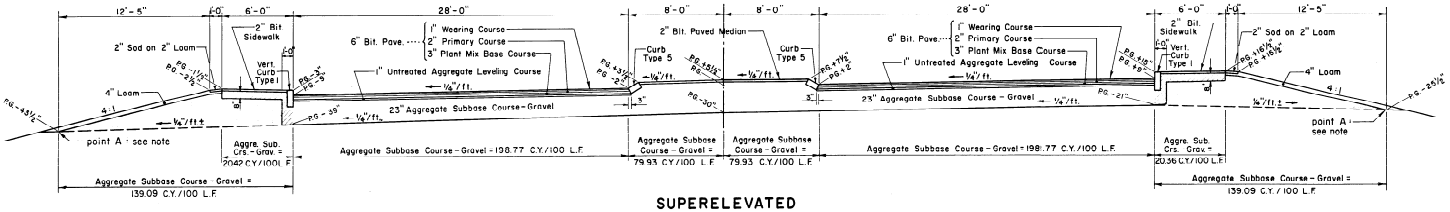


BERM WITHOUT SIDEWALK-CUT SECTION

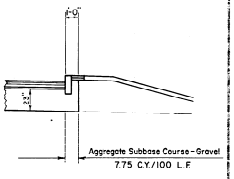
TOP OF CUT SLOPE
Where X+T is less than 2, T = 0.
Where X+T is between 2 and 7, X = 2.
Where X+T is more than 7, T = 5.
This formula may be modified by the engineer to safeguard trees and property.



CURB TYPE 3a NO SIDEWALK



SUPERELEVATED



BOX-WITHOUT SIDEWALK

DATE	BY	Drawn	Checked
1965			
1965			

Augusta U-015-1(14)

Fed. Road Dist. No.	State	Fed. Aid Proj. No.	Fiscal Year	Sheet No.	Total Sheets
8	Maine	257-F		1	23

STATE OF MAINE
STATE HIGHWAY COMMISSION

PLAN AND PROFILE
STATE HIGHWAY "E"
MANCHESTER - AUGUSTA
KENNEBEC COUNTY
FEDERAL AID PROJECT NO. 257-F

TOTAL LENGTH 1.515 MILES

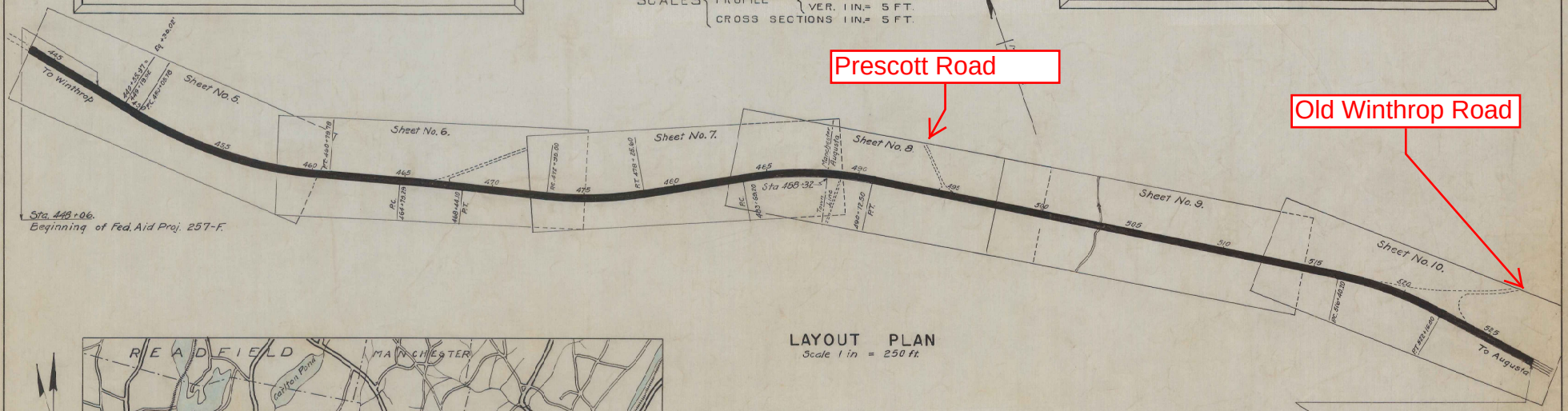
SCALES
- PLAN 1 IN. = 50 FT.
- PROFILE HOR. 1 IN. = 50 FT. / VER. 1 IN. = 5 FT.
- CROSS SECTIONS 1 IN. = 5 FT.

CONVENTIONAL SIGNS

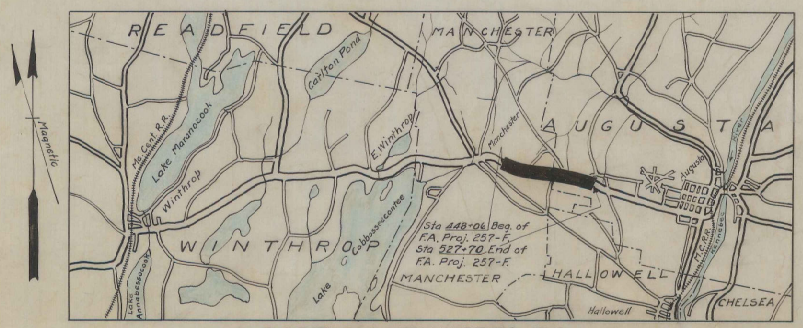
State or National Line	Survey Line
County Line	Culvert
Town Line	Drop Inlet
Unfenced Property	Trolley Pole
Fence	Power Pole
Right of Way Line	Tel. Pole
Traveled Way	Marsh
Railroad	Trees
Retaining Wall	Stone Wall

INDEX OF SHEETS

Sheet No. 1	Title Page	Sta. 448 + 06 to 527+70
Sheet No. 2 & 2A	Typical Sections	
Sheet No. 5 - 10	Plan and Profile	Sta. 448 + 06 to 527+70
Sheet No. 11 - 21	Cross-Sections	Sta. 448 + 06 to 527+70
Sheet No.	Bridges	Sta.
Sheet No. 3-3A & A	Special Details	



LAYOUT PLAN
Scale 1 in = 250 ft.



A PORTION KENNEBEC CO.

Note:
All work contemplated under this contract to be governed by and in conformity with the specifications as revised May 1935, except as modified on this plan.

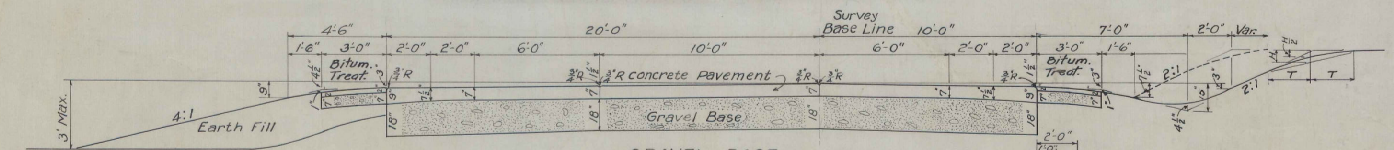
Approved:
Maine State Highway Commission
Paul R. Burnham, Chairman
Chief Engineer

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

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	257-F		2	28

CEMENT CONCRETE PAVEMENT

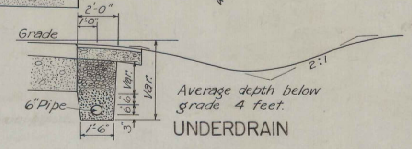
NOTE: Where Gravel Base is completed during 1936 Bituminous Treatment may be required over a width of 20 ft.



GRAVEL BASE
30' Roadway

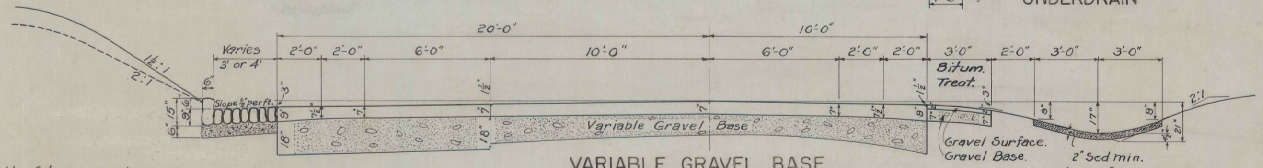
2" Gravel Surface Course = 1.85 C.Y. per 100 L.F.
7" Gravel Base Course = 6.48 C.Y. per 100 L.F.

Cement Concrete Pavement = 66.46 C.Y. per 100 L.F.
15" Gravel Base Course = 143.42 C.Y. per 100 L.F.
18" Gravel Base Course = 171.20 C.Y. per 100 L.F.



Average depth below grade 4 feet.

UNDERDRAIN



VARIABLE GRAVEL BASE

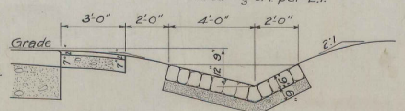
Depth of bases as shown may be changed to meet local conditions.

Where a 2:1 slope is not practicable, use a 1½:1 slope in cuts.

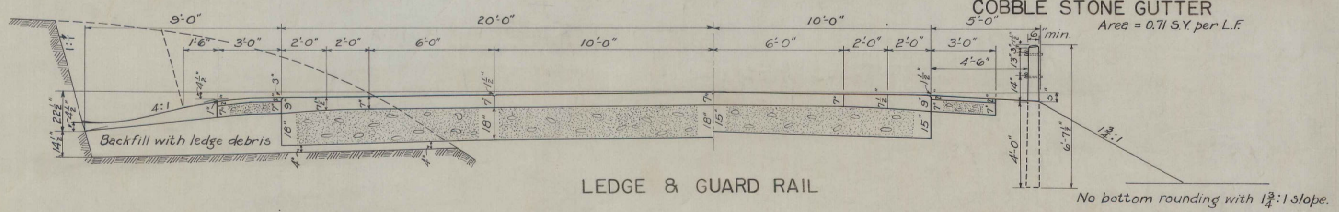
18" Gravel Base Course (under outside slab) = 5782 C.Y. per 100 L.F.

Over old pavement only
Sta. 448+06 to 449+50
Sta. 457+50 to 460+50
Sta. 468+0 to 476+90
Sta. 494+90 to 503+50
Sta. 513+50 to 515+0

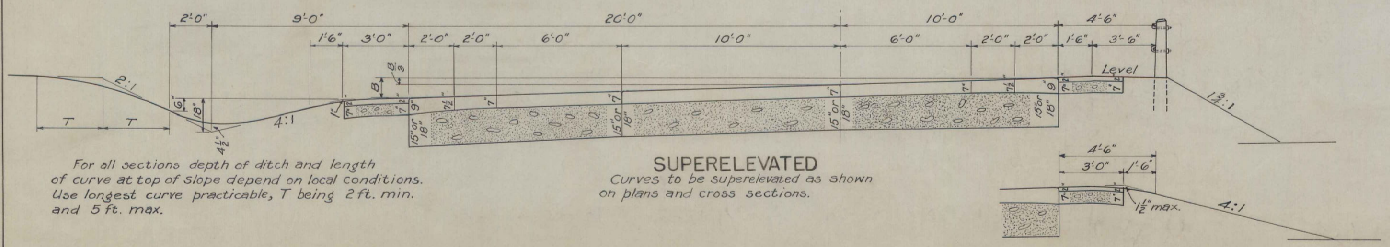
Minimum depth of Variable Gravel Base = 2 inches.
Minimum depth of existing surface and base = 15 inches.



COBBLE STONE GUTTER
Area = 0.71 S.Y. per L.F.



LEDGE & GUARD RAIL



For all sections depth of ditch and length of curve at top of slope depend on local conditions. Use longest curve practicable, T being 2 ft. min. and 5 ft. max.

SUPERELEVATED
Curves to be superelevated as shown on plans and cross sections.

TABLE OF FINAL QUANTITES			
ITEMS	DESCRIPTION	QUANTITY	UNIT
12-A	Earth Excavation	13,007	c.y.
12-B	Rock Excavation	306	c.y.
12-C	Trees Removed	16	each
13	Excavation for Struct.	1,399	c.y.
17-A	Common Borrow	990	c.y.
17-B	Gravel Borrow	608	c.y.
23	Gravel Base Course.	12,811.5	c.y.
27	Gravel Surface Course.	343	c.y.
31	Cmt. Concrete Pavt.	4,120.5	c.y.
32	Stl. Rein. for Con. Pavt.	279,613	lbs.
35-A	Class "A" Concrete.	6.2	c.y.
35-B	Class "B" Concrete	49.4	c.y.
36	Stl. Rein. for Con. Str.	994	lbs.
38	Cmt. Rubble Masonry.	17.4	c.y.
40-A	12" C.M.P.	278	l.f.
40-B	15" C.M.P.	86	l.f.
40-E	24" C.M.P.	50	l.f.
43-B	15" R.C.P.	260	l.f.
43-D	24" R.C.P.	152	l.f.
	6" V.C.P.	50	l.f.
44-C	12" V.C.P.	44	l.f.
44-D	15" V.C.P.	250	l.f.
44-E	18" V.C.P.	280	l.f.
45-A	Drop Inlets "A"	5	each.
45-B	Drop Inlets "B"	2	each.
45-C	Catch Basins	1	each.
48-A	Underdrain "A"	230	l.f.
48-B	Underdrain "B"	2,351	l.f.
49	Cobble Stone Gutter.	259.6	s.y.
51-A	Wire Cable Guard Rail	3531	l.f.
51-B	Anchorages for W.C.G.R.	22	each.
52	Loam.	4	c.y.
53-B	Seeding - Roadside.	179.5	T.S.F.
54	Sodding	1092	s.y.
55	Bituminous Treatment.	2652	gals.
57	Integral Conc. Curb.	3600	l.f.
58	Cmt. Concrete Base.	1348.5	c.y.
59	Tack Coat.	7,854	s.y.
60	Bit. Conc. Surf. Course.	7857.7	s.y.
61	Relaying 12" C.M.P.	78	l.f.
62	Relaying 18" C.M.P.	50	l.f.
	Liquidated Damages.	3	days.

NOTE:

PREMOULDED BITUMINOUS EXPANSION JOINT FILLER SHALL BE USED STA. 448+06 TO STA. 476+90 & STA. 494+90 TO STA. 527+70

PREMOULDED CORK EXPANSION JOINT FILLER AND TIE BARS SHALL BE USED STA. 476+90 TO STA. 494+90

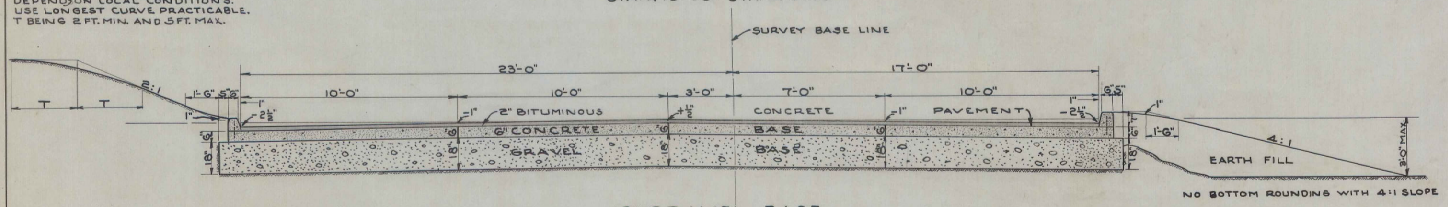
"E" Manchester – Augusta.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	257-F		2-A	23

BITUMINOUS CONCRETE PAVEMENT

STA. 476+90 - STA. 494+90

LENGTH OF CURVE AT TOP OF SLOPE DEPENDS ON LOCAL CONDITIONS. USE LONGEST CURVE PRACTICABLE. T BEING 2 FT. MIN. AND 5 FT. MAX.



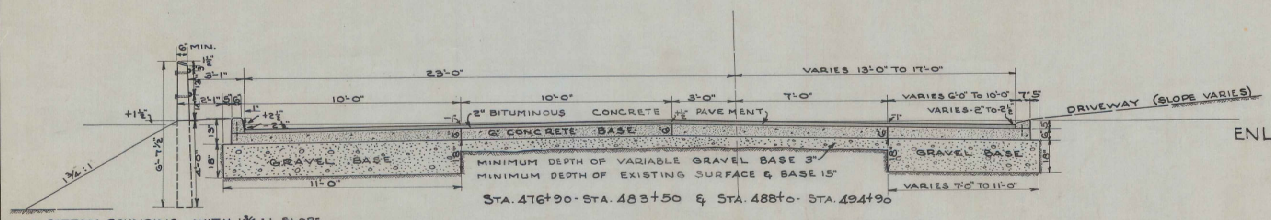
18" GRAVEL BASE

40' ROADWAY

2" BITUMINOUS CONCRETE SURFACE (40') = 444.71 SQ. YDS. PER 100 LIN. FT.
6" CONCRETE BASE (41'-2") = 76.23 CU. YDS. PER 100 LIN. FT.
18" GRAVEL BASE (42') = 233.33 CU. YDS. PER 100 LIN. FT.

CULVERT LIST

STA.	SIZE	KIND	LENGTH	REMARKS

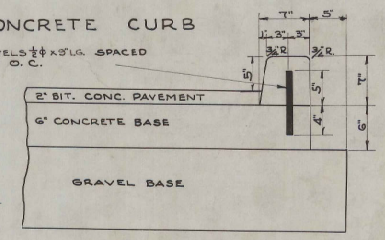


STA. 476+90 - STA. 483+50 & STA. 488+00 - STA. 494+90

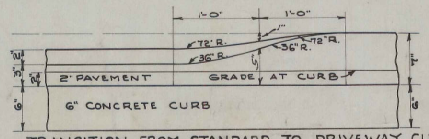
VARIABLE GRAVEL BASE & GUARD RAIL TRANSITION SECTION

2" BITUMINOUS CONCRETE SURFACE (36') = 400.26 SQ. YDS. PER 100 LIN. FT.
6" CONCRETE BASE (37'-2") = 68.83 CU. YDS. PER 100 LIN. FT.
18" GRAVEL BASE (17') = 38.80 CU. YDS. PER 100 LIN. FT.
18" GRAVEL BASE (11') = 21.11 CU. YDS. PER 100 LIN. FT.

ENLARGED INTEGRAL CONCRETE CURB

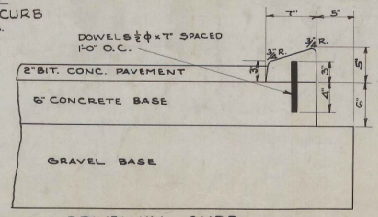


STANDARD CURB



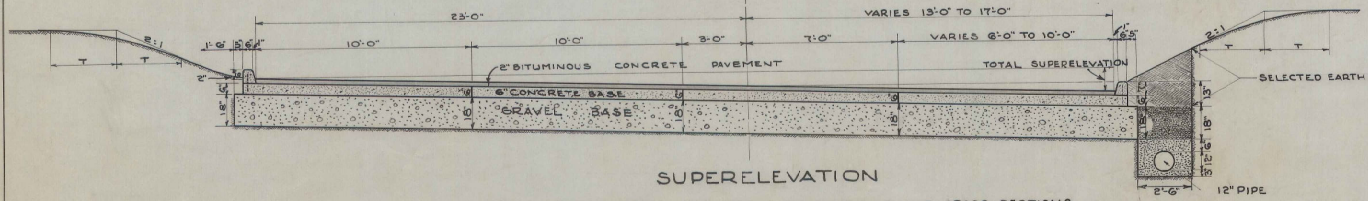
TRANSITION FROM STANDARD TO DRIVEWAY CURB

PAYMENT TO BE MADE AT THE PRICE BID PER LIN. FT. FOR CURB.



DRIVEWAY CURB

PAYMENT TO BE MADE AT THE PRICE BID PER LIN. FT. FOR CURB



SUPERELEVATION

CURVES TO BE SUPERELEVATED AS SHOWN ON PLANS AND CROSS SECTIONS

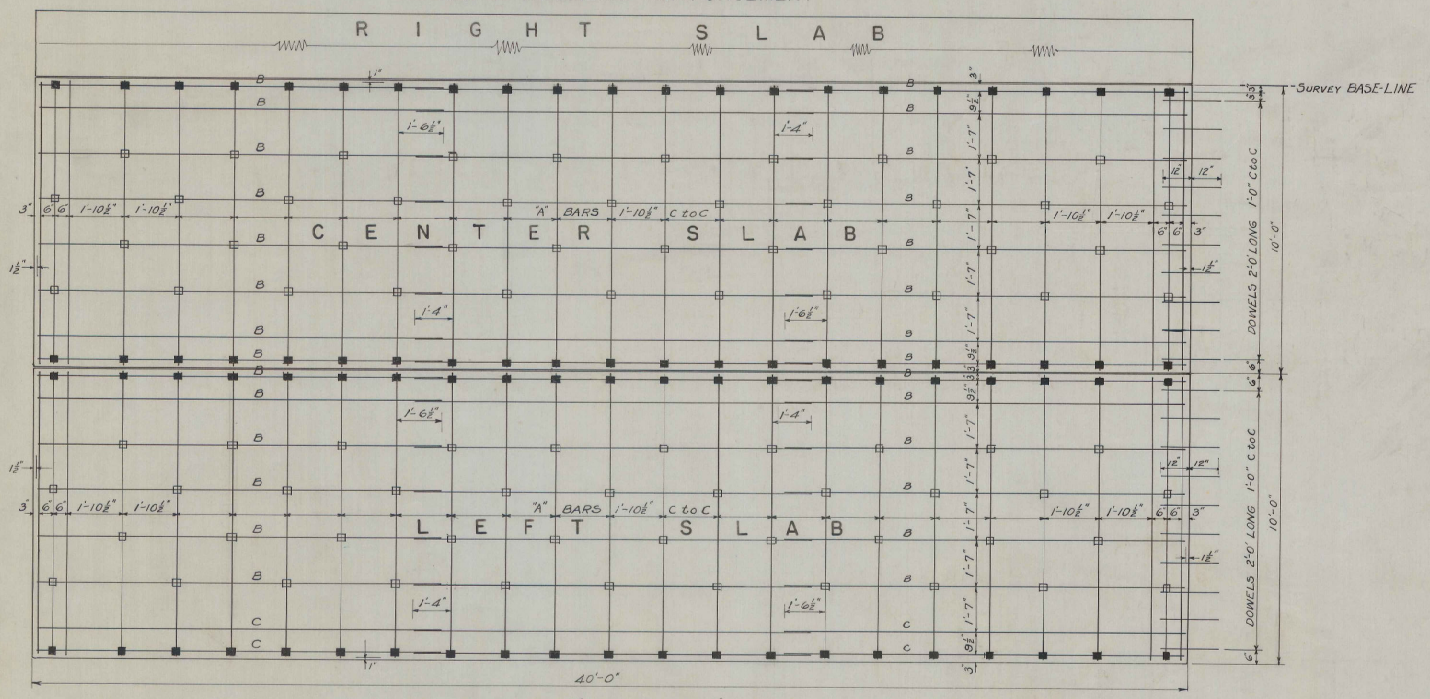
UNDERDRAIN TYPE "A"

NOTE: CONCRETE FOR CURB TO COMPLY WITH THE SPECIFICATIONS FOR CLASS "A" CONCRETE. PAYMENT TO BE MADE AT THE PRICE BID, PER LIN. FT., COMPLETE IN PLACE INCLUDING ALL MATERIALS, EXCEPT DOWELS TO BE PAID FOR UNDER THE ITEM OF REINF. FOR PAVEMENT.

"E" MANCHESTER - AUGUSTA

FED. ROAD DIST. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
9	MAINE	257-F		3	85

PLAN OF PAVEMENT REINFORCEMENT



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

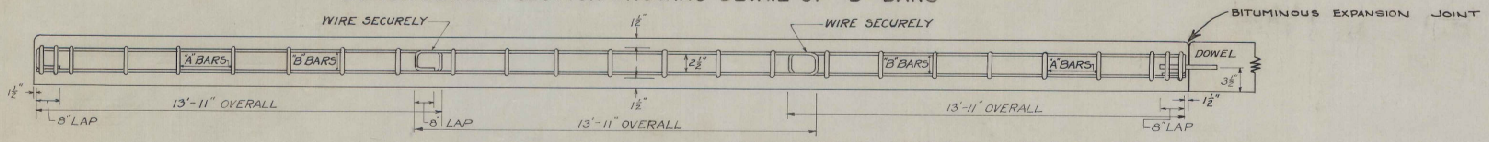
□ HIGH SUPPORTS
■ LOW SUPPORTS

REINFORCING DATA

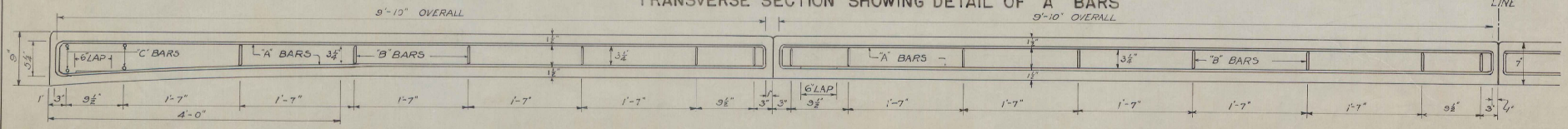
Bars $\frac{3}{8}$" Diameter. Plain Steel = 0.376 Lbs. per Lin. Ft.
Dowels $\frac{3}{4}$" Diameter. Plain Steel = 1.502 Lbs. per Lin. Ft.
"A" Bars Bent 9'-10" overall. Lapped 6" and wired.
"B" Bars Bent 13'-11" overall. Lapped 8" and wired.
"C" Bars Straight 13'-11" long. Top and Bottom.
Dowels 2'-0" Long.
Each Outside 10'×40' Slab contains 25 "A" Bars, 18 "B" Bars and 12 "C" Bars made up in 3 Sections.
The Center 10'×40' Slab contains 25 "A" Bars, and 24 "B" Bars made up in 3 Sections.
Each Section to be securely wired before placing.
Each 10'×40' Slab contains a minimum of 42 low Supports and 42 high Supports.
Total weight of steel including dowels for a 30 foot width of pavement 10.908 lbs. per sq. yd.

Dowels must be accurately held in place perpendicular to the plane of the cross section of the pavement. One-half of the dowel shall be coated with bituminous material sufficient to break the bond, and provided with a 6 in. approved tight fitting metal cap allowing a $\frac{3}{4}$ in. expansion.

LONGITUDINAL SECTION SHOWING DETAIL OF B BARS



TRANSVERSE SECTION SHOWING DETAIL OF A BARS

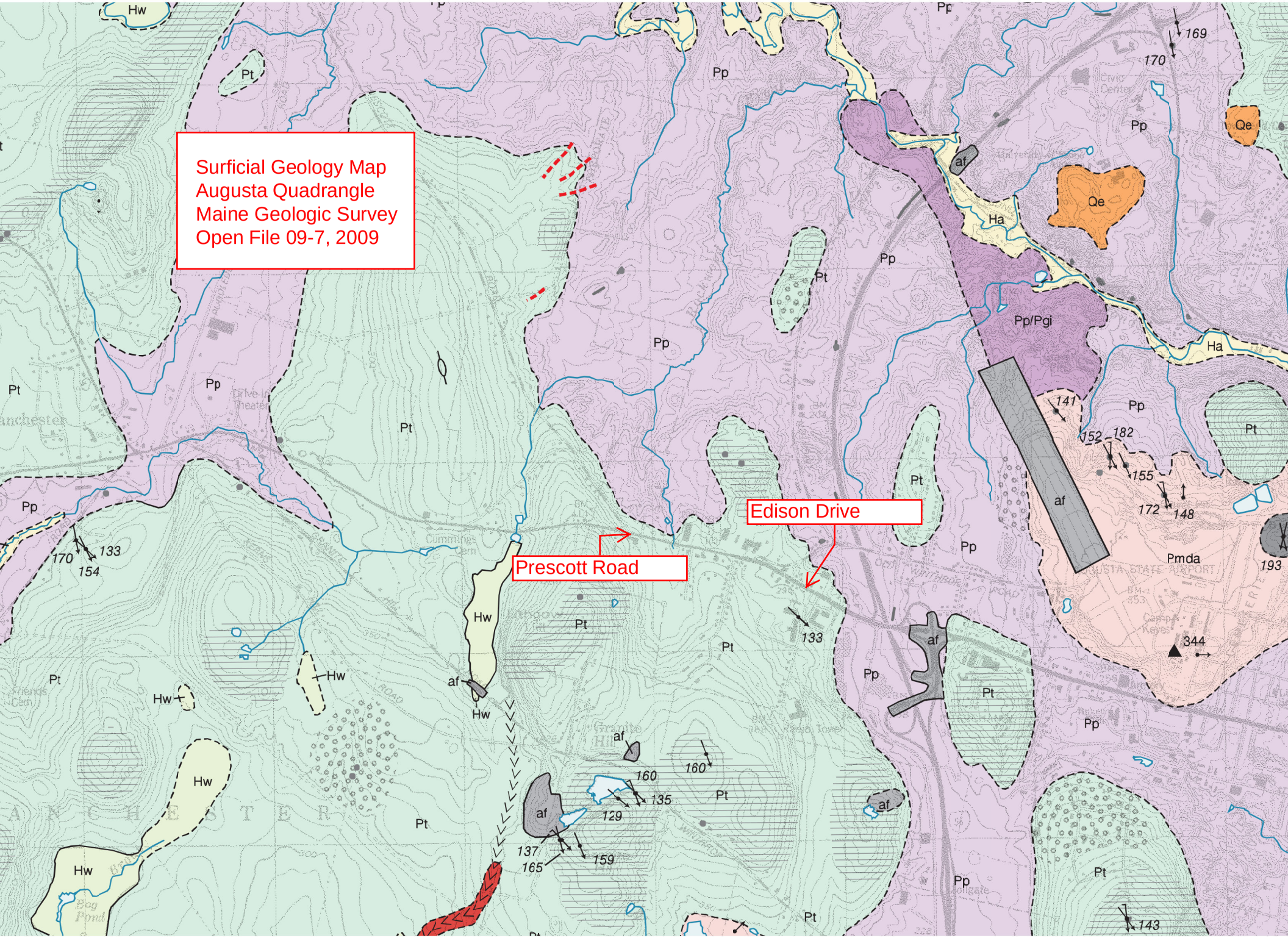


LEFT SLAB CENTER SLAB RT. SLAB

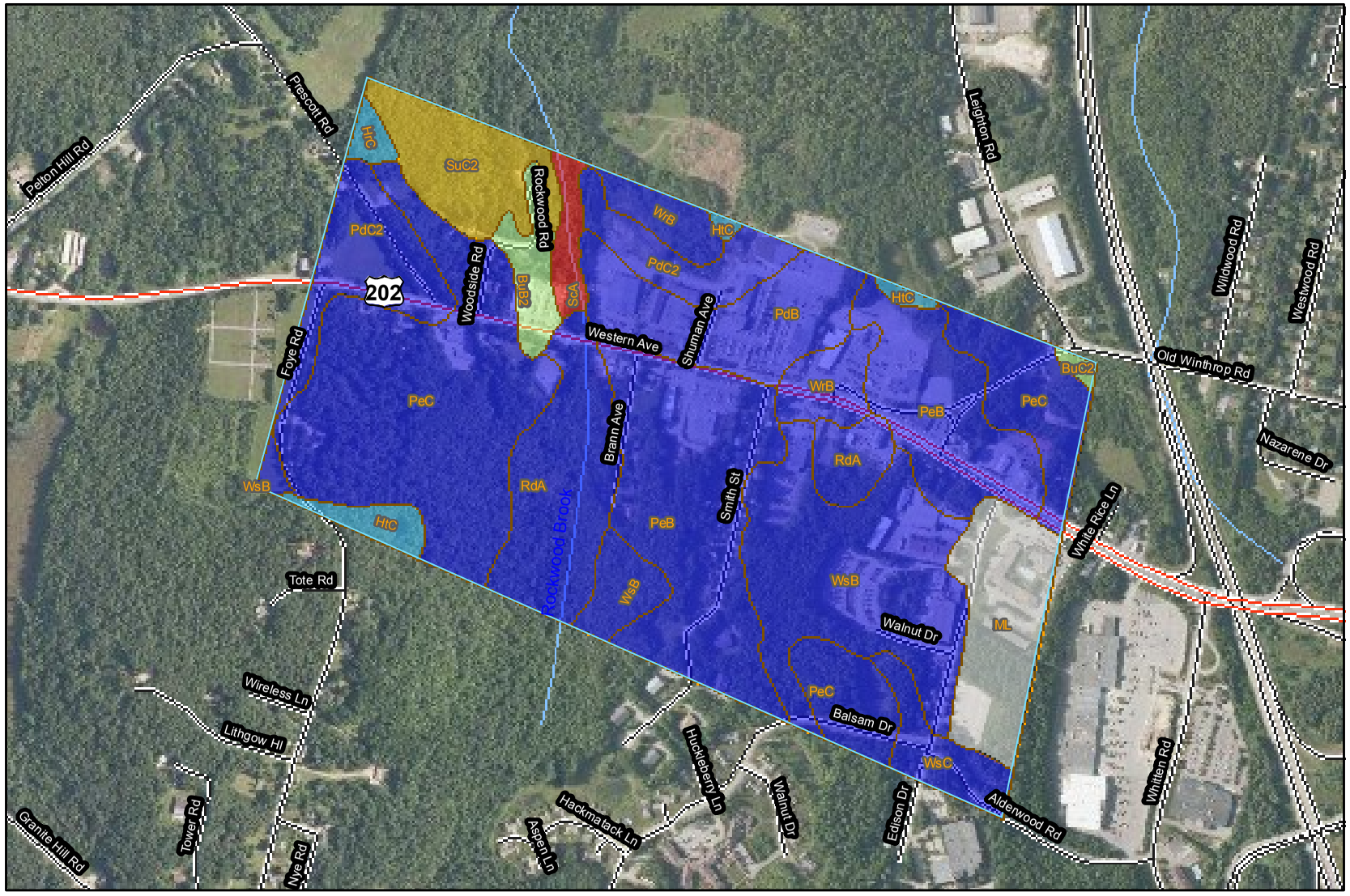
"E" Manchester-Augusta

Appendix B

Soils Maps


Surficial Geology Map
Augusta Quadrangle
Maine Geologic Survey
Open File 09-7, 2009
Edison Drive
Prescott Road
Pp
Pt
Hw
af
Ha
Qe
Pp/Pgi
Pmda
169
170
141
152
182
155
172
148
193
344
133
154
160
135
129
137
165
159
143

69° 50' 16"
69° 48' 34"
44° 19' 31"
44° 19' 32"



44° 18' 42"
44° 18' 43"
69° 50' 15"
69° 48' 33"

Map Scale: 1:10,800 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

<= 9.7

> 9.7 AND <= 12.2

> 12.2 AND <= 14.7

> 14.7 AND <= 60

> 60 AND <= 66

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:10,800 if printed on A size (8.5" × 11") sheet.

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

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

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

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

Soil Survey Area: Kennebec County, Maine
Survey Area Data: Version 11, Jul 27, 2009

Date(s) aerial images were photographed: Data not available.

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

Percent Sand

Percent Sand— Summary by Map Unit — Kennebec County, Maine (ME011)				
Map unit symbol	**Map unit name**	**Rating (percent)**	**Acres in AOI**	**Percent of AOI**
BuB2	Buxton silt loam, 3 to 8 percent slopes, eroded	14.7	4.8	1.9%
BuC2	Buxton silt loam, 8 to 15 percent slopes, eroded	14.7	0.6	0.3%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	60.0	1.4	0.6%
HtC	Hollis-Rock outcrop complex, 8 to 15 percent slopes	60.0	3.7	1.5%
ML	Made land		14.5	5.7%
PdB	Paxton-Charlton fine sandy loams, 3 to 8 percent slopes	66.0	16.3	6.5%
PdC2	Paxton-Charlton fine sandy loams, 8 to 15 percent slope s, eroded	66.0	19.4	7.7%
PeB	Paxton-Charlton very stony fine sandy loams, 3 to 8 per cent slopes	66.0	48.0	19.0%
PeC	Paxton-Charlton very stony fine sandy loams, 8 to 15 pe rcent slopes	66.0	58.0	23.0%
RdA	Ridgebury very stony fine sandy loam	65.7	21.9	8.7%
ScA	Scantic silt loam	9.7	3.1	1.2%
SuC2	Suffield silt loam, 8 to 15 percent slopes, eroded	12.2	11.4	4.5%
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes	66.0	8.8	3.5%
WsB	Woodbridge very stony fine sandy loam, 3 to 8 percent s lopes	66.0	34.4	13.6%
WsC	Woodbridge very stony fine sandy loam, 8 to 15 percent slopes	66.0	5.8	2.3%
Totals for Area of Interest			**252.3**	**100.0%**

Description

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the database, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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

Rating Options

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Interpret Nulls as Zero: No

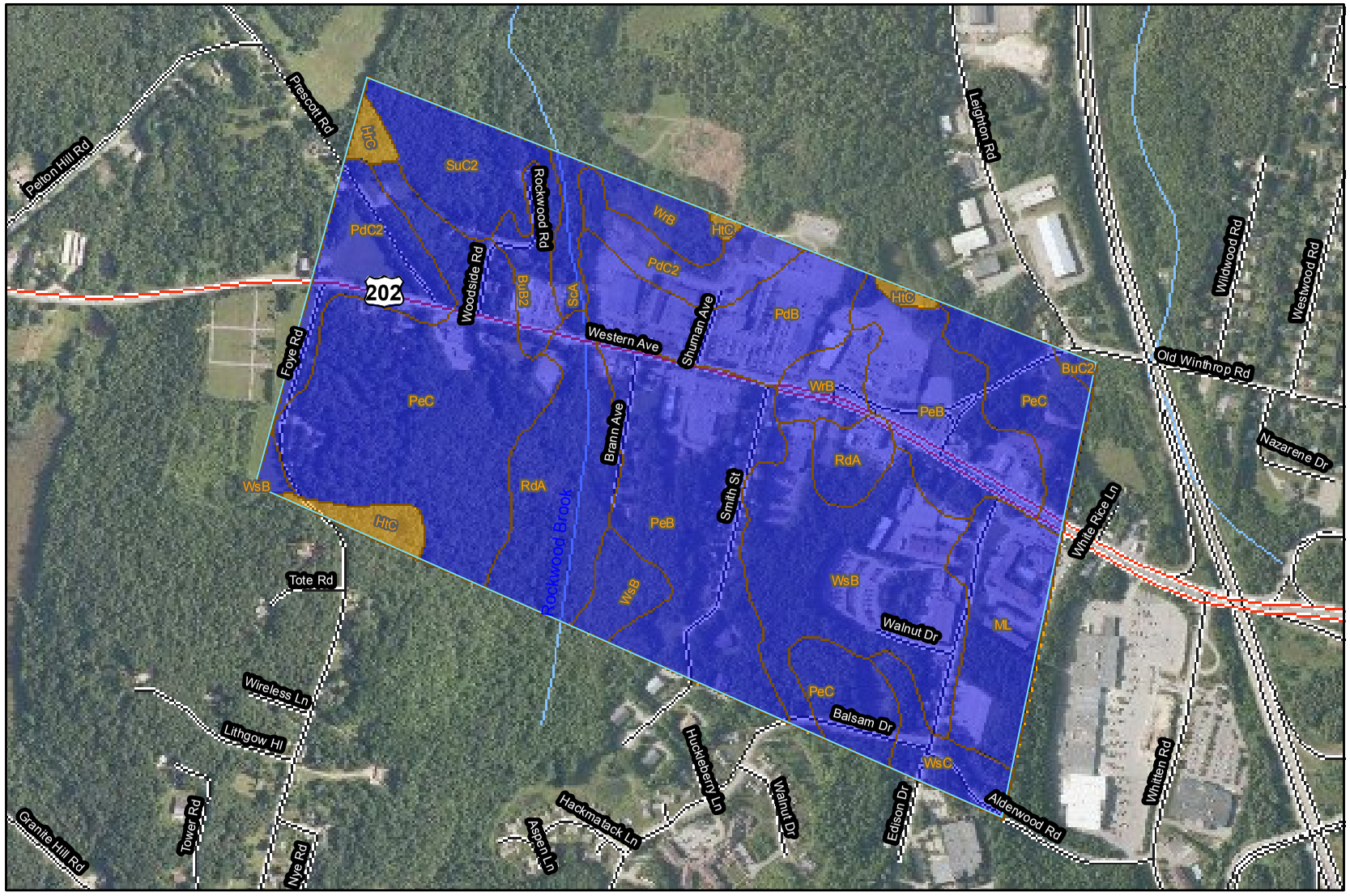
Layer Options: Depth Range

Top Depth: 0

Bottom Depth: 800

Units of Measure: Centimeters

69° 50' 16"
69° 48' 34"
44° 19' 31"
44° 19' 32"



69° 50' 15"
69° 48' 33"
44° 18' 42"
44° 18' 43"

Map Scale: 1:10,800 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:10,800 if printed on A size (8.5" × 11") sheet.

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

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

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

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

Soil Survey Area: Kennebec County, Maine
Survey Area Data: Version 11, Jul 27, 2009

Date(s) aerial images were photographed: Data not available.

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

Depth to a Selected Soil Restrictive Layer: Lithic bedrock

Depth to a Selected Soil Restrictive Layer: Lithic bedrock— Summary by Map Unit — Kennebec County, Maine (ME011)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
BuB2	Buxton silt loam, 3 to 8 percent slopes, eroded	>200	4.8	1.9%
BuC2	Buxton silt loam, 8 to 15 percent slopes, eroded	>200	0.6	0.3%
HrC	Hollis fine sandy loam, 8 to 15 percent slopes	46	1.4	0.6%
HtC	Hollis-Rock outcrop complex, 8 to 15 percent slopes	46	3.7	1.5%
ML	Made land	>200	14.5	5.7%
PdB	Paxton-Charlton fine sandy loams, 3 to 8 percent slopes	>200	16.3	6.5%
PdC2	Paxton-Charlton fine sandy loams, 8 to 15 percent slope s, eroded	>200	19.4	7.7%
PeB	Paxton-Charlton very stony fine sandy loams, 3 to 8 per cent slopes	>200	48.0	19.0%
PeC	Paxton-Charlton very stony fine sandy loams, 8 to 15 pe rcent slopes	>200	58.0	23.0%
RdA	Ridgebury very stony fine sandy loam	>200	21.9	8.7%
ScA	Scantic silt loam	>200	3.1	1.2%
SuC2	Suffield silt loam, 8 to 15 percent slopes, eroded	>200	11.4	4.5%
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes	>200	8.8	3.5%
WsB	Woodbridge very stony fine sandy loam, 3 to 8 percent s lopes	>200	34.4	13.6%
WsC	Woodbridge very stony fine sandy loam, 8 to 15 percent slopes	>200	5.8	2.3%
Totals for Area of Interest			**252.3**	**100.0%**

Description

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

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

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

Rating Options

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Appendix C

Boring Logs

Laboratory Testing Data

GPR Summary and Notes

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: 4HB-AUG-101
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	103+00, 2.3 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT. 0.58	
								-1.00		Cobble or Block, (Fill). 1.00	
										Bottom of Exploration at 1.00 feet below ground surface.	
5											
10											
15											
20											
25											

Remarks:

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

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

Boring No.: 4HB-AUG-101

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-102
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	107+00, 7.9 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58	7" PAVEMENT. 0.58	
								-1.17	7" CONCRETE. 1.17	
	S1		1.17 - 3.00						Brown, damp, gravelly, fine to coarse SAND, little silt.	G#239970 A-1-a, SM WC=1.7%
								-3.00	3.00	
	S2		3.00 - 7.00						Olive-brown, moist, silty SAND, trace gravel.	G#239971 A-4, SM WC=10.1%
5										
								-7.00	7.00	
									Bottom of Exploration at 7.00 feet below ground surface. NO REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Boring No.: HB-AUG-102

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-103
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	12/20/11; 09:30-10:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	109+00, 8.6 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:	0.84	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Sample Information

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58	7" PAVEMENT. (0.58)	
								-1.17	7" CONCRETE. (1.17)	
	1D	24/14	1.50 - 3.50	14/21/13/9	34	48			Brown, damp, dense, gravelly, fine to coarse SAND, little silt.	G#244653 A-1-a, SW-SM WC=2.6%
5	2D	24/18	5.00 - 7.00	11/8/7/9	15	21		-5.20	Light brown, wet, medium dense, sandy SILT, trace gravel. (5.20)	G#244654 A-4, SM WC=14.7%
								-9.00	(9.00)	
10	3D	24/20	10.00 - 12.00	17/15/16/27	31	43			Olive, moist, dense, sandy SILT, trace gravel.	G#244655 A-4, ML WC=9.3%
								-12.00	(12.00) **Bottom of Exploration at 12.00 feet below ground surface.** NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Boring No.: HB-AUG-103

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-104
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	110+50, 7.5 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT. 0.58	
								-1.17		7" CONCRETE. 1.17	
										Brown, damp, gravelly, fine to coarse SAND, trace silt.	
								-4.50		4.50	
5										**Bottom of Exploration at 4.50 feet below ground surface.** REFUSAL	
10											
15											
20											
25											

Remarks:

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

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

Boring No.: HB-AUG-104

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-105
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	111+00, 7.3 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT. 0.58	
								-1.17		7" CONCRETE. 1.17	
	S3		1.17 - 4.00							Brown, moist, fine to medium SAND, some garvel, some silt.	G#239972 A-2-4, SM WC=6.2%
								-4.00		4.00 Olive, moist, silty, fine to medium SAND, little gravel.	
5								-7.00		7.00	
										Bottom of Exploration at 7.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-106
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	112+00, 6.1 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58	7" PAVEMENT. 0.58	
								-1.17	7" CONCRETE. 1.17	
									Brown, moist, fine to medium SAND, little garvel, little silt. ≅S3	
								-3.00	3.00	
	S4		3.00 - 12.00						Olive-brown, wet, sandy SILT, trace gravel.	G#239973 A-4, ML WC=10.9%
5										
10										
								-12.00	12.00	
									Bottom of Exploration at 12.00 feet below ground surface. NO REFUSAL	
15										
20										
25										

Remarks:

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

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

Boring No.: HB-AUG-106

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-107
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	113+60, 4.8 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT. 0.58	
										Brown, moist, fine to medium SAND, little garvel, little silt. ≅S3	
5								-4.80		4.80 Olive-brown, wet, silty, fine to coarse SAND, little gravel. ≅S4	
								-7.30		7.30 **Bottom of Exploration at 7.30 feet below ground surface.** REFUSAL	
10											
15											
20											
25											

Remarks:

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

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

Boring No.: HB-AUG-107

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-108
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	115+00, 12.4 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S5		0.54 - 5.20				SSA	-0.54	6½" PAVEMENT.	
									0.54 Brown, moist SAND, some gravel, little silt.	G#239974 A-1-b, SW-SM WC=2.2%
5	S6		5.20 - 7.20					-5.20	5.20 Brown, wet, fine to coarse SAND, little gravel, some silt.	G#239975 A-1-b, SM WC=6.7%
								-7.20	7.20 **Bottom of Exploration at 7.20 feet below ground surface.** REFUSAL	
10										
15										
20										
25										

Remarks:

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

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

Boring No.: HB-AUG-108

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-109
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	121+00, 41.4 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT.	
										0.58 Brown, moist, gravelly, fine to coarse SAND, trace silt. ≅S5	
								-3.80		3.80 Brown, wet, fine to coarse SAND, little gravel, trace silt. ≅S6	
5								-7.00		7.00 **Bottom of Exploration at 7.00 feet below ground surface.** NO REFUSAL	
10											
15											
20											
25											

Remarks:

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

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

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-110
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	116+00, 37.8 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.58		7" PAVEMENT. 0.58	
										Brown, moist, gravelly, fine to coarse SAND, trace silt. ≥S5	
								-4.10		4.10	
										Bottom of Exploration at 4.10 feet below ground surface. REFUSAL	
5											
10											
15											
20											
25											

Remarks:

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Boring No.: HB-AUG-110

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-111
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	111+75, 35.6 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	-0.54		6½" PAVEMENT. 0.54	
								-1.08		6½" CONCRETE. 1.08	
										Brown, moist, gravelly, fine to coarse SAND, trace silt. ≈S5	
								-4.50		4.50	
5										**Bottom of Exploration at 4.50 feet below ground surface.** REFUSAL	
10											
15											
20											
25											

Remarks:

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Boring No.: HB-AUG-111

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-112
WIN: 4270.10

Driller:	MaineDOT	**Elevation (ft.)**		**Auger ID/OD:**	5" Dia.
Operator:	Giguere/Giles	**Datum:**	NAVD88	**Sampler:**	Off Flights
Logged By:	B. Wilder	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	12/20/11-12/20/11	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	103+00, 10.7 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Obsewrved
Hammer Efficiency Factor:		**Hammer Type:**	Automatic ☐ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Sample Information

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0	S7		0.58 - 3.10				SSA	-0.58		7" PAVEMENT.	
										Brown, moist, fine to coarse SAND, some gravel, little silt. (0.58)	G#244651 A-1-b, SM WC=3.6%
								-3.10		(3.10)	
	S8		3.10 - 7.00							Olive, wet, SILT, trace sand, trace gravel.	G#244652 A-4, CL-ML WC=20.9%
5											
								-7.00		(7.00)	
										Bottom of Exploration at 7.00 feet below ground surface. NO REFUSAL	
10											
15											
20											
25											

Remarks:

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: A 0.60 mile portion of Routes 11/202, (Western Ave.)
Location: Augusta-Manchester, Maine

Boring No.: HB-AUG-201
WIN: 4270.10

Driller:	Northern Test Boring	**Elevation (ft.)**		**Auger ID/OD:**	2.25-6.25"
Operator:	Mike/Adam	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	B. Wilder	**Rig Type:**	Diedrich D-50 Track	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	1/17/2012; 12:00-12:20	**Drilling Method:**	Hollow Stem Auger	**Core Barrel:**	N/A
Boring Location:	105+39, 27.8 ft Rt.	**Casing ID/OD:**	N/A	**Water Level*:**	6.5 ft bgs
Hammer Efficiency Factor:	0.768	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MV = Unsuccessful Insitu Vane Shear Test attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = weight of 140lb. hammer
WOR/C = weight of rods or casing
WO1P = Weight of one person
S_u = Insitu Field Vane Shear Strength (psf)
T_v = Pocket Torvane Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw field SPT N-value
Hammer Efficiency Factor = Annual Calibration Value
N_{60} = SPT N-uncorrected corrected for hammer efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
WC = water content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Sample Information

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							HSA	-0.58	7" TOPSOIL, sod and roots. 0.58	
	1D	24/18	2.50 - 4.50	8/10/9/9	19	24			Brown, wet, medium dense, silty SAND, trace gravel.	G#244656 A-4, SM WC=11.0%
								-4.50	4.50	
5	2D	24/16	5.00 - 7.00	3/7/9/15	16	20			Brown ,wet, medium dense silty SAND, little gravel.	G#244657 A-4, SM WC=13.4%
									Very dense at 7.0 ft bgs.	
								-8.10	8.10	
10									**Bottom of Exploration at 8.10 feet below ground surface.** REFUSAL	
15										
20										
25										

Remarks:

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State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): Augusta Work Number: 4270.10

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C. %	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
HB-AUG-102, S1	107+00	7.9 Lt.	1.17-3.0	239970	1	1.7			SM	A-1-a	II
HB-AUG-102, S2	107+00	7.9 Lt.	3.0-7.0	239971	1	10.1			SM	A-4	III
HB-AUG-103, 1D	109+00	8.6 Lt.	1.5-3.5	244653	1	2.6			SW-SM	A-1-a	0
HB-AUG-103, 2D	109+00	8.6 Lt.	5.0-7.0	244654	1	14.7			SM	A-4	III
HB-AUG-103, 3D	109+00	8.6 Lt.	10.0-12.0	244655	1	9.3			ML	A-4	IV
HB-AUG-105, S3	111+00	7.3 Lt.	1.17-4.0	239972	2	6.2			SM	A-2-4	II
HB-AUG-106, S4	112+00	6.1 Lt.	3.0-12.0	239973	2	10.9			ML	A-4	IV
HB-AUG-108, S5	115+00	12.4 Rt.	0.54-5.2	239974	2	2.2			SW-SM	A-1-b	0
HB-AUG-108, S6	115+00	12.4 Rt.	5.2-7.2	239975	2	6.7			SM	A-1-b	II
HB-AUG-112, S7	103+00	10.7 Lt.	0.58-3.1	244651	3	3.6			SM	A-1-b	II
HB-AUG-112, S8	103+00	10.7 Lt.	3.1-7.0	244652	3	20.9			CL-ML	A-4	IV
HB-AUG-201, 1D	105+39	27.8 Rt.	2.5-4.5	244656	3	11.0			SM	A-4	III
HB-AUG-201, 2D	105+39	27.8 Rt.	5.0-7.0	244657	3	13.4			SM	A-4	III
Borings are not in Station order.											

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 MaineDOT and Corps of Engineers Classification Systems.

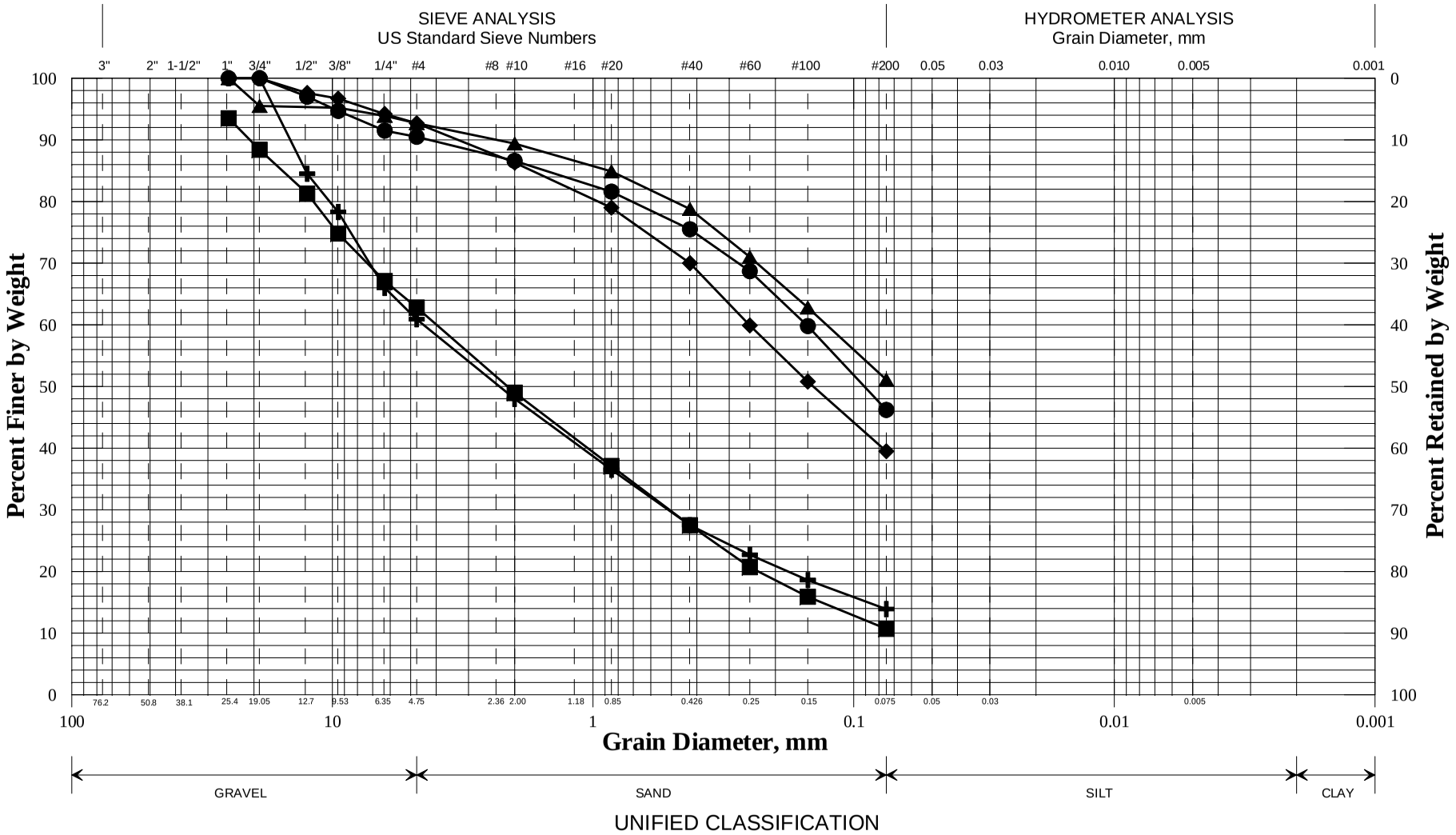
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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 NP = Non Plastic

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

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



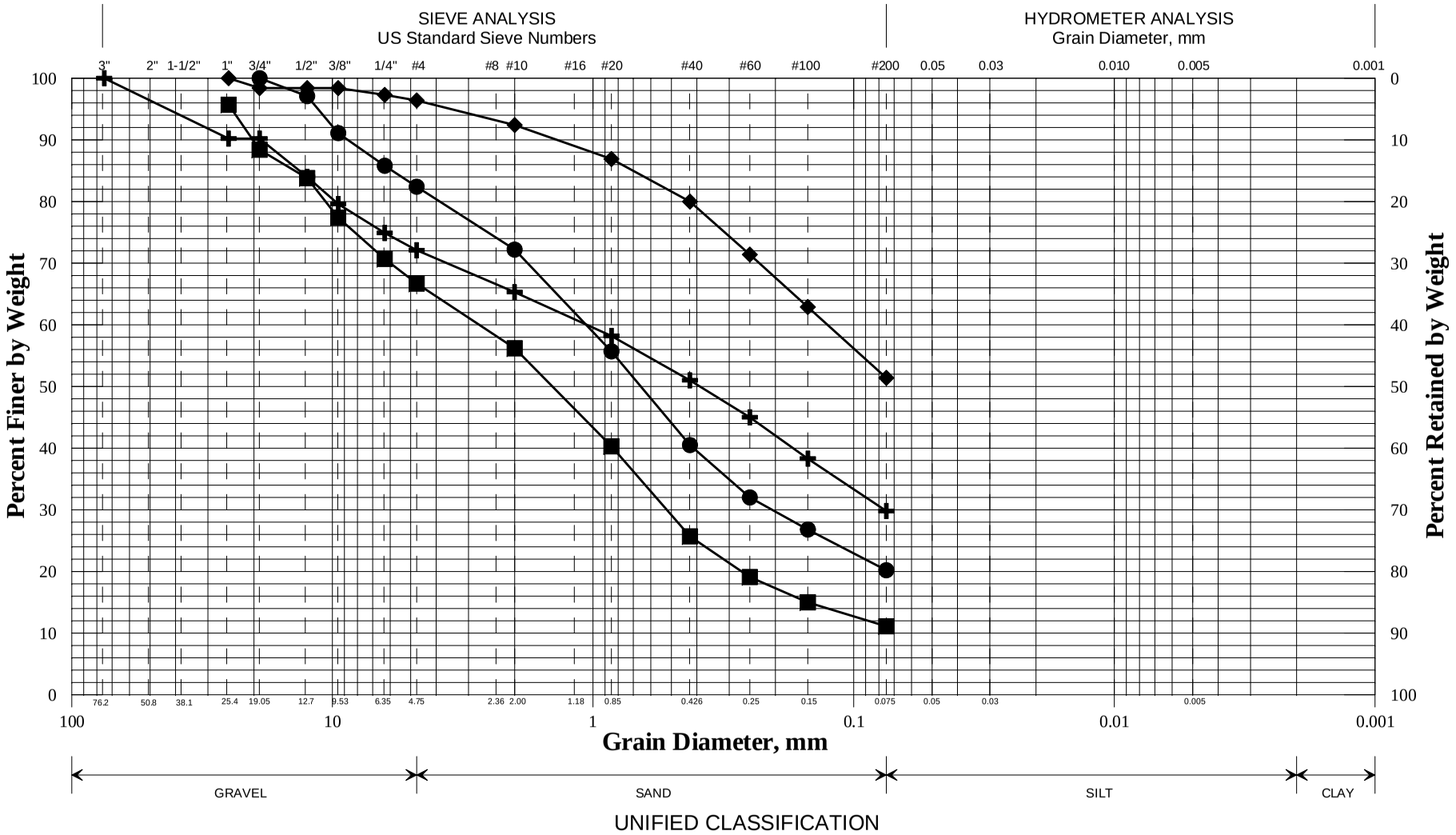
UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-AUG-102/S1	107+00	7.9 LT	1.17-3.0	Gravelly SAND, little silt.	1.7			
◆	HB-AUG-102/S2	107+00	7.9 LT	3.0-7.0	Silty SAND, trace gravel.	10.1			
■	HB-AUG-103/1D	109+00	8.6 LT	1.5-3.5	Gravelly SAND, little silt.	2.6			
●	HB-AUG-103/2D	109+00	8.6 LT	5.0-7.0	Sandy SILT, trace gravel.	14.7			
▲	HB-AUG-103/3D	109+00	8.6 LT	10.0-12.0	Sandy SILT, trace gravel.	9.3			
✕									

WIN
004270.10
Town
Augusta
Reported by/Date
WHITE, TERRY A 4/3/2012

SHEET 1

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



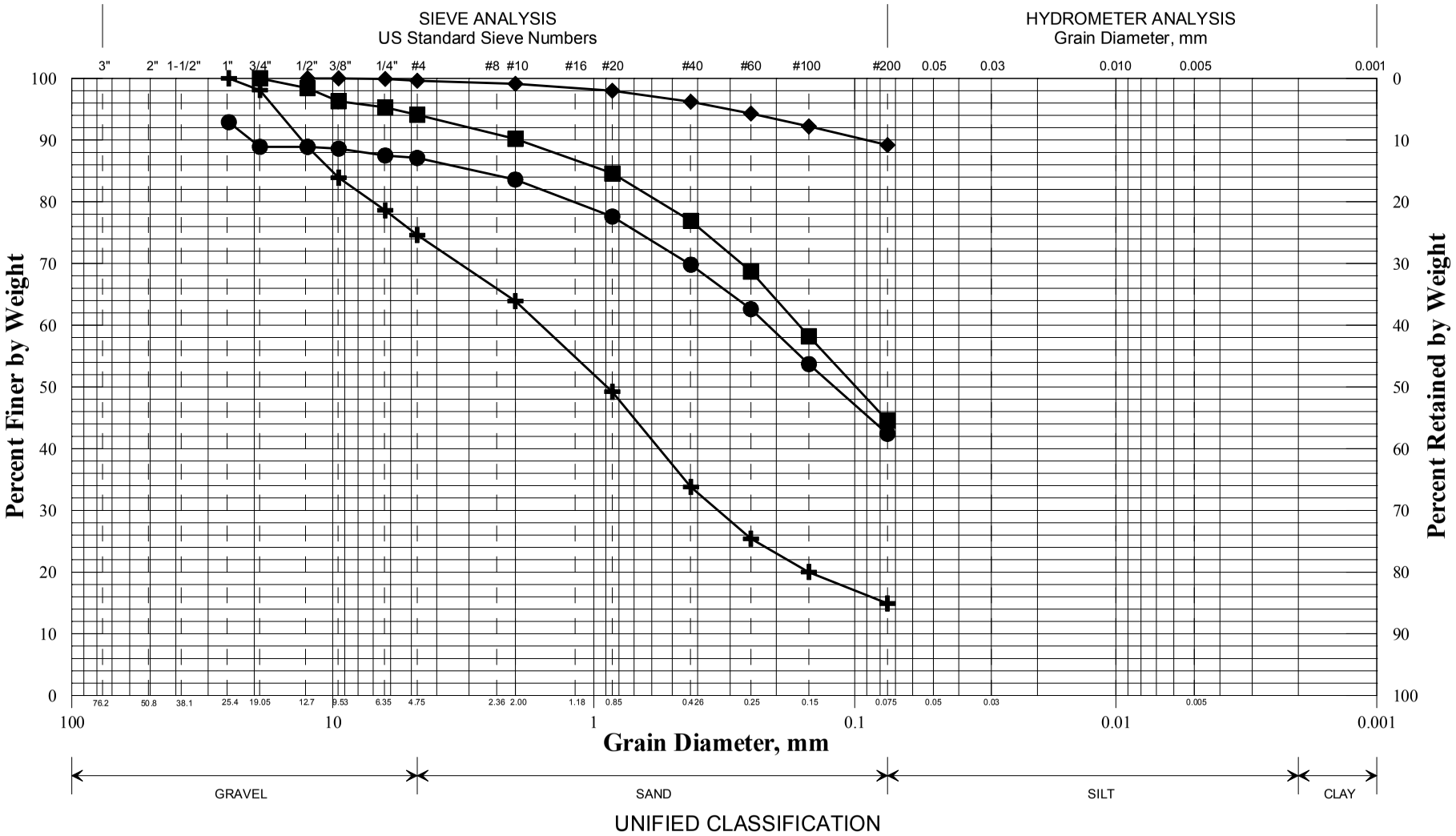
UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-AUG-105/S3	111+00	7.3 LT	1.17-4.0	SAND, some silt, some gravel.	6.2			
◆	HB-AUG-106/S4	112+00	6.1 LT	3.0-12.0	Sandy SILT, trace gravel.	10.9			
■	HB-AUG-108/S5	115+00	12.4 RT	0.54-5.2	SAND, some gravel, little silt.	2.2			
●	HB-AUG-108/S6	115+00	12.4 RT	5.2-7.2	SAND, some silt, little gravel.	6.7			
▲									
✖									

WIN
004270.10
Town
Augusta
Reported by/Date
WHITE, TERRY A 4/3/2012

SHEET 2

State of Maine Department of Transportation
GRAIN SIZE DISTRIBUTION CURVE



	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	W, %	LL	PL	PI
✚	HB-AUG-112/S7	103+00	10.7 LT	0.58-3.1	SAND, some gravel, little silt.	3.6			
◆	HB-AUG-112/S8	103+00	10.7 LT	3.1-7.0	SILT, trace sand, trace gravel.	20.9			
■	HB-AUG-201/1D	105+39	27.8 RT	2.5-4.5	Silty SAND, trace gravel.	11.0			
●	HB-AUG-201/2D	105+39	27.8 RT	53.0-7.0	Silty SAND, little gravel.	13.4			
▲									
✕									

WIN
004270.10
Town
Augusta
Reported by/Date
WHITE, TERRY A 4/3/2012

SHEET 3

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

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239970	HB-AUG-102/S1	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **107+00** Offset, ft: **7.9** **LT** Dbfg, ft: **1.17-3.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**84.5**
⅜ in. [9.5 mm]	**78.3**
¼ in. [6.3 mm]	**66.0**
No. 4 [4.75 mm]	**60.9**
No. 10 [2.00 mm]	**48.0**
No. 20 [0.850 mm]	**36.5**
No. 40 [0.425 mm]	**27.5**
No. 60 [0.250 mm]	**22.7**
No. 100 [0.150 mm]	**18.6**
No. 200 [0.075 mm]	**13.9**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

1.7

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/29/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239971	HB-AUG-102/S2	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **107+00** Offset, ft: **7.9** **LT** Dbfg, ft: **3.0-7.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**97.6**
⅜ in. [9.5 mm]	**96.7**
¼ in. [6.3 mm]	**94.2**
No. 4 [4.75 mm]	**92.7**
No. 10 [2.00 mm]	**86.3**
No. 20 [0.850 mm]	**79.0**
No. 40 [0.425 mm]	**70.0**
No. 60 [0.250 mm]	**59.9**
No. 100 [0.150 mm]	**50.8**
No. 200 [0.075 mm]	**39.5**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

10.1

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244653	**HB-AUG-103/1D**	**GEOTECHNICAL (DISTURBED)**	**12/20/2011**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **109+00** Offset, ft: **8.6** **LT** Dbfg, ft: **1.5-3.5**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**93.5**
¾ in. [19.0 mm]	**88.4**
½ in. [12.5 mm]	**81.3**
⅜ in. [9.5 mm]	**74.8**
¼ in. [6.3 mm]	**67.1**
No. 4 [4.75 mm]	**62.8**
No. 10 [2.00 mm]	**49.0**
No. 20 [0.850 mm]	**37.1**
No. 40 [0.425 mm]	**27.5**
No. 60 [0.250 mm]	**20.7**
No. 100 [0.150 mm]	**15.9**
No. 200 [0.075 mm]	**10.7**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

2.6

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

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Reported by: **FOGG, BRIAN** Date Reported: **3/29/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244654	HB-AUG-103/2D	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **109+00** Offset, ft: **8.6** **LT** Dbfg, ft: **5.0-7.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**97.0**
⅜ in. [9.5 mm]	**94.7**
¼ in. [6.3 mm]	**91.5**
No. 4 [4.75 mm]	**90.5**
No. 10 [2.00 mm]	**86.6**
No. 20 [0.850 mm]	**81.6**
No. 40 [0.425 mm]	**75.5**
No. 60 [0.250 mm]	**68.7**
No. 100 [0.150 mm]	**59.8**
No. 200 [0.075 mm]	**46.2**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

14.7

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/29/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244655	**HB-AUG-103/3D**	**GEOTECHNICAL (DISTURBED)**	**12/20/2011**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **109+00** Offset, ft: **8.6** **LT** Dbfg, ft: **10.0-12.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**95.5**
½ in. [12.5 mm]	
⅜ in. [9.5 mm]	**95.2**
¼ in. [6.3 mm]	**93.9**
No. 4 [4.75 mm]	**92.7**
No. 10 [2.00 mm]	**89.4**
No. 20 [0.850 mm]	**84.9**
No. 40 [0.425 mm]	**78.8**
No. 60 [0.250 mm]	**71.0**
No. 100 [0.150 mm]	**62.8**
No. 200 [0.075 mm]	**51.1**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

9.3

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239972	HB-AUG-105/S3	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **111+00** Offset, ft: **7.3** **LT** Dbfg, ft: **1.17-4.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	100.0
1 in. [25.0 mm]	90.2
¾ in. [19.0 mm]	90.2
½ in. [12.5 mm]	84.0
⅜ in. [9.5 mm]	79.6
¼ in. [6.3 mm]	74.9
No. 4 [4.75 mm]	72.1
No. 10 [2.00 mm]	65.3
No. 20 [0.850 mm]	58.2
No. 40 [0.425 mm]	51.0
No. 60 [0.250 mm]	45.0
No. 100 [0.150 mm]	38.3
No. 200 [0.075 mm]	29.8

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %
6.2

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239973	HB-AUG-106/S4	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **112+00** Offset, ft: **6.1** **LT** Dbfg, ft: **3.0-12.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**98.4**
½ in. [12.5 mm]	**98.4**
⅜ in. [9.5 mm]	**98.4**
¼ in. [6.3 mm]	**97.3**
No. 4 [4.75 mm]	**96.4**
No. 10 [2.00 mm]	**92.4**
No. 20 [0.850 mm]	**86.9**
No. 40 [0.425 mm]	**80.0**
No. 60 [0.250 mm]	**71.4**
No. 100 [0.150 mm]	**62.9**
No. 200 [0.075 mm]	**51.4**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

10.9

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239974	**HB-AUG-108/S5**	**GEOTECHNICAL (DISTURBED)**	**12/20/2011**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **115+00** Offset, ft: **12.4 RT** Dbfg, ft: **0.54-5.2**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**95.7**
¾ in. [19.0 mm]	**88.4**
½ in. [12.5 mm]	**83.8**
⅜ in. [9.5 mm]	**77.4**
¼ in. [6.3 mm]	**70.7**
No. 4 [4.75 mm]	**66.7**
No. 10 [2.00 mm]	**56.2**
No. 20 [0.850 mm]	**40.3**
No. 40 [0.425 mm]	**25.7**
No. 60 [0.250 mm]	**19.1**
No. 100 [0.150 mm]	**15.0**
No. 200 [0.075 mm]	**11.1**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

2.2

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

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GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
239975	HB-AUG-108/S6	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **115+00** Offset, ft: **12.4 RT** Dbfg, ft: **5.2-7.2**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	100.0
½ in. [12.5 mm]	97.1
⅜ in. [9.5 mm]	91.1
¼ in. [6.3 mm]	85.8
No. 4 [4.75 mm]	82.4
No. 10 [2.00 mm]	72.2
No. 20 [0.850 mm]	55.7
No. 40 [0.425 mm]	40.5
No. 60 [0.250 mm]	32.0
No. 100 [0.150 mm]	26.8
No. 200 [0.075 mm]	20.2

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

Liquid Limit @ 25 blows (T 89), %

Plastic Limit (T 90), %

Plasticity Index (T 90), %

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

6.7

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

Paper Copy: Lab File; Project File; Geotech File

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

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244651	**HB-AUG-112/S7**	**GEOTECHNICAL (DISTURBED)**	**12/20/2011**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **103+00** Offset, ft: **10.7 LT** Dbfg, ft: **0.58-3.1**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**100.0**
¾ in. [19.0 mm]	**98.1**
½ in. [12.5 mm]	**88.9**
⅜ in. [9.5 mm]	**83.9**
¼ in. [6.3 mm]	**78.6**
No. 4 [4.75 mm]	**74.6**
No. 10 [2.00 mm]	**63.9**
No. 20 [0.850 mm]	**49.2**
No. 40 [0.425 mm]	**33.8**
No. 60 [0.250 mm]	**25.4**
No. 100 [0.150 mm]	**20.0**
No. 200 [0.075 mm]	**14.9**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

3.6

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

Paper Copy: Lab File; Project File; Geotech File

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

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244652	HB-AUG-112/S8	GEOTECHNICAL (DISTURBED)	12/20/2011	3/16/2012

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **103+00** Offset, ft: **10.7 LT** Dbfg, ft: **3.1-7.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	
½ in. [12.5 mm]	**100.0**
⅜ in. [9.5 mm]	**100.0**
¼ in. [6.3 mm]	**99.9**
No. 4 [4.75 mm]	**99.6**
No. 10 [2.00 mm]	**99.1**
No. 20 [0.850 mm]	**98.0**
No. 40 [0.425 mm]	**96.2**
No. 60 [0.250 mm]	**94.3**
No. 100 [0.150 mm]	**92.2**
No. 200 [0.075 mm]	**89.2**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

20.9

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

Paper Copy: Lab File; Project File; Geotech File

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

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244656	**HB-AUG-201/1D**	**GEOTECHNICAL (DISTURBED)**	**1/17/2012**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **105+39** Offset, ft: **27.8 RT** Dbfg, ft: **2.5-4.5**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	
¾ in. [19.0 mm]	**100.0**
½ in. [12.5 mm]	**98.4**
⅜ in. [9.5 mm]	**96.3**
¼ in. [6.3 mm]	**95.3**
No. 4 [4.75 mm]	**94.1**
No. 10 [2.00 mm]	**90.2**
No. 20 [0.850 mm]	**84.6**
No. 40 [0.425 mm]	**76.9**
No. 60 [0.250 mm]	**68.7**
No. 100 [0.150 mm]	**58.2**
No. 200 [0.075 mm]	**44.5**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

11.0

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

Paper Copy: Lab File; Project File; Geotech File

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

GEOTECHNICAL TEST REPORT
Central Laboratory

SAMPLE INFORMATION

Reference No.	Boring No./Sample No.	Sample Description	Sampled	Received
244657	**HB-AUG-201/2D**	**GEOTECHNICAL (DISTURBED)**	**1/17/2012**	**3/16/2012**

Sample Type: **GEOTECHNICAL** Location: **ROADWAY** Station: **105+39** Offset, ft: **27.8 RT** Dbfg, ft: **53.0-7.0**

WIN/Town **004270.10 - AUGUSTA** Sampler: **WILDER, BRUCE H**

TEST RESULTS

Sieve Analysis (T 27, T 11)

Wash Method

Procedure A

SIEVE SIZE U.S. [SI]	% Passing
3 in. [75.0 mm]	
1 in. [25.0 mm]	**92.9**
¾ in. [19.0 mm]	**88.9**
½ in. [12.5 mm]	**88.9**
⅜ in. [9.5 mm]	**88.6**
¼ in. [6.3 mm]	**87.5**
No. 4 [4.75 mm]	**87.1**
No. 10 [2.00 mm]	**83.6**
No. 20 [0.850 mm]	**77.6**
No. 40 [0.425 mm]	**69.8**
No. 60 [0.250 mm]	**62.6**
No. 100 [0.150 mm]	**53.7**
No. 200 [0.075 mm]	**42.4**

Direct Shear (T 236)

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

Consolidation (T 216)

Trimmings, Water Content, %	

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

Miscellaneous Tests

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

Loss on Ignition (T 267)

Loss, %	H2O, %

Water Content (T 265), %

13.4

Vane Shear Test on Shelby Tubes (Maine DOT)

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

Comments:

AUTHORIZATION AND DISTRIBUTION

Reported by: **FOGG, BRIAN** Date Reported: **3/30/2012**

Paper Copy: Lab File; Project File; Geotech File

4270.10 Augusta
Concrete Edge Summary

Station (feet)	Edge of Concrete Left of C/L (feet)	C/L	Edge of Concrete Right of C/L (feet)	Comments
119+00	-		-	No Clear Indication of Concrete
118+00	-		-	" "
117+00	-		-	" "
116+00	-		-	" "
115+00	-		-	" "
114+00	26.80		3.20	
113+00	24.75		5.20	
112+00	22.95		6.70	
111+00	22.25		7.75	
110+00	22.58		7.72	
109+00	22.98		7.32	
108+00	23.35		7.20	
107+00	24.00		6.80	
106+00	24.35		5.65	
105+00	24.18		5.82	
104+00	24.10		3.85	
103+00	24.77		*	* See Note Below
102+00	22.18		7.82	
101+00	19.85		9.86	
100+00	16.69		13.40	
99+00	15.00		15.00	
98+00	15.69		14.31	
97+00	16.00		14.00	
96+00	-		-	No Clear Indication of Concrete
95+00	-		-	" "
94+00	-		-	" "

* Right Edge of Concrete at this station was actually Left of Centerline. 1.05 Feet Left of Centerline. Possible Utility Trench.

Ground Penetrating Radar (GPR) Notes

4270.10 Augusta – Route #202

Ground Penetrating Radar (GPR) data was collected on project 4270.10 on July 10th, 2012, in an effort to identify bedrock from station 110+00 to 116+00. The Departments 400 megahertz ground coupled antenna was deployed utilizing a three wheel/walk behind cart. Data was collected using a scan of 18/foot.

Data was collected in both the right and left paved shoulder area. Data in the right shoulder did not provide a clear indication of bedrock presence and was not reported. Data in the left shoulder, at an offset of approximately 38 feet from construction centerline provided strong reflections at the top of bedrock from station 110+00 to 110+87 and from station 114+81 to 115+77 (see Photo I, below).

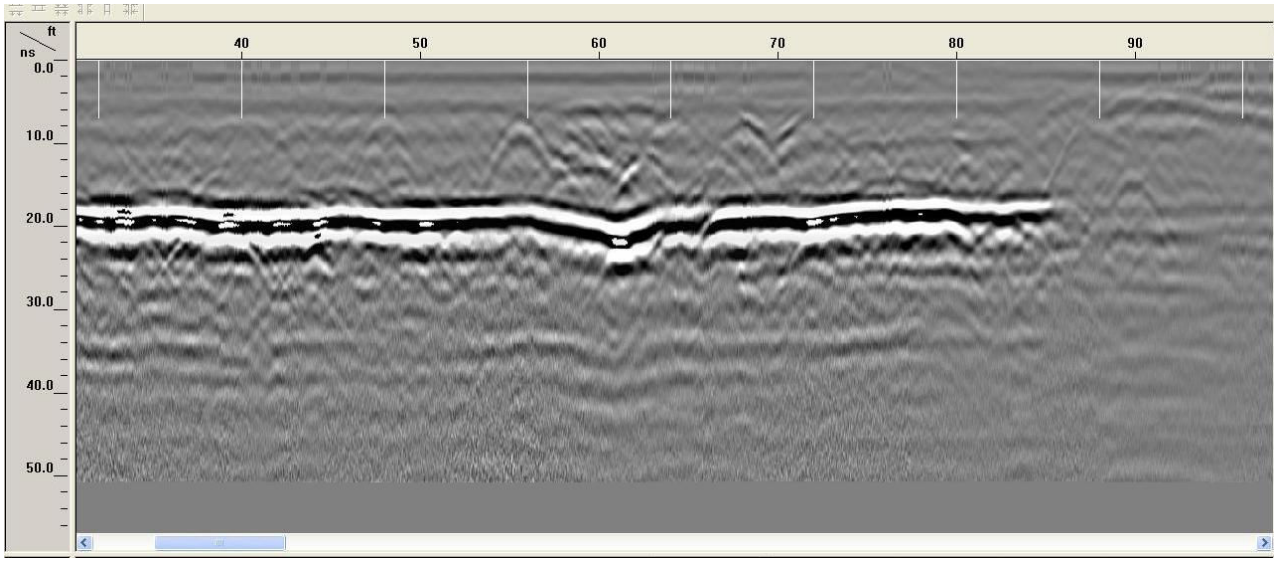

Photo 1: Bedrock reflection from approximately 110+30 to 110+87

GPR data was "ground truthed" utilizing Geotechnical boring information. For the section from 110+00 to 110+87, the closest available boring location was at 111+75, offset 35.6 feet left (HB-AUG-111). This boring indicated a refusal at 4.5 feet. For the section from station 114+81 to 115+77, the boring located at station 116+00, offset 37.8 feet left (HB-AUG-110) was used for ground truthing. Refusal at this location was 4.1 feet.

A summary of the GPR results is attached.

Prepared by:

Stephen Colson – MaineDOT

4270.10 Augusta
Western Ave. (Rte. 202)
Depth to Bedrock Using GPR

Station	Offset	Depth (In.)	Station	Offset	Depth (In.)
110+01	38 feet - left	54.29	114+81	38 feet - left	51.94
110+02	38 feet - left	56.37	114+82	38 feet - left	50.13
110+03	38 feet - left	55.98	114+83	38 feet - left	50.32
110+04	38 feet - left	53.61	114+84	38 feet - left	50.45
110+05	38 feet - left	53.35	114+85	38 feet - left	50.96
110+06	38 feet - left	54.00	114+86	38 feet - left	51.19
110+07	38 feet - left	56.01	114+87	38 feet - left	51.07
110+08	38 feet - left	56.93	114+88	38 feet - left	51.98
110+09	38 feet - left	54.89	114+89	38 feet - left	53.13
110+10	38 feet - left	52.86	114+90	38 feet - left	53.57
110+11	38 feet - left	57.04	114+91	38 feet - left	52.64
110+12	38 feet - left	56.87	114+92	38 feet - left	51.05
110+13	38 feet - left	56.70	114+93	38 feet - left	50.67
110+14	38 feet - left	56.03	114+94	38 feet - left	50.82
110+15	38 feet - left	53.57	114+95	38 feet - left	50.79
110+16	38 feet - left	55.03	114+96	38 feet - left	50.86
110+17	38 feet - left	56.96	114+97	38 feet - left	50.38
110+18	38 feet - left	57.04	114+98	38 feet - left	50.11
110+19	38 feet - left	56.26	114+99	38 feet - left	50.10
110+20	38 feet - left	55.70	115+00	38 feet - left	50.25
110+21	38 feet - left	57.00	115+01	38 feet - left	50.33
110+22	38 feet - left	57.04	115+02	38 feet - left	50.75
110+23	38 feet - left	57.04	115+03	38 feet - left	50.77
110+24	38 feet - left	57.04	115+04	38 feet - left	50.42
110+25	38 feet - left	57.04	115+05	38 feet - left	51.04
110+26	38 feet - left	56.78	115+06	38 feet - left	50.89
110+27	38 feet - left	56.85	115+07	38 feet - left	50.85
110+28	38 feet - left	56.89	115+08	38 feet - left	50.90
110+29	38 feet - left	56.07	115+09	38 feet - left	51.38
110+30	38 feet - left	55.42	115+10	38 feet - left	52.24
110+31	38 feet - left	54.63	115+11	38 feet - left	51.38
110+32	38 feet - left	53.59	115+12	38 feet - left	52.32
110+33	38 feet - left	54.28	115+13	38 feet - left	52.52
110+34	38 feet - left	54.11	115+14	38 feet - left	52.58
110+35	38 feet - left	53.52	115+15	38 feet - left	52.98
110+36	38 feet - left	53.85	115+16	38 feet - left	52.93
110+37	38 feet - left	55.90	115+17	38 feet - left	52.73
110+38	38 feet - left	56.68	115+18	38 feet - left	52.68
110+39	38 feet - left	57.04	115+19	38 feet - left	52.81
110+40	38 feet - left	57.08	115+20	38 feet - left	52.29
110+41	38 feet - left	57.04	115+21	38 feet - left	52.38
110+42	38 feet - left	57.04	115+22	38 feet - left	52.33

110+43	38 feet - left	57.04
110+44	38 feet - left	57.04
110+45	38 feet - left	56.72
110+46	38 feet - left	55.64
110+47	38 feet - left	55.88
110+48	38 feet - left	56.89
110+49	38 feet - left	57.04
110+50	38 feet - left	57.04
110+51	38 feet - left	57.04
110+52	38 feet - left	57.02
110+53	38 feet - left	56.81
110+54	38 feet - left	56.37
110+55	38 feet - left	56.12
110+56	38 feet - left	55.27
110+57	38 feet - left	55.88
110+58	38 feet - left	56.68
110+59	38 feet - left	57.04
110+60	38 feet - left	58.47
110+61	38 feet - left	61.18
110+62	38 feet - left	61.31
110+63	38 feet - left	58.36
110+64	38 feet - left	56.03
110+65	38 feet - left	55.83
110+66	38 feet - left	55.04
110+67	38 feet - left	55.84
110+68	38 feet - left	56.68
110+69	38 feet - left	56.22
110+70	38 feet - left	56.03
110+71	38 feet - left	56.20
110+72	38 feet - left	56.76
110+73	38 feet - left	53.57
110+74	38 feet - left	52.60
110+75	38 feet - left	52.34
110+76	38 feet - left	52.34
110+77	38 feet - left	52.04
110+78	38 feet - left	51.69
110+79	38 feet - left	51.24
110+80	38 feet - left	51.32
110+81	38 feet - left	52.42
110+82	38 feet - left	52.84
110+83	38 feet - left	52.81
110+84	38 feet - left	52.23
110+85	38 feet - left	52.40
110+86	38 feet - left	52.21
110+87	38 feet - left	53.29

115+23	38 feet - left	52.07
115+24	38 feet - left	50.18
115+25	38 feet - left	49.61
115+26	38 feet - left	50.61
115+27	38 feet - left	49.68
115+28	38 feet - left	50.05
115+29	38 feet - left	51.32
115+30	38 feet - left	50.27
115+31	38 feet - left	49.94
115+32	38 feet - left	49.20
115+33	38 feet - left	47.87
115+34	38 feet - left	46.92
115+35	38 feet - left	48.87
115+36	38 feet - left	48.95
115+37	38 feet - left	48.79
115+38	38 feet - left	48.73
115+39	38 feet - left	48.74
115+40	38 feet - left	48.80
115+41	38 feet - left	48.66
115+42	38 feet - left	47.87
115+43	38 feet - left	47.48
115+44	38 feet - left	47.32
115+45	38 feet - left	47.60
115+46	38 feet - left	47.83
115+47	38 feet - left	46.94
115+48	38 feet - left	47.02
115+49	38 feet - left	48.32
115+50	38 feet - left	49.36
115+51	38 feet - left	49.24
115+52	38 feet - left	49.13
115+53	38 feet - left	48.94
115+54	38 feet - left	48.58
115+55	38 feet - left	48.49
115+56	38 feet - left	48.43
115+57	38 feet - left	48.04
115+58	38 feet - left	47.89
115+59	38 feet - left	47.65
115+60	38 feet - left	47.85
115+61	38 feet - left	49.08
115+62	38 feet - left	49.05
115+63	38 feet - left	48.80
115+64	38 feet - left	48.79
115+65	38 feet - left	49.05
115+66	38 feet - left	49.13
115+67	38 feet - left	48.40
115+68	38 feet - left	49.52
115+69	38 feet - left	49.60
115+70	38 feet - left	49.56
115+71	38 feet - left	50.10
115+72	38 feet - left	50.44

115+73	38 feet - left	50.98
115+74	38 feet - left	51.03
115+75	38 feet - left	51.01
115+76	38 feet - left	50.93
115+77	38 feet - left	51.42

Appendix D

Calculations

Retataining Wall and Wingwall Active Earth Pressures:

Effective active earth pressure coefficient:

Rankine Theory - Active Earth Pressure from MaineDOT Bridge Design Guide Section 3.6.5.2, pg 3-7

$\beta := 0 \cdot deg$ slope angle of backfill soils from horizontal

$\phi_a := 34 \cdot deg$ assumed effective friction angle for dense gravelly sand

$$K_a := \tan\left(45 \cdot deg - \frac{\phi_a}{2}\right)^2 \qquad K_a = 0.28$$

Service Limit State Bearing Resistance - Medium Dense silty SAND:

Nominal and factored Bearing Resistance

Presumptive Bearing Resistance for Service Limit State ONLY

Reference: AASHTO LRFD Bridge Design Specifications 5th Edition
Table C10.6.2.6.1-1 Presumptive Bearing Resistances for Spread Footings at the Service Limit State Modified after US Department of Navy (1982)

Type of Bearing Material: Silty SAND or sandy SILT, trace to little gravel

Consistency In Place: medium dense

Bearing Resistance: Ordinary Range (ksf)
8 - 14 ksf for medium dense to dense

Recommended Value of Use: 5 ksf

Recommended Value: $5 \cdot ksf = 2.5 \cdot tsf$ $\qquad tsf := g \cdot \left(\frac{ton}{ft^2}\right)$

Note: This bearing resistance is settlement limited (1 inch) and applies only a the service limit state.

Characteristics of Native Soils at foundation level

Gray-brown, wet, dense gravelly fine SAND (fill)

$wc := .11$ estimated water content

$e := 0.65$ estimated void ratio

$\gamma_w := 62.4pcf$ unit weight of water

$sp := 2.67$ estimated specific gravity

saturation $\qquad sat := \frac{(wc \cdot sp)}{e} \qquad sat = 0.4518$

total unit weight

$$\gamma_t := \frac{(sp + sat \cdot e) \cdot \gamma_w}{(1 + e)} \qquad \gamma_t = 112.1 \cdot pcf$$

saturated unit weight

$$\gamma_{sat} := \frac{(sp + e) \cdot \gamma_w}{(1 + e)} \qquad \gamma_{sat} = 126 \cdot pcf$$

Strength Limit State Bearing Resistance - Native Soils:

Nominal and factored Bearing Resistance for box culvert and wing walls

Assumptions

1. Wingwalls will be embedded 1.5 feet below streambed

$$D_f := 1.5ft$$

2. Assumed parameters based on granular fill

Moist unit weight	$\gamma_t = 112.1 \cdot pcf$
Saturated unit weight	$\gamma_{sat} = 125.6 \cdot pcf$
Angle of internal friction	$\phi_b := 34deg$
Undrained shear strength	$c := 0.psf$
Depth to groundwater	$D_w := 0ft$

3. L > B, so use Terzaghi strip foundation equations

Terzaghi shape factors	$B := 4ft$
	$s_c := 1.0$
	$s_\gamma := 1.0$
Meyerhof bearing capacity factors	$N_c := 42.14$
	$N_q := 29.4$
	$N_\gamma := 31.1$

Effective stress at footing level

$$q_{eff} := D_w \cdot \gamma_t + (D_f - D_w) \cdot (\gamma_{sat} - \gamma_w)$$

$$q_{eff} = 95 \cdot psf$$

Nominal Bearing Resistance

$$q_{nom} := c \cdot N_c \cdot s_c + q_{eff} \cdot N_q + 0.5 \cdot (\gamma_{sat} - \gamma_w) \cdot B \cdot N_\gamma \cdot s_\gamma$$

$$q_{nom} = 6.714 \cdot ksf$$

Resistance Factor from LRFD Table 10.5.5.2.2-1, pg 10-32 $\qquad \Phi_b := 0.45$

$$q_{factored} := q_{nom} \cdot \Phi_b \qquad q_{factored} = 3.02 \cdot ksf$$

For these walls, the Strength limit state controls.
Factored Bearing Resistance of 3 ksf should be used.

Nominal and factored Bearing Resistance for retaining walls

Assumptions

1. Retaining walls will be embedded 1.0 feet

$D_f := 1.0ft$

2. Assumed parameters based on granular fill

Moist unit weight	$\gamma_t = 112.1 \cdot pcf$
Saturated unit weight	$\gamma_{sat} = 125.6 \cdot pcf$
Angle of internal friction	$\phi_b := 34deg$
Undrained shear strength	$c := 0.psf$
Depth to groundwater	$D_w := 5ft$

3. L > B, so use Terzaghi strip foundation equations

Terzaghi shape factors	$B := 4ft$
	$s_c := 1.0$
	$s_\gamma := 1.0$
Meyerhof bearing capacity factors	$N_c := 42.14$
	$N_q := 29.4$
	$N_\gamma := 31.1$

Effective stress at footing level

$$q_{eff} := D_w \cdot \gamma_t + (D_f - D_w) \cdot (\gamma_{sat} - \gamma_w)$$

$$q_{eff} = 308 \cdot psf$$

Nominal Bearing Resistance

$$q_{nom} := c \cdot N_c \cdot s_c + q_{eff} \cdot N_q + 0.5 \cdot (\gamma_{sat} - \gamma_w) \cdot B \cdot N_\gamma \cdot s_\gamma$$

$$q_{nom} = 12.977 \cdot ksf$$

Resistance Factor from LRFD Table 10.5.5.2.2-1, pg 10-32 $\Phi_b := 0.45$

$q_{factored} := q_{nom} \cdot \Phi_b$ $q_{factored} = 5.84 \cdot ksf$

For these walls, the Service limit state controls.
Factored Bearing Resistance of 5 ksf should be used.