Brunswick Layover Environmental Assessment (EA)

Appendix H: Preliminary Geotechnical Data Report, Parsons Brinckerhoff, December 2011
Geotechnical Report, Summit Geoengineering Services, May 2013

September 2013

PRELIMINARY GEOTECHNICAL DATA REPORT

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BRUNSWICK LAYOVER FACILITY

PREPARED BY

PARSONS BRINCKERHOFF

December 2011

Table of Contents

Figures

Appendices

1.0 INTRODUCTION

This Preliminary Geotechnical Data Report (PGDR) presents the results of a preliminary geotechnical investigation by the Northern New England Passenger Rail Authority (NNEPRA) for the proposed construction of The Brunswick Layover Facility Project in Brunswick, Maine. The purpose of the PGDR is to provide potential Design-Builders with subsurface condition data in the vicinity of the proposed project. The project consists of the design and construction of the layover facility structure using design-build contracting methods.

There is currently no existing building at the proposed site. The project proposes that a train storage building be located on land owned by NNEPRA in the existing rail yard in Brunswick, Maine constructed just north of existing tracks which are on state-owned land. The existing tracks are in use for both freight and passenger trains.

2.0 SCOPE OF GEOTECHNICAL WORK

The scope of geotechnical work for preparation of this PGDR included:

- A geotechnical investigation program consisting of four (4) test borings drilled along the proposed structure alignment.
- Preparation of this Preliminary Geotechnical Data Report.

3.0 SUBSURFACE INVESTIGATION PROGRAM

The site for the proposed Brunswick Layover Facility is located north of existing active tracks and is surrounded by vegetation. Subsurface conditions were explored by drilling four (4) test borings at the site.

Test boring B-1 was drilled just East of the East edge of the proposed building location. Test borings B-2 to B-4 were drilled moving towards the West edge of the proposed building location. The exploration locations are shown on Figure 2. An observation well was installed in boring B-1, Appendix B presents log details.

The borings were drilled between October 25 and 26, 2011 by New Hampshire Boring, Inc. Details and sampling methods used, field data obtained, and soil and groundwater conditions encountered are presented in the boring logs provided in Appendix A. Survey information was provided by Maine Department of Transportation and is NAVD88 for elevations and NAV83 for

the coordinate system.

The borings were drilled using driven cased wash boring. Soil samples were typically obtained at 5-foot intervals using Standard Penetration Test (SPT) methods. During SPT sampling, the sampler was driven 24 inches and the hammer blows for each 6 inch interval of penetration were recorded. The standard penetration resistance, N-value, is the sum of the blows for the second and third intervals. The drill rig used was a Diedrich D-50 on Rubber Tracked ATV and used a standard rope and cathead system.

4.0 SUBSURFACE CONDITIONS

The test borings were advanced from grade to 31 to 41 feet in depth. Borehole elevations ranged from 82.8 to 85.0 based on NAVD-88 datum.

Typically, the soils at the proposed site location indicate fine to medium to coarse sand underlain by silt and fine sand, underlain by fine sand. N-values ranged from 3 to 55 with an overall average N-value of 20.

Water level depths taken during drilling were consistently measured at approximately 5 feet from grade at the boring locations. One installation well was placed and the following table shows readings taken from October 25 to November 14, 2011.

B-1 Well			
Top of PVC = Ground Surface =			82.8
Readings:			
Date	Elevation	Depth	
25-Oct	77.8	5	ft
26-Oct	77.5	5.3	ft
14-Nov	77.7	5.1	ft

Table 1: B-1 Well Readings

5.0 CLOSURE

This Preliminary Geotechnical Data Report has been prepared for the use of the NNEPRA for specific application to the proposed Brunswick Layover Facility in Brunswick, Maine in accordance with generally accepted geotechnical engineering practices. No other intended use or warranty is expressed or implied.

A limited number of borings have been conducted at discrete locations to the North of existing active rail. Subsurface conditions may vary from those presented in this report. Northern New England Passenger Rail Authority shall not be responsible for Bidders' and Design-Builders' interpretations of or estimates or conclusions drawn from the geotechnical information. Variations in the nature and extent of subsurface conditions between borings are expected.

Figures

Site Location Plan

DownEaster Brunswick
Storage & Maintenance Facility

Figure 1

December 2011

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

PARSONS BRINCKERHOFF

ICHARDS, JR.
U26/7
GE – 15622/303
POR NO. –

MSTR. LLC
TAX MAP/LOT – U23/57A
C.C.R.D. BOOK/PAGE – 2517/98

DOWNEAST ENERGY CORP.
TAX MAP/LOT – U23/55A
C.C.R.D. BOOK/PAGE – –/–
POR NO. – 8

MAINELINE MOTEL, LLC
TAX MAP/LOT – U23/50
C.C.R.D. BOOK/PAGE – 15496/36
POR NO. – 9

LOT 22

127 PLEASANT STREET
TAX MAP/LOT – U23/47
C.C.R.D. BOOK/PAGE – 21500/304
POR NO. – 10

LOT 25

A L. JACOBS, JR.
/LOT – U23/20
BOOK/PAGE – 4365/166
POR NO. –

POR NO. –

CAMPER A

6IRON X6IRON CRANETEWDRH1INBGC

3/4IN IP: 1IN BG

DETAIL "B"

3/4IN IP: 2IN AG
1IN IP: 2IN AG

N 89^06'24" E 1,485.22'

1-1/2IN IP: 1DIN AG

RUSTED 5FT IR

RUSTED 5FT IR

A BOAT & TRAILER

RUSTED 5FT IR

15" CMP

ATV BRIDGE

R/R TIE BRIDGE DECK

B-4

B-3

B-2

B-1

LOT 10
PER PLAN
REFERENCE A

LOT 11
PER PLAN REFERENCE A

LOT 12
PER PLAN REFERENCE A

LOT 13
PER PLAN
REFERENCE A

LOT 14
PER PLAN REFERENCE A

LOT 15
PER PLAN REFERENCE A

MAINE
TAX MAP/

TAX MAP 28, LOT 9-2
TAX MAP 26, LOT 9-1

PER PLAN REFERENCE A

20'-0"
20'-0"
15'-0"
20'-0"
35'-0"

MAINE CENTRAL RAILROAD COMPANY
TAX MAP/LOT – U23/93 AND U26/15

MAINE WOOLENS, LLC
TAX MAP/LOT – U26/12

89^06'24" W 2,161.07'

O/S 38'

S78°W 1540'

OWEN

STANWOOD

44

1296 1145 1297 1146 1298 1147 1299 1148 1300 1149 1301 1150 1302 1151 1303 1152 1304 1153

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

KENNEBEC AND PORTLAND RAILROAD
LOT NO. 3
C.C.R.D BOOK 210, PAGE 54

KENNEBEC AND PORTLAND RAILROAD
LOT NO. 4
C.C.R.D BOOK 216, PAGE 342

S/BIN CIR: DOUG JOHNSON – B. SMITH – #2078

TAX MAP/LOT – U26/18 & U23/92 & U22/107
C.C.R.D. BOOK/PAGE – 9572/306

RIGHT-OF-WAY AND TRACK MAP
MAINE CENTRAL RAILROAD COMPANY
FROM 1292+63 TO STATION 1314+45
REVISED DATE – JUNE 15, 1931

V-1 22
V-1 23

STATE
DEPART

O/S 28'

631' FROM STATION 1292

JOAN F. BAYER
TAX MAP/LOT – U28/93
C.C.R.D. BOOK/PAGE – 15338/133
POR NO. – 101

JEFFREY EDMONDS
BRIDGET EDMONDS
TAX MAP/LOT – U28/91
C.C.R.D. BOOK/PAGE – 27435/254
POR NO. – 102

DANIEL J. SULLIVAN
TAX MAP/LOT – U28/3
C.C.R.D. BOOK/PAGE – 25106/346
POR NO. – 103

NORMA J. BO
TAX MAP/LOT –
C.C.R.D. BOOK/P

JORDAN E. CARDONE
TAX MAP/LOT – U28/4
C.C.R.D. BOOK/PAGE – 13564/

CHARLES F. WALLACE, JR.
CLAIRE M. WALLACE
TAX MAP/LOT – U28/1A
C.C.R.D. BOOK/PAGE – 9050/215
POR NO. – 100

N

Borehole ID	Northing	Easting	Elevation
B-1	392993	1087907	82.8
B-2	392986	1087583	83.8
B-3	392987	1087254	85.0
B-4	393044	1087779	83.8

=BORING ID

PLAN

20 0 20 40 60

Scale of Feet

DownEaster Brunswick
Storage & Maintenance Facility
BORING LOCATION PLAN

Figure 2

NORTHERN NEW ENGLAND
PASSENGER RAIL AUTHORITY

PARSONS BRINCKERHOFF

Appendix A
Boring Logs

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

BORING NUMBER: **B-1**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**
CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Diedrich D-50 on Rubber Tracked ATV**

LOCATION: **Brunswick, Maine**
COORD. **N: 392993** **E: 1087907**
STN. NO.: OFFSET:
SURFACE ELEV.: **82.8 feet**
DATUM: **NAVD-88**
START DATE: **10/25/11**
FINISH DATE: **10/25/11**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▤
I.D.	4"	1.375"	"	"		1.875"
O.D.	4.5"	2"	"	"		2.980"
Length	60"	24"	"	"		7.5'
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		N	
Hammer Fall	24"	30"	I.D. (O.D.)		1.875" (2.65")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
10/25/11	12:40 pm	5.0	29.0	31.0

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
															Depth / Elev.
		S	1		14				1	3	3	3	6		0.5 / 82.3 Top 6": Dark brown fine to medium SAND, little silt, trace roots, loose (TOPSOIL) Bot 8": Light brown fine to medium SAND, loose
80															
	5	S	2		13				10	20	26	33	46		Light brown fine to medium SAND, dense
75															8.0 / 74.8
	10	S	3		19				5	7	5	6	12		Olive SILT and fine SAND, trace clay, medium dense
70															12.5 / 70.3
	15	S	4		14				5	4	4	3	8		Olive fine SAND, loose
65															Light gray fine SAND, medium dense

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

(continued)

BORING NUMBER: **B-1**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**

CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
		S	5		15				7	8	8	8	16		
60															
	25	S	6		16				3	5	5	7	10		Light gray fine SAND, loose to medium dense
															Depth 27.5 / Elev. 55.3
55															Gray fine SAND, little silt, trace clay, very loose to loose
	30	S	7		16				1	2	2	5	4		Depth 31.0 / Elev. 51.8
50															Bottom of Hole - 31ft
	35														
45															
	40														
40															
	45														
35															

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

BORING NUMBER: **B-2**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**
CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Diedrich D-50 on Rubber Tracked ATV**

LOCATION: **Brunswick, Maine**
COORD. **N: 392986** **E: 1087583**
STN. NO.: OFFSET:
SURFACE ELEV.: **83.8 feet**
DATUM: **NAVD-88**
START DATE: **10/25/11**
FINISH DATE: **10/25/11**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▤
I.D.	4"	1.375"	"	"		1.875"
O.D.	4.5"	2"	"	"		2.980"
Length	60"	24"	"	"		7.5'
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		N	
Hammer Fall	24"	30"	I.D. (O.D.)		1.875" (2.65")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
10/25/11	2:50 pm	4.9	15.0	31.0
10/25/11	2:56 pm	4.9	0.0	31.0

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
															Depth / Elev.
		S	1		15				1	5	6	7	11		0.5 / 83.3 Top 6": Dark brown fine to medium SAND, little silt, trace root, medium dense (TOPSOIL) Bot 9": Light brown fine to medium SAND, medium dense
80															
	5	S	2		11				12	16	24	30	40		Light brown fine to coarse SAND, trace fine gravel, dense
75															
	10	S	3		13				6	11	14	16	25		Light brown fine to coarse SAND to fine SAND, medium dense
70															
	15	S	4		14				6	7	6	9	13		Light brown fine SAND, trace silt, medium dense
															17.5 / 66.3
65															Top 6": Olive SILT, trace clay, soft to medium stiff Mid 6": Gray SILT and CLAY

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

(continued)

BORING NUMBER: **B-2**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**

CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
		S	5		24				2	2	2	2	4		Next 6": Gray fine SAND, trace silt, very loose to loose Bot 6": Gray fine SAND, little silt, little clay
60	25	S	6		19				4	4	4	12	8		Gray fine SAND, trace silt, loose
55	30	S	7		22				WOR	1	5	1	6		Gray SILT, some fine sand, trace clay (varved), loose
															Depth Elev. 31.0
50	35														52.8 Bottom of Hole - 31ft
45	40														
40	45														

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

BORING NUMBER: **B-3**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**
CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Diedrich D-50 on Rubber Tracked ATV**

LOCATION: **Brunswick, Maine**
COORD. **N: 392987** **E: 1087254**
STN. NO.: OFFSET:
SURFACE ELEV.: **85.0 feet**
DATUM: **NAVD-88**
START DATE: **10/26/11**
FINISH DATE: **10/26/11**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▤
I.D.	4"	1.375"	"	"		1.875"
O.D.	4.5"	2"	"	"		2.980"
Length	60"	24"	"	"		7.5'
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		N	
Hammer Fall	24"	30"	I.D. (O.D.)		1.875" (2.65")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
10/26/11	12:15 pm	4.9	0.0	10.0

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
															Depth / Elev.
		S	1	■	18				1	5	5	10	10		0.5 / 84.5 Top 6": Dark brown fine to medium SAND and SILT, trace roots, loose to medium dense (TOPSOIL). Bot 12": Light brown fine to medium SAND, trace fine gravel
80	5	S	2	■	14				19	21	27	38	48		Light brown/orange brown fine to medium SAND, trace fine gravel, dense
75	10	S	3	■	11				6	9	12	11	21		Light brown/orange brown fine to coarse SAND, trace fine gravel, medium dense
70	15	S	4	■	18				21	20	19	18	39		Dark brown to light brown fine to coarse SAND, trace fine gravel, trace silt, dense
															17.5 / 67.5 Olive SILT and fine SAND, medium dense

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

(continued)

BORING NUMBER: **B-3**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**

CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
		S	5		20				11	13	11	11	24		Depth / Elev.
															23.0
															62.0
60	25	S	6		20				4	5	11	11	16		Gray SILT, some fine SAND, trace clay (thinly stratified), medium dense
55	30	S	7		20				4	4	12	17	16		Top 12": Olive SILT, some fine sand, trace clay, medium dense Bot 8": Olive fine SAND, little silt
															32.5
															52.5
50	35	S	8		22				4	3	3	7	6		Gray SILT, some fine sand, little clay (thinly stratified), loose
															36.0
															49.0
45	40														
40	45														

PB BORING LOG 2_MAINE.GPJ_FOR MAKING FENCES MAINE.GLB_12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

BORING NUMBER: **B-4**
SHEET NUMBER: **1** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**
CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**
DRILLING METHOD: **Rotary Wash**
RIG TYPE: **Diedrich D-50 on Rubber Tracked ATV**

LOCATION: **Brunswick, Maine**
COORD. **N: 393044** **E: 1087779**
STN. NO.: OFFSET:
SURFACE ELEV.: **83.8 feet**
DATUM: **NAVD-88**
START DATE: **10/26/11**
FINISH DATE: **10/26/11**

	Casing	Split Spoon	Shelby Tube	Piston	Grab	Core Barrel
Type/Symbol	HW	S ■	U ▯	P ▯	G ☒	C ▯
I.D.	4"	1.375"	"	"		1.875"
O.D.	4.5"	2"	"	"		2.980"
Length	60"	24"	"	"		7.5'
Hammer Wt.	300 lbs	140 lbs	Drill Rod Size		N	
Hammer Fall	24"	30"	I.D. (O.D.)		1.875" (2.65")	

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
10/26/11	9:20 am	4.9	0.0	24.0

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
															Depth / Elev.
		S	1	■	13				1	1	2	1	3		0.5 / 83.3 Top 6": Dark brown fine to medium SAND and SILT, little roots, very loose (TOPSOIL) Bot 7": Light brown fine to medium SAND, trace silt
															3.0 / 80.8
80	5	S	2	■	15				13	23	32	35	55		Light brown fine to coarse SAND, very dense
75	10	S	3	■	16				7	11	13	15	24		Light brown fine SAND, medium dense
															12.5 / 71.3
70	15	S	4	■	24				5	2	8	6	10		Top 6": Olive SILT, little fine sand, loose to medium dense Mid 6": Olive SILT, trace fine sand, trace clay Bot 12": Olive SILT and fine SAND, trace clay
65															Light brown fine SAND, trace silt, medium dense

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

PARSONS BRINCKERHOFF

NORTHERN NEW ENGLAND PASSENGER RAIL AUTHORITY

BORING LOG

(continued)

BORING NUMBER: **B-4**
SHEET NUMBER: **2** of **2**
PROJECT NUMBER: **52567CP**

PROJECT: **Downeaster Brunswick Storage & Maintenance Facility**
LOCATION: **Brunswick, Maine**
CLIENT: **Northern New England Passenger Rail Authority (NNEPRA)**

CONTRACTOR: **NH Boring Company**
DRILLER: **Walter Hoeckele**
INSPECTOR: **David D'Angelo**

ELEVATION (feet)	DEPTH (feet)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE SYMBOL	SAMPLE RECOVERY (in.)	SAMPLE RECOVERY (%)	SAMPLE RQD (in.)	SAMPLE RQD (%)	SOIL BLOWS/6 in. ON SAMPLER (* denotes 300 lb hammer) 0/6	6/12	12/18	18/24	N VALUE	GRAPHIC LOG	FIELD CLASSIFICATION AND REMARKS
		S	5		22				9	10	12	14	22		
60	25	S	6		24				4	4	17	20	21		Top 12": Olive fine SAND and SILT, medium dense Bot 12": Olive fine SAND, trace silt
															Depth 28.0 Elev. 55.8
55	30	S	7		17				13	23	29	30	52		Gray fine SAND, very dense
50	35	S	8		15				3	2	6	17	8		Top 12": Gray SILT and fine SAND, trace clay, loose Bot 3": Gray fine SAND
45	40	S	9		13				14	15	20	26	35		Gray fine SAND, trace silt, dense
															Depth 41.0 Elev. 42.8
40	45														Bottom of Hole - 41ft

PB BORING LOG 2 MAINE.GPJ FOR MAKING FENCES MAINE.GLB 12/8/11

Appendix B
Monitoring Well

PARSONS BRINCKERHOFF
75 Arlington Street
Boston, Massachusetts 02116

MONITORING WELL INSTALLATION

SHEET 1 OF 1
PROJECT NO.: 52567CP
WELL NO.: B-1

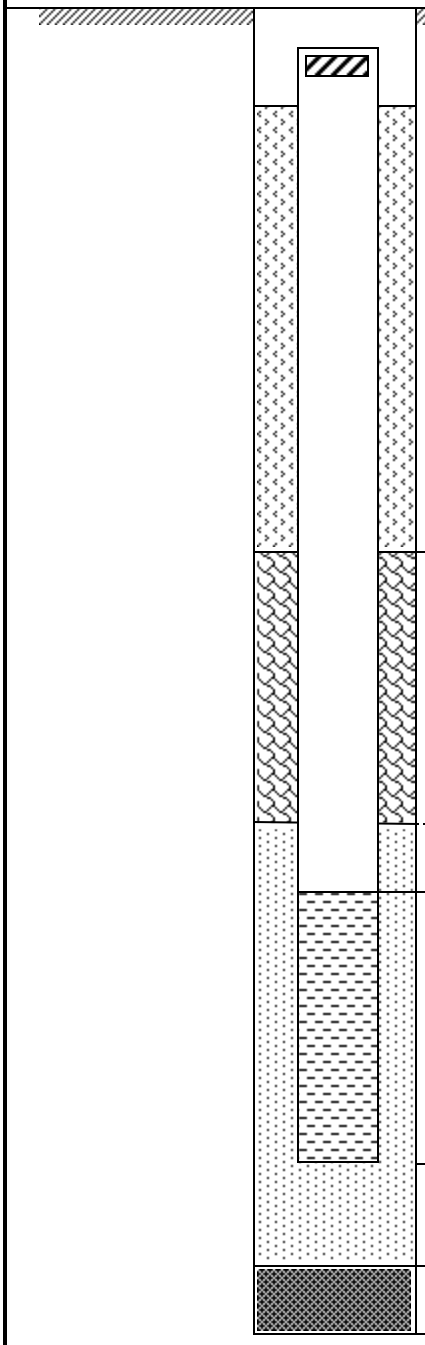
Logged by: D D'angelo

DownEaster Brunswick
Storage & Maintenance Facility
Northern NE Passenger Rail Authority (NNEPRA)
Brunswick, ME

Boring Contractor: **NH Boring Company**
Driller: **W Hoeckle**

DATE STARTED: 25-Oct-11
DATE FINISHED: 25-Oct-11

NOTES:



	DEPTH	ELEVATION
Ground Surface	0	82.8
Top of Seal	5	77.8
Bottom of Seal	6	76.8
Top of Screen	19	63.8
Bottom of Screen	29	53.8
Bottom of Filter Sand	31	51.8
Bottom of Hole	31	51.8

SUMMIT
GEOENGINEERING SERVICES

GEOTECHNICAL REPORT

NORTHERN NEW ENGLAND PASSANGER RAIL AUTHORITY
AMTRAK LAYOVER FACILITY
CHURCH ROAD
BRUNSWICK, MAINE

Prepared for:

Consigli Construction Company, Inc.

Prepared by:

Summit Geoengineering Services
Project #13057
May 2013

640 Main Street, Lewiston, Maine 04240, (207) 576-3313
434 Cony Road, Augusta, Maine 04330, (207) 318-7761

SUMMIT
GEOENGINEERING SERVICES

May 16, 2013
Summit #13057

Noel E. Rollins, AIA, NCARB, LEED GA
Consigli Construction Company, Inc.
15 Franklin Street
Portland, Maine 04101

Reference: Geotechnical Engineering Services
NNEPRA 1201 Amtrak Layover Facility – Church Road Brunswick, Maine

Dear Mr. Rollins:

We have completed our geotechnical investigation for the Northern New England Passenger Rail Authority new Amtrak Layover Facility located off Lombard Street in Brunswick, Maine. Our scope of services included performing geotechnical explorations at the site and preparing this report summarizing our findings and recommendations.

The subsurface conditions consist of thin topsoil and/or fill (mixture of sand with coal ash) overlying marine regressive delta deposits (sand-silt with localized layers of silt-clay). Groundwater was present at a depth range of 2 to 9 feet below existing ground surface. Bedrock was not present to a depth of 92 feet below existing ground surface.

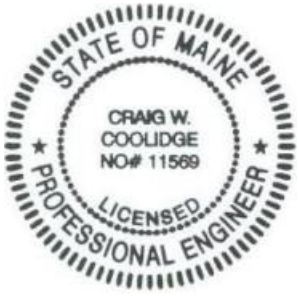
In general, the geotechnical considerations for development at the site include:

- The presence of deep sand-silt-clay soils and associated IBC seismic site classification.
- The potential for liquefaction of loose sands under dynamic loads and/or earthquake
- The presence of loose sand-silt subgrade and its potential for localized settlement
- The presence of shallow groundwater at a depth range of 2 to 9 feet below ground surface

The recommendations provided in this report are based on our geotechnical findings and the preliminary design information provided by Consigli Construction Company, Inc. We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,
Summit Geoengineering Services,

Craig W. Coolidge, P.E.
Vice President
Senior Geotechnical Engineer



SECTION 1
INTRODUCTION AND SCOPE OF SERVICES

Summit Geoengineering Services (SGS) was contracted by Consigli Construction Company, Inc. to perform geotechnical investigations and prepare this report summarizing our findings and recommendations for the proposed Amtrak Layover Facility at a vacant site located off Church Road in Brunswick, Maine. Our scope of services included performing geotechnical explorations, pertinent laboratory testing, and preparing this report summarizing our findings and geotechnical recommendations.

This report does not include an environmental assessment or further investigation into the presence or absence of contaminated soil or groundwater. Any comments regarding the nature and composition of the subsurface materials discovered are intended for informational purposes only.

SECTION 2
PROJECT AND SITE DESCRIPTION

The project consists of the design and construction of the Amtrak Layover Facility being proposed within a vacant site located off Church Road in Brunswick, Maine. The anticipated development includes the following:

- New steel frame building structure having a footprint of 51,000 ft^2
- New railroad entry and exit tracks (3 total) through building from existing tracks
- New bituminous pavement sections for access drive and parking spaces
- New stormwater treatment ponds (2 total) at each end of the site development

Currently the site contains an existing gravel drive, former railroad line, and recently cleared wooded areas. The site is located adjacent to existing Pan Am railroad lines currently in service. The is bordered by the existing railroad lines to the south, housing and commercial development along Route 1 to the north, Church Road to the west, and commercial development to the east. The site is access by Church Road to the west and Lombard Street to the east.

Existing grades at the site slope west to east from elevation 90 feet along Church Road to elevation 75 feet at Lombard Street. Grades within the proposed building footprint range from elevations 84 feet to 80 feet west to east. We understand the proposed finish floor elevation for the building slab is elevation 81.43 feet.

Project building foundation and train load design information used for our geotechnical evaluation include the following:

- Conventional spread footing with slab on grade foundation
- Maximum column load of 75 kips
- Maximum wall load of 7.5 kips per linear foot
- Column spacing of 25 feet center on center
- Cooper E80 train loading
- Individual concrete slabs beneath each interior railroad track

SECTION 3
EXPLORATIONS AND LABORATORY TESTING

3.1 Exploration

Summit Geoengineering Services (SGS) observed the subsurface conditions at the site with the drilling of 24 borings on April 22 through 25, 2013. The borings were advanced to depths of 12 to 22 feet using a rubber track mounted PowerProbe 9500 VTR. Borings were advanced using 3.5 inch direct push casing with SPT split spoon sampling. Groundwater monitoring wells were installed at 4 boring locations (B-3, B-11, B-16, and B-26).

Cone Penetration Testing (CPT) was performed by Summit Geoengineering Services (SGS) on April 25 and 26, 2013 at 4 locations along the centerline of the building footprint referred to as boring locations (B-9, B-12, B-19, and B-20). CPT was performed using a rubber track mounted PowerProbe 9500 VTR with a single point hollow stem anchor set to a depth of 5 feet. CPT was performed using a Vertek 10 ton digital cone pushed to a depth of 49 to 92 feet at a constant rate (2 cm/s). Parameters obtained include cone resistance (q_c), sleeve friction (f_s), and piezocone pore pressure (u). Seismic testing was performed at 1-meter (3.3-foot) intervals during the CPT test to obtain shear wave velocity data.

Resistivity testing was performed within the centerline of the building footprint using the Wenner Four Probe method in accordance with ASTM G57-06. Probes were aligned in an east to west alignment. Probe spacing ranged from 2 to 100 feet using 5-foot spacing.

The explorations were survey located prior to performing the explorations by TKM Land Surveyors Inc under contract to others. Locations of the explorations are shown on Test Boring Location Plan in Appendix A. Photograph logs and exploration logs for the test borings, cone penetration testing (CPT), and resistivity testing are provided in Appendix B.

Due to the presence of private utilities Dig Smart of Maine was subcontracted by Summit Geoengineering Services (SGS) to assist with locating underground utilities prior to performing the boring explorations.

3.2 Laboratory Testing

One sample was tested for Atterberg Limits in accordance with ASTM D4318 and for moisture content in accordance with ASTM D2216. Result of the Atterberg Limit indicates liquid limit of 24, plastic index 7, and moisture content of 26.1 percent. Thirteen samples were tested for grain size analyses in accordance with ASTM D422 and for moisture content in accordance with ASTM D2216. Detailed results of the laboratory tests are provided in Appendix C. A summary of the gradation results and moisture contents are presented below:

LABORATORY SUMMARY TABLE						
Location	**USCS**	**%Gravel**	**%Sand**	**%Silt**	**%Clay**	**WC**
B-3, 2 to 8.5 ft	SP	0.0%	95.8%	4.2%		15.4%
B-3, 10 to 12 ft	SP	0.5%	98.9%	0.6%		23.8%
B-3, 15 to 17 ft	SP	0.0%	95.2%	4.8%		24.8%
B-11, 5 to 7 ft	SP	0.5%	93.9%	5.6%		22.7%
B-11, 10 to 12 ft	SP	0.0%	99.6%	0.4%		21.5%
B-11, 15 to 17 ft	SP-SM	0.0%	91.0%	9.0%		23.1%
B-11, 20 to 22 ft	SP-SM	0.0%	86.3%	13.7%		25.6%
B-17, 15 to 17 ft	SM-ML	0.0%	45.1%	43.1%	11.8%	22.2%
B-18, 15 to 17 ft	ML	0.0%	31.0%	46.5%	15.5%	23.7%
B-18, 20 to 22 ft	ML	0.0%	36.0%	48.5%	12.5%	22.7%
B-26, 2 to 7 ft	SP	1.5%	96.9%	1.6%		6.9%
B-26, 7 to 12 ft	SP	2.0%	96.5%	1.5%		17.7%
B-26, 15 to 17 ft	ML	0.0%	9.0%	77.2%	13.8%	26.5%

Based on ASTM D422 test and Unified Soil Classification System particle distribution.

SECTION 4
SUBSURFACE CONDITIONS

The subsurface conditions at the site consist of thin topsoil and/or fill (mixture of sand with coal ash) overlying marine regressive delta deposits (sand-silt with localized layers of silt-clay). Bedrock was not encountered to a depth of 92 feet, elevation -10 feet. Groundwater seepage was observed at a depth range of 2 to 9 feet, elevations 71 to 81 feet.

4.1 Soil

Topsoil at the site consist of dark brown sandy silt with roots and organics and is classified as ML in accordance with the Unified Soil Classification System (USCS). The topsoil is considered loose and humid.

Fill at site ranged from 1 to 4 feet in thickness and consist of brown to black sand with some to trace gravel, silt, and coal ash and is classified as SM in accordance with the Unified Soil Classification System (USCS). The fill is considered loose to compact and humid. Occasional wood debris, brick, steel, or other debris was present within portions of the fill.

Marine regressive delta deposit at the site consists of brown sand overlying olive-gray mixtures of sand-silt overlying silt-clay and is classified as SP, SM, ML, and CL in accordance with the Unified Soil Classification System (USCS). The marine regressive delta deposit is considered loose to compact and humid to wet with depth.

Cone penetration testing (CPT) indicates an average normalized tip resistance range of 550 to 850 psi. Shear strength for underlying silt-clay encountered at CPT-B9 (depth of 30 to 60 feet) and CPT B12 (depth of 47 to 92 feet) is estimated at 1,150 psf based on cone penetration shear resistance. Shear wave velocity tests (V_s) performed during cone penetration testing (CPT) range from an average velocity per CPT test of 601 to 753 feet per second. The mean shear wave velocity estimated for the site based on the 4 CPT tests is 655 feet per second.

4.2 Bedrock

Bedrock was not encountered within the explorations performed to a maximum depth of 92 feet, elevation -10 feet. Surficial materials mapping by the Maine Geological Survey indicate bedrock depths within the vicinity of the site are at a depth range of approximately 3 to 136 feet. Mapping from the Maine Geological Survey indicates the bedrock is part of the Nehumkeag Pond Formation (Onp) consisting of light to medium gray plagioclase-quartz-biotite granofels and gneiss.

4.3 Groundwater

Groundwater was measured within 4 groundwater monitoring wells installed at borings B-3, B-11, B-16, and B-26. Groundwater depths observed within the monitoring wells are as follows:

GROUNDWATER WELL DATA			
Location	**Date**	**Depth**	**Elevation**
B-3	4/22/2013	7.7 ft	71 ft
B-3	4/26/2013	7.7 ft	71 ft
B-11	4/23/2013	3.2 ft	78 ft
B-11	4/26/2013	4.0 ft	77 ft
B-16	4/24/2013	4.1 ft	80 ft
B-16	4/26/2013	4.4 ft	80 ft
B-26	4/13/2013	6.7 ft	81 ft
B-26	4/24/2013	6.8 ft	81 ft

In general, the site topography is relatively flat slightly sloping west to east from Church Road toward Lombard Street from elevation 90 to 75 feet. Groundwater seepage appears to flow west to east within the marine regressive delta deposits from elevation 81 to 71 feet across the site. Mottling within the upper marine regressive delta deposits indicates groundwater fluctuates slightly during wet and dry periods. Significant Sand and Gravel Aquifer mapping by the Maine Geological Survey indicates the site is within a potential moderate to good groundwater yield of 10 to 50 gallons per minute.

SECTION 5
GEOTECHNICAL RECOMMENDATIONS

5.1 Allowable Bearing Pressure

With proper site preparation the building foundations can be supported using conventional spread footings. We recommend building foundations be designed using a net allowable bearing pressure of 3,000 psf. Total settlement for the allowable bearing pressure is estimated to be 1 inch or less. Differential settlement is estimated at or less than a deflection of 1/300 (δ/L, deflection divided by span length). The bearing pressure and associated settlement are based on the following conditions:

- Column loads are limited to 75 kips and walls loads of 7.5 kips/linear ft
- The foundation footings are constructed on 12 inches of crushed stone
- The subgrade is prepared as outlined under Section 5.4 Subgrade Ground Improvement
- Slab loads for railroad tracks are designed for Cooper E80 train loads or less.

We further recommend the following design parameters be used for foundation design:

PARAMETER	GRANULAR BACKFILL [1]	MARINE DELTA DEPOSIT
Total Natural (moist) Unit Weight (γ_t)	130 pcf	115 pcf
Saturated (buoyant) Unit Weight (γ_s)	68 pcf	53 pcf
Friction Coefficient (f_c) on Concrete	0.50	0.40
Friction Coefficient (f_s) on Steel	0.30	0.30
Passive Earth Pressure Coefficient (K_p)	3.54	3.39
Active Earth Pressure Coefficient (K_a)	0.28	0.29
Friction Angle (Φ)	34^0	33^0 (sand)
Cohesion (c)	--	1 ksf (clay)

[1] Based on 95% compaction of imported fill by ASTM D1557, Modified Proctor Density

5.2 Frost Protection

The exterior footings for the building foundation should be constructed at a minimum depth of 54 inches (4.5 feet) below the exterior finished grade for required frost protection. This frost penetration depth is based on a design air-freezing index of 1,300 degree days for the Brunswick area. Footings on 12 inches of ¾ inch crushed stone may be constructed at a minimum depth of 3.5 feet for a total frost protection depth of 4.5 feet. We recommend that the exterior of the foundation walls be backfilled with soil meeting the following gradation specification:

FOUNDATION BACKFILL	
Sieve Size	**Percent finer**
3 inch	100
¼ inch	60 to 100
No. 40	0 to 50
No. 200	0 to 7

Reference: MDOT Specification 703.06, Type F

The maximum particle size should be limited to 6 inches. The Foundation Backfill should be compacted to a minimum of 95 percent of its maximum dry density, determined in accordance with ASTM D1557.

5.3 Concrete Slab Design

Reinforced concrete slabs are planned beneath the individual railroad tracks (total of 3) within the building. The anticipated slab width for each railroad track is approximately 12 feet with a thickness of 12 inches. The railroad track slabs will be subject to Cooper E80 train live loading. The estimated total settlement for the track slabs under Cooper E80 live loading is 1 inch or less with a deflection of 1/300 (δ/L, deflection divided by span length). To minimize the effects of potential settlement control joints between slab sections are recommended. Alternatively, a single reinforced concrete mat foundation beneath the railroad tracks may be used to further distribute train loads and reduce potential settlement.

We recommend the interior building slabs be constructed on a minimum 12-inch thick layer of Structural Backfill. Slabs beneath the railroad tracks should be constructed on a minimum thickness of 18-inch thick layer of Structural Backfill. Structural Backfill should have a maximum particle size limited to 6 inches and meet the following gradation specifications passing the 3-inch sieve:

STRUCTURAL BACKFILL	
Sieve Size	**Percent finer**
3 inch	100
¼ inch	25 to 70
No. 40	0 to 30
No. 200	0 to 5

Reference: MDOT Specification 703.06, Type C

The Structural Backfill should be placed in 6 to 12-inch lifts and should be compacted to 95 percent of its maximum dry density determined in accordance with ASTM D1557. Additional fill required beneath the slabs should consist of Structural Backfill. Where placement is required near or below groundwater crushed stone may be substituted for Structural Backfill. The subgrade should be prepared as outlined under Section 5.4 Subgrade Ground Improvement

The coefficient of subgrade reaction, k (per 12-inch plate) applies to the design of reinforced concrete slabs over soil. We recommend a k value of 150 tons/ft^3 for slabs constructed on compacted Structural Backfill.

5.4 Subgrade Ground Improvement

Subgrade ground improvement is recommended prior to construction of building foundations, interior slabs, exterior railroad tracks, and pavement areas. Subgrade improvement is recommended to improve the density of underlying granular sand to improve bearing capacity and to minimize the effects of post construction settlement and potential for localized liquefaction due to surface dynamic loading. To improve subgrade density, a proof-rolling ground improvement program is recommended.

We recommend the following be performed as subgrade preparation:

- All topsoil/organics are removed prior to proof-rolling and Structural Backfill placement.

- Subgrade is dewatered sufficiently to permit proof-rolling and/or excavation in the dry. Proof-rolling using large vibratory equipment is not recommended where groundwater is present within 2 feet of the top of grade due to its potential for liquefaction.

- Where disturbed or liquefied subgrade is encountered it should be remove and replace with 12 inches of crushed stone and geotextile fabric such as Mirafi Polypropylene 500X.

- Proof-rolling should consist of a minimum of five passes in a north-south direction and then five passes in an east-west direction using a large (15 ton operating weight) vibratory roller. Additional compaction passes should be performed as required to achieve sufficient compaction of subgrade. Proof-rolling should be performed prior to excavation for foundation footings.

- Due to variability in subgrade sands, field inspection (observational method) of proof-rolling is recommended in place of conventional field density compaction testing to 95 percent of its maximum dry density determined in accordance with ASTM D1557. Field inspection should consist of performing initial field density testing prior to proof-rolling and subsequent field density testing after proof-rolling for comparison of density improvement. Additional compaction passes shall be made until the increase value in field density tests indicate that the maximum compaction has been achieved, thus field testing results will show no density improvement with additional compaction passes.

- Moisture content for the subgrade sand should be evaluated by the geotechnical engineer to determine if additional water is necessary to improve proof-rolling efficiency. Laboratory maximum density tests (ASTM D1557) will assist with determining appropriate moisture content and corresponding density targets prior to performing the proof-rolling subgrade improvement. Oversight and review of the proof-rolling subgrade improvement should be performed by the geotechnical engineer.

5.5 Groundwater Control

Groundwater within the building footprint was observed using monitoring wells at boring B-11 and B-16. Groundwater depths recorded within these observation wells indicate groundwater depths of 3.2 to 4.4 feet, elevations 77 to 80 feet. We understand the proposed finish floor elevation is 81.43 feet. Based on this groundwater is anticipated slightly below and near the finish floor elevation. Frost protection for the Brunswick area requires exterior footings to be constructed at a depth of 4.5 feet below grade. Based on this, the bottom of exterior footings is anticipated near elevation 77 feet. This will require footings to be constructed at or below groundwater depth.

Due to the presence of groundwater, we recommend perimeter underdrains be installed along the base of the exterior foundation footings. Additional dewatering within the building footprint such as cutoff trenches or similar should also be considered to minimize the amount of groundwater above footing depths. Alternative, a reinforced mat foundation system could be utilized to eliminate foundation footings below groundwater. An increase in the finish floor elevation could also be used to elevate foundation footings above groundwater depths.

Slab underdrains should be used beneath the foundation slabs to provide drainage during potential seasonal groundwater fluctuations. We recommend exterior grades slope away from the foundations to reduce runoff water from infiltrating the Foundation Backfill.

Perimeter underdrains should consist of 4 inch rigid perforated PVC placed adjacent to the exterior footings and surrounded by a minimum of 6 inches of crushed stone wrapped in filter fabric to prevent clogging from the migration of the fine soil particles in the foundation backfill soils. The underdrain pipe should be outlet to a location where it will be free flowing. Where exposed at the ground surface, the ends of pipes should be screened or otherwise protected from entry and nesting of wildlife, which could cause clogging.

Due to the sand subgrade, the potential for capillary rise, and close proximity to groundwater we recommend a vapor barrier be used beneath all building slabs. The vapor barrier should be installed in accordance with the latest ACI specifications (ACI 302.1R-96).

Recommendations for groundwater dewatering during construction are provided in Section 6.3 Construction Dewatering.

5.6 Seismic Design

The subgrade at the site is categorized as Site Class D. This is based on cone penetration test (CPT) results indicating an average correlated N_{60} value of 16, underlying clay shear strength of 1,150 psf, and mean shear wave velocity V_s of 655 ft/sec. The following seismic site coefficients are in accordance with the 2012 International Building Code (ASCE 7-10 Standard):

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS – IBC 2012	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.230
1 second spectral response (S_1)	0.077
Maximum short period spectral response (S_{MS})	0.367
Maximum 1 second spectral response (S_{M1})	0.185
Design short period spectral response (S_{DS})	0.245
Design 1 second spectral response (S_{D1})	0.123

The following seismic site coefficients are in accordance with the 2009 International Building Code (ASCE 7-05 Standard):

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS – IBC 2009	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.296
1 second spectral response (S_1)	0.076
Site coefficient (F_a)	1.56
Site Coefficient (F_v)	2.40
Design short period spectral response (S_{DS})	0.308
Design 1 second spectral response (S_{DS})	0.121

The sand-silt marine regressive delta deposit is slightly susceptible to liquefaction during seismic events. The gradation result for the marine regressive delta deposit indicates a fines content range of 18.8 to 48.1 percent. The peak horizontal acceleration with 2 percent probability in 50 years for the site is mapped as 0.12 and 10 percent probability in 50 years mapped at 0.04 by the United States Geological Survey (USGS). The factor of safety to resist significant liquefaction by earthquake magnitude of 5.25 and 7.5 are estimated as follows:

LIQUIFACTION POTENTIAL - FACTOR OF SAFETY		
Probability in 50 years	Magnitude 5.25	Magnitude 7.5
2% Peak Acceleration 0.12	1.7	1.0
10% Peak Acceleration 0.04	5.0	3.0

Earthquake study performed by the Maine Geological Survey (Earthquakes in Maine by Henry N Berry IV, 2003) suggests that by statistical analysis Maine could be susceptible to an earthquake of magnitude 6 once every 300 to 400 years. Recorded earthquakes in Maine to date are less than 6 magnitudes. Regional seismicity data for the northeast indicates the largest recorded earthquake to date is 7.0 in 1663 which occurred in Charlevoix Quebec.

Based on the low probability for earthquakes in Maine to be greater than magnitude 6 and the mapped peak horizontal acceleration for the site, the potential for liquefaction during a seismic event is considered low and does not require ground improvement.

5.7 Exterior Railroad Tracks

We understand 3 new exterior railroad tracks are planned as entrance-exit into the building structure and connecting to the existing Pan Am railroad line in current operation located adjacently south of the development site. In general we understand the proposed exterior tracks are planned at or near existing grades to be constructed on existing subgrade. Existing subgrade is anticipated at sandy fill and/or sand marine regressive delta deposits.

We recommend subgrade beneath the new railroad track section be prepared as outlined under Section 5.4 Subgrade Ground Improvement. Structural design for the railroad track section should be in accordance with Cooper E80 live loading as outlined by The American Railway Engineering Association. We recommend railroad track section be designed using a net allowable bearing pressure of 3,000 psf or a coefficient of subgrade reaction k value of 150 tons/ft^3.

5.8 Stormwater Control Ponds

We understand two new storm water treatment ponds are proposed with one at the east corner of the site and the other at the west corner of the site. Design grades for the ponds have not yet been established for this report. Boring B-2 and B-3 were performed within the east pond footprint. Boring B-26 was performed within the west pond footprint.

The subgrade within the east pond consists of brown sand of medium-loose density grading to fine sand explored to a depth of 17 feet, elevation 61 feet. Groundwater observed at the monitoring well installed at B-3 recorded groundwater at a depth of 7.7 feet, near elevation 71 feet. Based on the gradation results for samples obtained at boring B-3 and observed in-situ density of the sand subgrade, we recommend an infiltration rate of approximately 45 in/hr be used for the sand layer within the pond footprint.

The subgrade within the west pond consists of brown sand of medium-loose density grading to olive brown silt encountered near a depth of 13 feet, elevation 75 feet. Groundwater observed at the monitoring well installed at B-26 recorded groundwater at a depth of 6.7 to 6.8 feet, near elevation 81 feet. Based on the gradation results for samples obtained at boring B-26 and observed in-situ density of the subgrade, we recommend an infiltration rate of approximately 75 in/hr be used for the upper sand layer and approximately 2 in/hr or less for the lower silt layer within the pond footprint.

Subgrade conditions anticipated within the base of the pond is anticipated as medium-loose sand. Due to the presence of groundwater at or near the base of the pond and moderate susceptibility of sand to soften during excavation, conventional construction excavations may be difficult without a suitable plan for dewatering, water diversion, and stabilization.

Stabilization, if necessary, may include a working mat consisting of riprap overlying geotextile or similar where equipment is required to work below the water level. We recommend the working mat, if required, be left in place after construction to prevent disturbance and sediment erosion.

5.9 Pavement Section Recommendations

The project includes new pavement sections for access drives and parking areas. We anticipate the subgrade will consist of existing fill. The mean annual freezing index for the Brunswick area is estimated at 800 degree days. Based on the anticipated subgrade and mean annual freezing index, the mean annual frost penetration depth is 40 inches.

We recommend a minimum total pavement section thickness of 50% of the mean annual frost penetration or 21 inches for light duty pavement sections and 60% of the mean annual frost penetration depth or 25 inches for pavements subjected to moderate to heavy truckloads. We further recommend that the pavement section consist of the following materials.

MATERIAL	THICKNESS (in) Light Duty	THICKNESS (in) Heavy Duty	SPECIFICATION
Asphalt Surface Course	1	1.5	MDOT Superpave
Asphalt Binder Course	2	2.5	MDOT Superpave
Base Soil	3	3	MDOT 703.06 Type A
Subbase Soil	15	18	MDOT 703.06 Type D

We recommend the following gradation requirements be used for Base and Subbase gravel:

Sieve Designation	Percent Passing a 3-inch Sieve	
	MDOT Type A (Base)	MDOT Type D (Subbase)
3 Inch	100	100
2 Inch	100	--
½ Inch	45 – 70	--
¼ Inch	30 – 55	25 – 70
No. 40	0 – 20	0 – 30
No. 200	0 – 5	0 - 7

The material specifications are referenced to the 1995 Maine Department of Transportation Standard Specifications for Highways and Bridges and Maine Department of Transportation Standard Specifications, Revision of 2002.

We recommend the granular soil subgrade be proof-rolled as part of ground improvement as outlined in Section 5.4 Subgrade Ground Improvement.

SECTION 6
EARTHWORK CONSIDERATIONS

6.1 General Earthwork Considerations

Foundation Backfill, Structural Backfill, MDOT Type A, and MDOT Type D gravel should be placed in maximum of 12 inch lifts to a minimum of 95 percent of its maximum dry density, determined in accordance with ASTM D1557, Modified Proctor Density.

Grain size analyses were performed for samples of the marine regressive delta deposits (sand). Based on the gradation results, the marine regressive delta deposits (sand) does not meet specifications for Foundation Backfill, Structural Backfill, MDOT Type A, or Type D due to low gravel content. Gradation results are provided in Appendix C.

The subgrade is classified as type C soil in conformance with Occupational Safety and Health Administration (OHSA) excavation guidelines. Based on this, general excavations below 4 feet should be sloped no greater than 1.5H to 1V for granular soils.

We recommend that a qualified geotechnical consultant be retained to monitor and test soil materials used during construction and confirm that soil conditions and construction methods are consistent with this report.

6.2 Subgrade Preparation

Subgrade improvement should be performed as outlined in Section 5.4 Subgrade Ground Improvement. Sand subgrade should be sufficiently dewatered to prevent subgrade liquefaction during proof rolling. Placement of Structural Backfill and proof-rolling of sand subgrade near groundwater may potentially liquefy if heavy compaction equipment is used. We recommend that compaction near the groundwater level be performed after dewatering using lighter compaction equipment such as a vibratory plate compactor.

Alternatively to proof-rolling where dewatering is unavailable and groundwater is near top of grade, is over excavation and placement of 12 inches of crushed stone overlying geotextile fabric such as Mirafi Polypropylene 500X to stabilize the subgrade prior to placement of Structural Backfill. A minimum of 12 inches of crushed stone is recommended beneath foundation footings. Crushed stone should be tamped to lock the stone structure together. Crushed Stone should have a maximum particle size limited to 3 inches and meet the following:

CRUSHED STONE	
Sieve Size	**Percent finer**
3 inch	100
¾ inch	60 to 90
½ inch	10 to 35
3/8 inch	2 to 15
No. 4	0 to 5

Reference: MDOT Specification 703.12, Crushed Stone

To prevent the migration of fines and to distribute foundation loads we recommend geotextile filter fabric such as Mirafi Polypropylene 500X or equivalent be placed between the stabilized subgrade and Foundation Backfill. Geotextile should be placed with a minimum overlap of 2 feet. A minimum soil lift section of 6 inches is recommended prior to tracking vehicles or equipment over geotextile to prevent damage.

We recommend that Summit Geoengineering Services (SGS) be made available to visually inspect the subgrade during proof-rolling to verify the subgrade meets suitable preparation with our geotechnical recommendations.

6.3 Construction Dewatering

Dewatering will be required for excavations 3 to 8 feet below existing grade. Dewatering may consist of shallow sumps, a well point system, or other dewatering methods. The upper subgrade soils (sand) are considered pervious with an estimated permeability of approximately 45 to 75 in/hr based on the gradation results. Significant Sand and Gravel Aquifer mapping by the Maine Geological Survey indicates the site is within a potential moderate to good groundwater yield of 10 to 50 gallons per minute.

The contractor should furnish, install, operate, maintain, and remove the temporary dewatering systems to lower and control groundwater levels at least 2 feet below subgrade of excavations and to permit construction in-the-dry. Dewatering methods could include sump pumps placed at the base of a ¾ inch bedding stone layer. Pumps should be wrapped in approximately 6 to 12 inches of stone placed near the bottom of the excavation to reduce the amount of vacuum required to dewater the base of the excavation. The subgrade should be sloped to provide positive drainage to the sumps.

Temporary groundwater diversion such as a cut-off trench, underdrains, or other suitable method to adequately prevent additional water flow from entering the foundation excavation should be used to permit excavation in the dry. Excavations should be sloped to prevent surface water from flowing into the excavations.

For deeper excavations requiring a greater dewatering capacity, a well point dewatering system will be required. Should a well point system be selected it should be designed by a qualified engineer. Summit can be made available to provide this services if requested.

6.4 Cold Weather Construction

The following recommendations apply to earthwork construction during freezing conditions. In general, these recommendations are intended to minimize the penetration of frost into soil beneath foundations.

1. Foundation excavations should be protected from frost overnight by the use of insulated blankets or by tenting and heating.

2. Foundations should not be cast on frozen soil. The frozen zone should be removed and replaced as specified with the appropriate material.

3. Fill areas should be sealed with a 6 or 12 inch loose layer of soil (or otherwise insulated) at the end of the day to protect the compacted soil from freezing. The frozen layers should be removed in the morning prior to placing and compacting the next lift.

4. Due to the difficulty of thawing previously frozen soils (even within a heated shell), we recommend that the subgrade soil be protected from frost penetration where practical, especially if foundations are planned to be placed during periods of freezing.

5. Frozen foundation subgrade soils will become soft during thaw in the spring. We recommend that heavy traffic be avoided during thawing. Once the soil thaws and the accumulated water in the soil has drained, the subgrade should return to a firm condition. If placement of the footings or slabs occurs during thaw, we recommend that soft areas be removed and replaced with the use of geotextile fabric and crushed stone to stabilize soft areas.

We recommend that all winter concrete construction be performed in accordance with ACI 306, Cold Weather Concreting.

SECTION 7
CLOSURE

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions differ materially from those described in this report, SGS should be notified so that we can re-evaluate our recommendations.

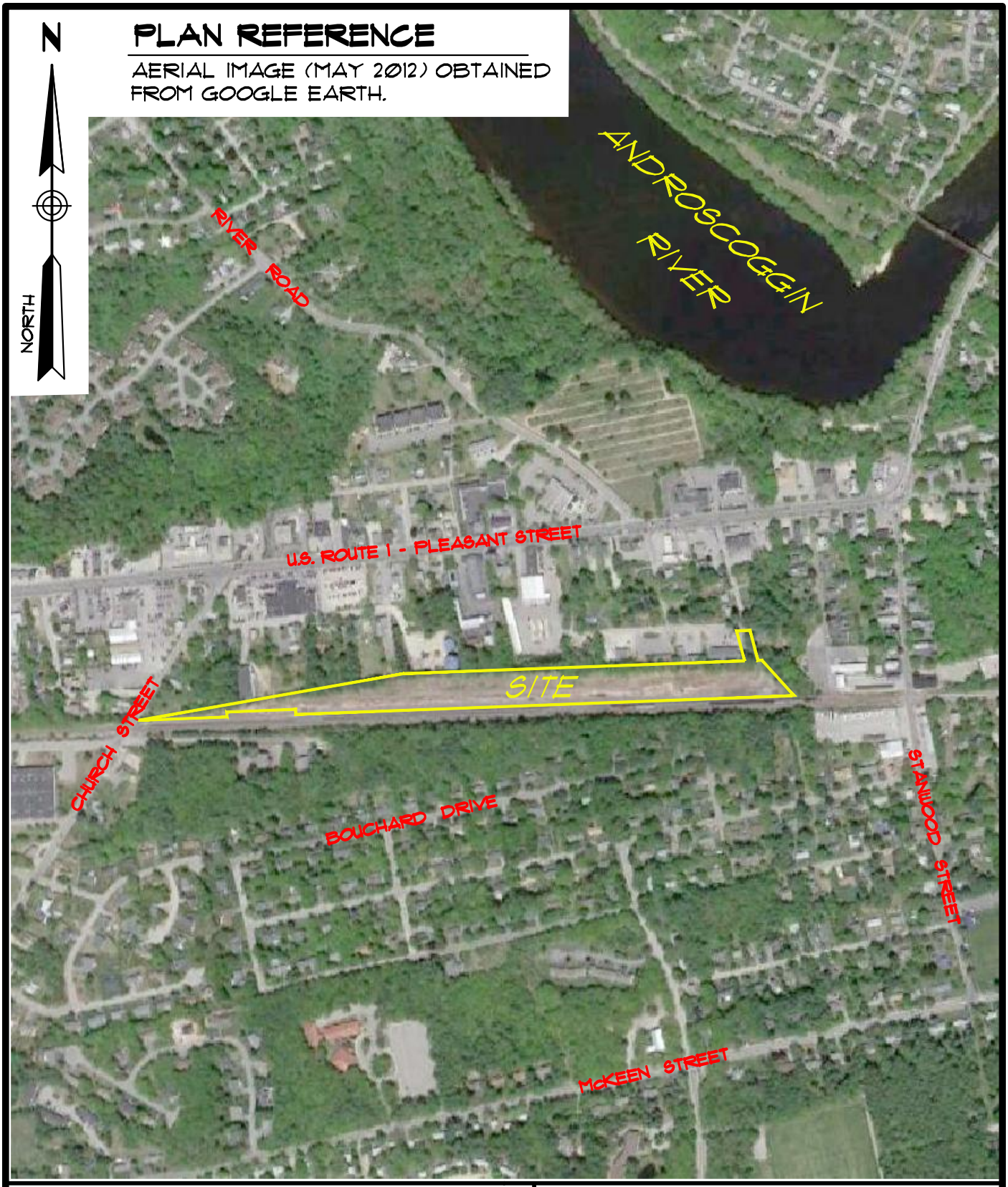
It is recommended that this report be made available in its entirety to contractors for informational purposes and be incorporated in the construction Contract Documents. We recommend that SGS be retained to review final construction documents relevant to the recommendations in this report.

APPENDIX A

SITE LOCATION PLAN

EXPLORATION LOCATION PLAN

GEOLOGICAL MAPPING



LOCATION MAP
AMTRAK LAYOVER FACILITY

BRUNSWICK, MAINE

PREPARED FOR

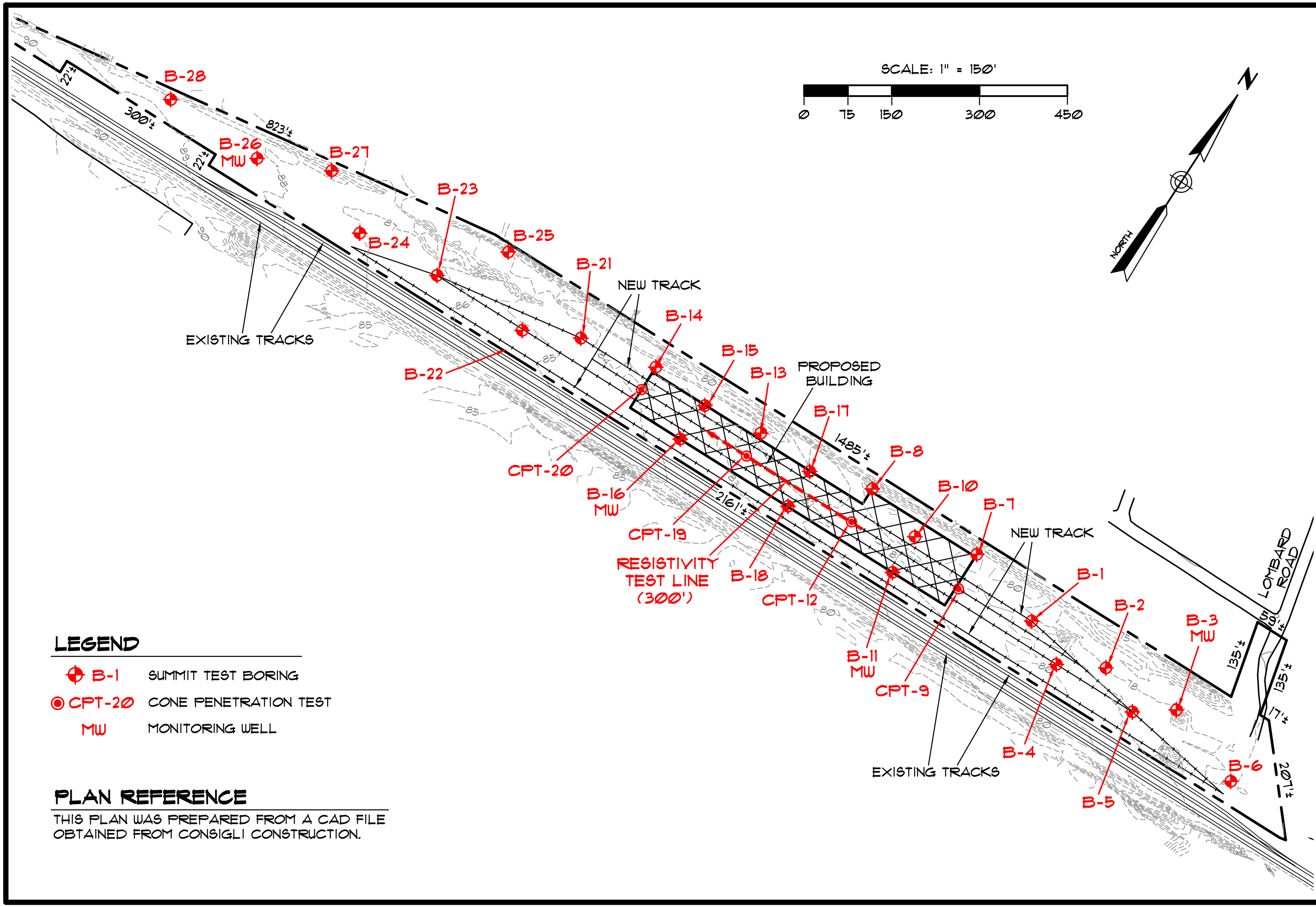
CONSIGLI CONSTRUCTION

DATE: MAY 2013	DRAWN BY: KRF	CHECKED BY: CC
JOB: 13057	SCALE: 1" = 600'	FILE: 13057 BOR

434 CONY ROAD
AUGUSTA, MAINE 04330

Tel.: (207) 318-7761
Fax: (207) 629-9094
www.summitgeoeng.com

SUMMIT
GEOENGINEERING SERVICES



LEGEND

B-1	SUMMIT TEST BORING
CPT-20	CONE PENETRATION TEST
MW	MONITORING WELL

PLAN REFERENCE

THIS PLAN WAS PREPARED FROM A CAD FILE OBTAINED FROM CONSIGLI CONSTRUCTION.

PROJECT:
AMTRAK LAYOVER FACILITY
CHURCH ROAD - BRUNSWICK, MAINE

CLIENT:
CONSIGLI CONSTRUCTION CO., INC.

TITLE:
TEST BORINGS
LOCATION PLAN

DRAWN BY: KRF
APPR. BY: WAP
SCALE: 1" = 150'
DATE: MAY 11, 2013

SUMMIT
GEOENGINEERING SERVICES
434 CONY ROAD
AUGUSTA, ME 04330
Tel.: (207) 318-7761
Fax: (207) 629-9094

PROJ.#: 13057

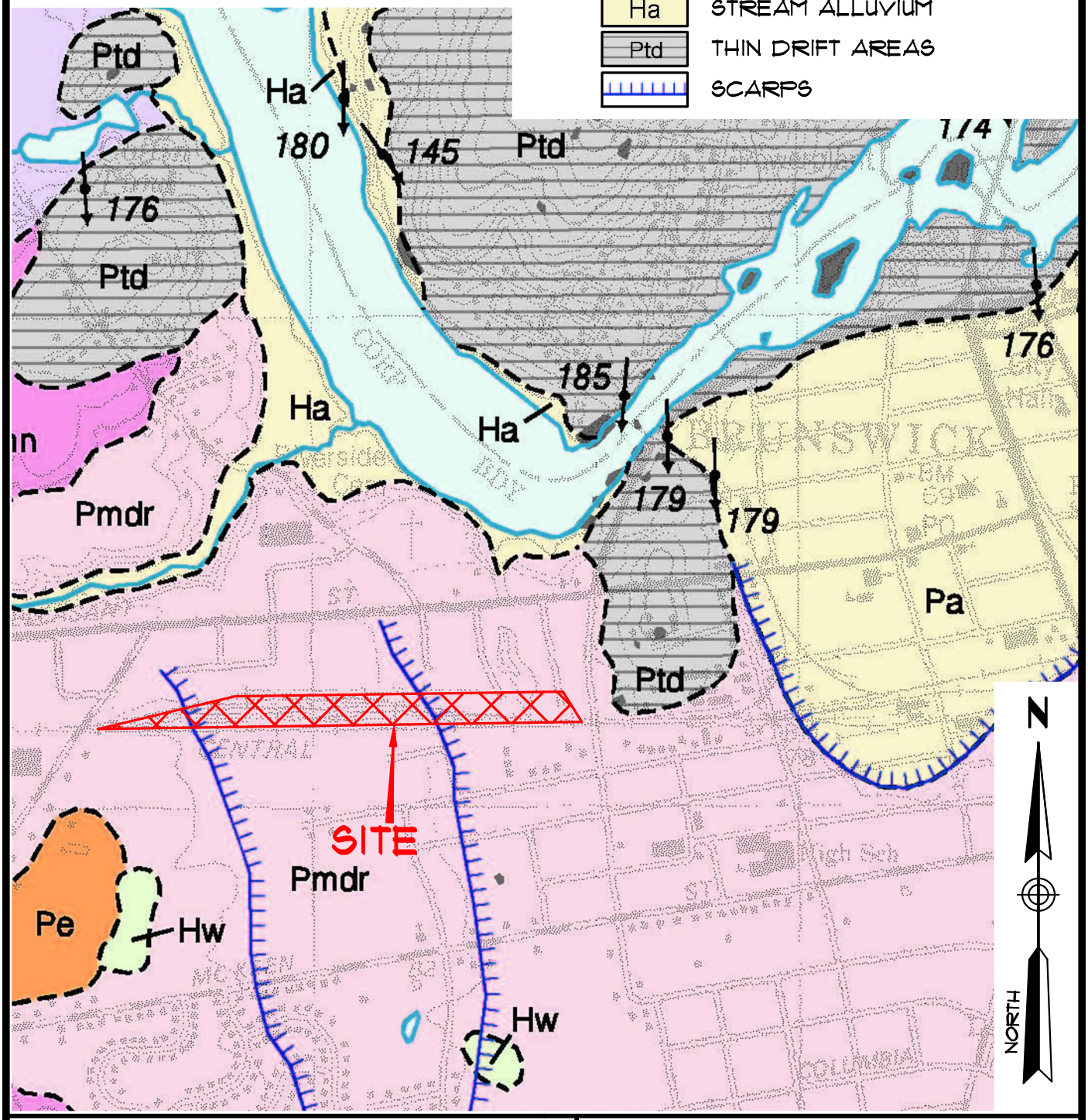
FIGURE:
1

PLAN REFERENCE

SURFICIAL MATERIALS, BRUNSWICK QUADRANGLE, DATED 2001, PREPARED BY MAINE GEOLOGICAL SURVEY.

LEGEND

Pmdr	REGRESSIVE MARINE DELTA
Hw	FRESHWATER WETLANDS
Ha	STREAM ALLUVIUM
Ptd	THIN DRIFT AREAS
	SCARPS



SURFICIAL GEOLOGY MAP
AMTRAK LAYOVER FACILITY

BRUNSWICK, MAINE
PREPARED FOR
CONSIGLI CONSTRUCTION

DATE: MAY 2013	DRAWN BY: KRF	CHECKED BY: CC
JOB: 13057	SCALE: 1" = 1000'	FILE: 13057 BOR

434 CONY ROAD
AUGUSTA, MAINE 04330

Tel.: (207) 318-7761
Fax: (207) 629-9094
www.summitgeoeng.com

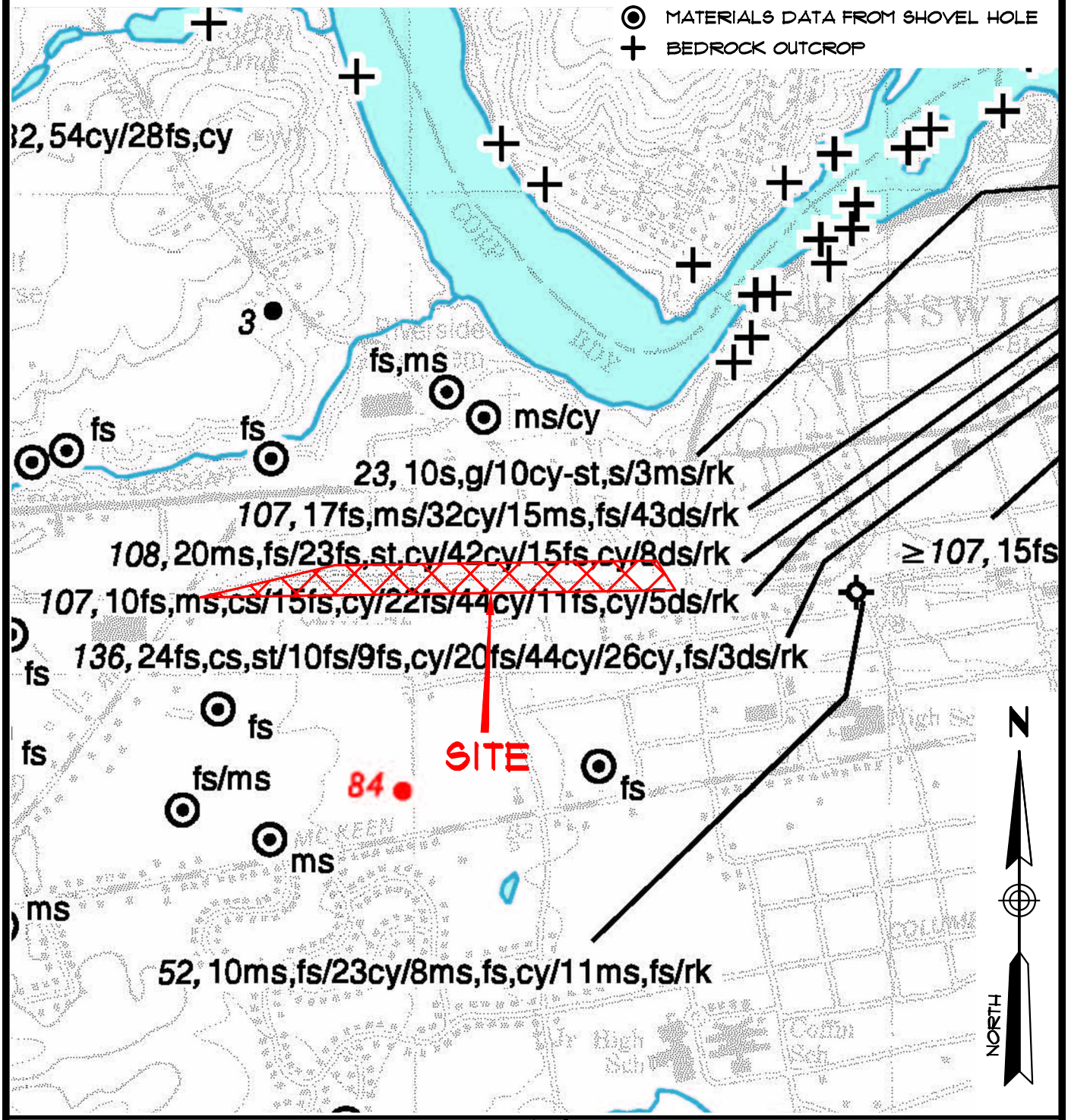
SUMMIT
GEOENGINEERING SERVICES

PLAN REFERENCE

SURFICIAL MATERIALS, BRUNSWICK QUADRANGLE, DATED 2001, PREPARED BY MAINE GEOLOGICAL SURVEY.

LEGEND

- BEDROCK WELL WITH DEPTH TO BEDROCK FROM SEISMIC LINE
- 37 BEDROCK WELL WITH DEPTH TO BEDROCK
- MATERIALS DATA FROM SHOVEL HOLE
- BEDROCK OUTCROP



SURFICIAL MATERIALS MAP
AMTRAK LAYOVER FACILITY

BRUNSWICK, MAINE

PREPARED FOR

CONSIGLI CONSTRUCTION

DATE: MAY 2013	DRAWN BY: KRF	CHECKED BY: CC
JOB: 13057	SCALE: 1" = 1000'	FILE: 13057 BOR

434 CONY ROAD
AUGUSTA, MAINE 04330

Tel.: (207) 318-7761
Fax: (207) 629-9094
www.summitgeoeng.com

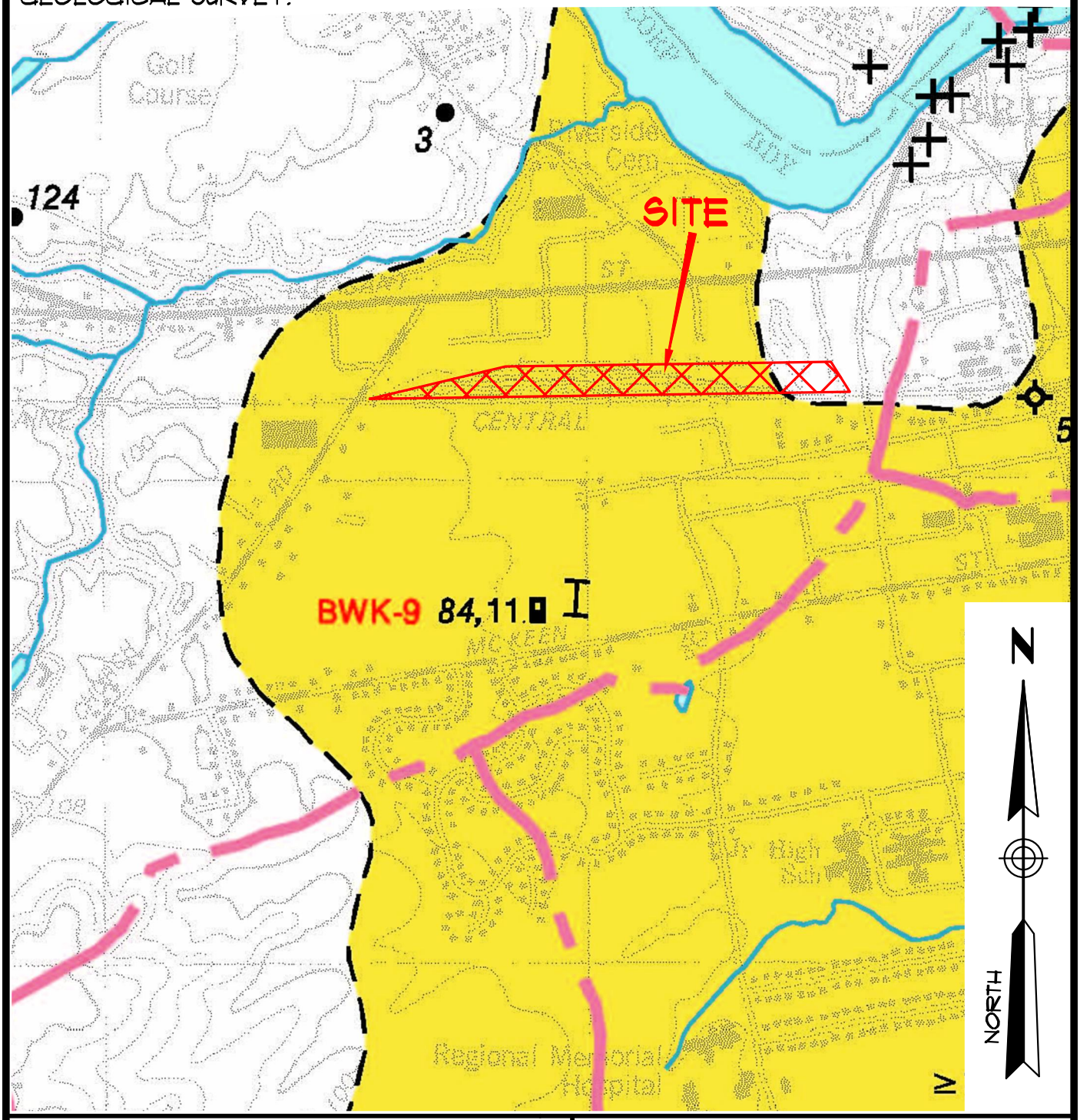
SUMMIT
GEOENGINEERING SERVICES

PLAN REFERENCE

SIGNIFICANT SAND & GRAVEL AQUIFERS, BRUNSWICK QUADRANGLE, DATED 1999, PREPARED BY MAINE GEOLOGICAL SURVEY.

LEGEND

SURFICIAL MATERIALS WITH GOOD TO MODERATE GROUNDWATER YIELDS (GREATER THAN 10 gal/min.)



SAND & GRAVEL AQUIFERS MAP
AMTRAK LAYOVER FACILITY

BRUNSWICK, MAINE

PREPARED FOR

CONSIGLI CONSTRUCTION

DATE: MAY 2013	DRAWN BY: KRF	CHECKED BY: CC
JOB: 13057	SCALE: 1" = 1000'	FILE: 13057 BOR

434 CONY ROAD
AUGUSTA, MAINE 04330

Tel.: (207) 318-7761
Fax: (207) 629-9094
www.summitgeoeng.com

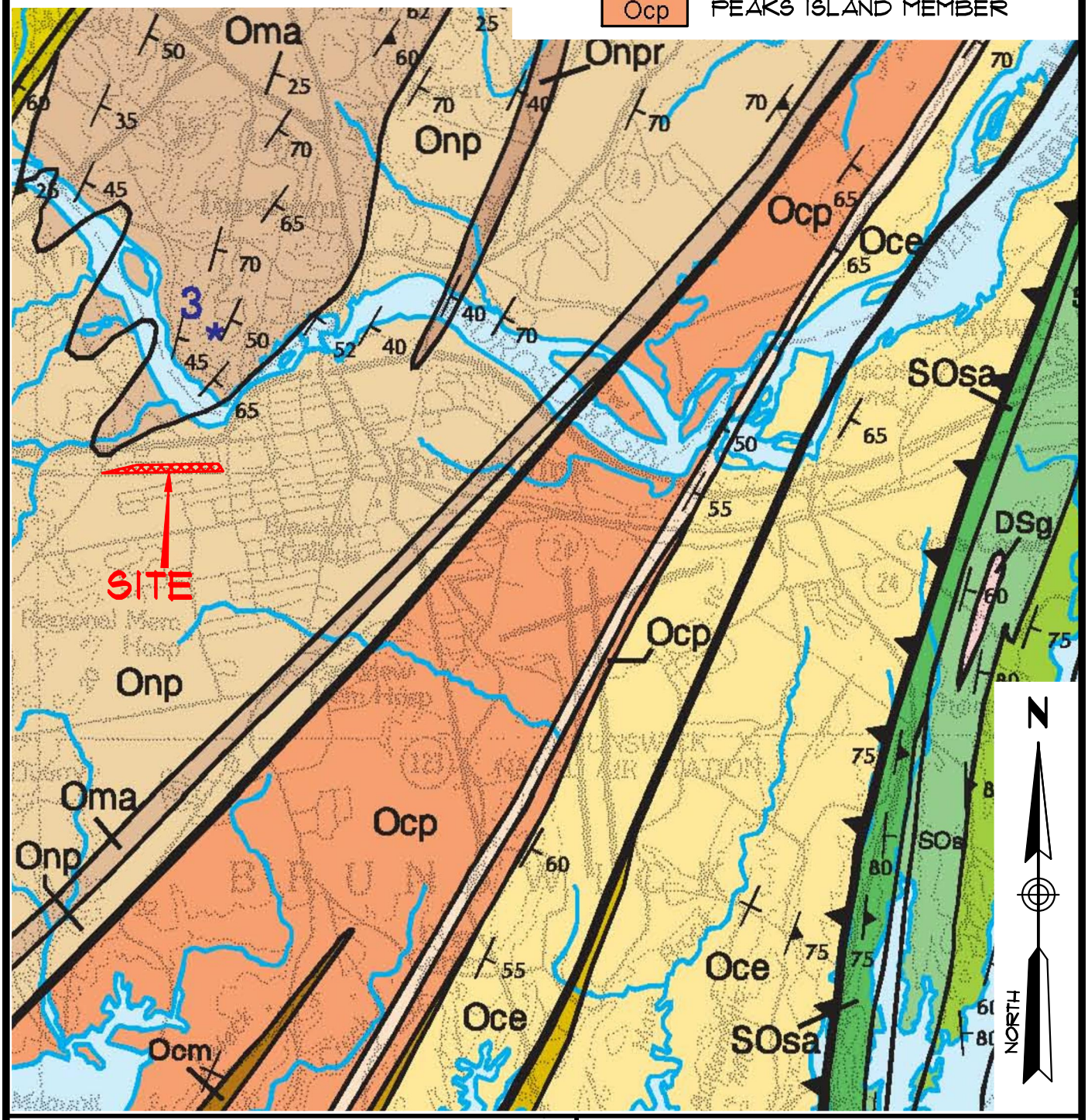
SUMMIT
GEOENGINEERING SERVICES

PLAN REFERENCE

SURFICIAL MATERIALS, BRUNSWICK QUADRANGLE, DATED 2001, PREPARED BY MAINE GEOLOGICAL SURVEY.

LEGEND

Oma	MOUNT ARARAT FORMATION
Onp	NEHUMKEAG POND FORMATION
Ocp	PEAKS ISLAND MEMBER



BEDROCK GEOLOGY MAP
AMTRAK LAYOVER FACILITY

BRUNSWICK, MAINE
PREPARED FOR
CONSIGLI CONSTRUCTION

DATE: MAY 2013	DRAWN BY: KRF	CHECKED BY: CC
JOB: 13057	SCALE: 1" = 4000'	FILE: 13057 BOR

434 CONY ROAD
AUGUSTA, MAINE 04330

Tel.: (207) 318-7761
Fax: (207) 629-9094
www.summitgeoeng.com

SUMMIT
GEOENGINEERING SERVICES

APPENDIX B
EXPLORATION LOGS
PHOTO LOGS

SUMMIT
GEOENGINEERING SERVICES

EXPLORATION COVER SHEET

The exploration logs are prepared by the geotechnical engineer from both field and laboratory data. Soil descriptions are based upon the Unified Soil Classification System (USCS) per ASTM D2487 and/or ASTM D2488 as applicable. Supplemental descriptive terms for estimated particle percentage, color, density, moisture condition, and bedrock may also be included to further describe conditions.

Drilling and Sampling Symbols:

SS = Split Spoon Sample
UT = Thin Wall Shelby Tube
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RW = Rotary Wash
SV = Shear Vane
PP = Pocket Penetrometer
RC = Rock Core Sample
Hyd = Hydraulic Advancement of Drilling Rods
Push = Direct Push of Drilling Rods
WOH = Weight of Hammer
WOR = Weight of Rod
PI = Plasticity Index
LL = Liquid Limit
W = Natural Water Content
USCS = Unified Soil Classification System

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. Groundwater monitoring wells may be required to record accurate depths and fluctuation.

Gradation Description and Terminology:

Boulders:	Over 12 inches	Trace:	Less than 5%
Cobbles:	12 inches to 3 inches	Little:	5% to 15%
Gravel:	3 inches to No.4 sieve	Some:	15% to 30%
Sand:	No.4 to No. 200 sieve	Silty, Sandy, etc.:	Greater than 30%
Silt:	No. 200 sieve to 0.005 mm		
Clay:	less than 0.005 mm		

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		DENSITY OF GRANULAR SOILS	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 4	Very Loose
2 to 4	Soft	5 to 10	Loose
5 to 8	Firm	11 to 30	Compact
9 to 15	Stiff	31 to 50	Dense
16 to 30	Very Stiff	>50	Very Dense
>30	Hard		

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-1
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	79 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	6.2	73 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/20	0 to 2	1		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				1		humid, very loose, SM		
				2				
2				4		Brown SAND, humid, compact, SP		MARINE DELTA
	S-2	24/2	2 to 4	4				
3				4				
				4				
4				3				
5								
	S-3	24/24	5 to 7	2		Olive brown Silty SAND, moist, compact, SM		
6				5		grading to		
				8		Mottled brown SAND, moist, compact, SW		
7				5				
8								
9								
10								
	S-4	24/24	10 to 12	2		Brown fine to coarse SAND, wet, loose, SP		
11				2				
				2				
12				2		Olive gray Silt-Clay at spoon tip		
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-2
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	78 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	6.1	72 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/10	0 to 2	2		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				4		humid, loose, SM		
				3		Brown SAND, humid, loose, SP		
2				3				
	S-2	24/18	2 to 4	4		Brown SAND mixed with coal ash, humid, loose, SM		
3				5		Reddish-brown fine SAND, damp, loose, SP		
				3				MARINE DELTA
4				3				
5								
	S-3	24/18	5 to 7	6		Brown fine to coarse SAND, moist to wet, loose, SP		
6				5				
				5				
7				4				
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown fine to coarse SAND, wet, loose, SP		
11				2				
				1				
12				5				
13								
14								
15								
	S-5	24/24	15 to 17	WH		Olive brown fine SAND, trace Silt, wet, very loose,		
16				WH		SP		
				WH				
17				1				
						End of boring at 17 feet, no refusal		
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-3**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	79 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	7.7	71 ft +/-	Groundwater well measurement
4/26/2013	7.7	71 ft +/-	Groundwater well measurement

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/9	0 to 2	1		Dark brown Silty SAND, rootlets, mulch,		TOPSOIL
1				1		humid, very loose, SM		
				2				
2				3				MARINE DELTA
	S-2	24/18	2 to 4	2		Brown medium-fine SAND, damp, loose, SP		
3				2				
				2				
4				3				2" PVC Well
							Gravel = 0.0%	Screen 3.5' to 13.5'
5	S-3	24/24	4.5 - 6.5	2		Brown and mottled SAND, damp to moist, loose, SP	Sand = 95.8%	
				2			Fines = 4.2%	
6				2			MC = 15.4%	
				2				
7	S-4	24/24	6.5 - 8.5	3		Brown and mottled SAND, wet, compact, SP		
				6				
8				6				
				7				
9								
10								
	S-5	24/24	10 to 12	1		Brown fine to coarse SAND, wet, loose, SP	Gravel = 0.5%	
11				2			Sand = 98.9%	
				2			Fines = 0.6%	
12				2			MC = 23.8%	
13								
14								
15								
	S-6	24/24	15 to 17	WH		Olive brown medium-fine SAND, wet, loose, SP	Gravel = 0.0%	
16				1			Sand = 95.2%	
				WH			Fines = 4.8%	
17				1			MC = 24.8%	
						End of boring at 17 feet, no refusal		
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-4
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	80 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	5.9	74 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/16	0 to 2	3		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				5		humid, loose, SM		
				6		Brown SAND, humid, loose, SP		
2				4				
	S-2	24/24	2 to 4	3		Brown SAND mixed with coal ash, humid, loose, SM		
3				4		Reddish-brown fine SAND, damp, loose, SP		
				5				MARINE DELTA
4				6				
5								
	S-3	24/16	5 to 7	6		Brown fine to coarse SAND, moist to wet, loose, SP		
6				6				
				5				
7				6				
8								
9								
10								
	S-4	24/24	10 to 12	2		Brown fine to coarse SAND, wet, loose, SP		
11				2				
				3		Olive brown SILT, little Clay and Sand, wet, firm, ML		
12				4				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-5
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	79 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	5.6	73 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/16	0 to 2	5		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				5		humid, loose, SM		
				5		Brown SAND, humid, loose, SP		
2				4				
	S-2	24/24	2 to 4	3		Brown SAND mixed with coal ash, humid, loose, SM		
3				2				
				2		Reddish-brown fine SAND, damp, loose, SP		
4				2				MARINE DELTA
	S-3	24/18	4 to 6	2		Brown fine to coarse SAND, moist to wet, loose, SP		
5				2				
				2				
6				3				
	S-4	24/24	6 to 8	4		Brown fine to coarse SAND, wet, compact, SP		
7				8		mixed with fine SAND, wet, compact, SP		
				9				
8				9				
9								
10								
	S-4	24/24	10 to 12	1		Brown fine to coarse SAND, wet, loose, SP		
11				3				
				4				
12				4				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-6**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	78 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/22/2013	Date Completed: 4/22/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/22/2013	7.9	70 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/19	0 to 2	3		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				4		humid, loose, SM		
				3		Brown SAND, humid, loose, SP		
2				4				
	S-2	24/16	2 to 4	3		Brown SAND mixed with coal ash, humid, loose, SM		
3				2		Reddish-brown fine SAND, damp, loose, SP		
				2				MARINE DELTA
4				3				
	S-3	24/16	4 to 6	1		Brown fine to coarse SAND, moist to wet, loose, SP		
5				1				
				1				
6				1				
	S-4	24/23	6 to 8	1		Brown fine to coarse SAND, wet, compact, SP		
7				1		mixed with fine SAND, wet, compact, SP		
				1				
8				2				
	S-5	24/19	8 to 10	1		Brown fine to coarse SAND, wet, loose, SP		
9				1				
				1				
10				1				
	S-6	24/24	10 to 12	3		Brown fine to coarse SAND, wet, loose, SP		
11				4				
				6		Olive brown Silty fine Sand, wet, compact, SM		
12				6				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-7
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	80 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	4.8	75 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/16	0 to 2	WH		Dark brown Silty SAND, rootlets, humid, SM		TOPSOIL
1				WH				
				1				
2				1				MARINE DELTA
	S-2	24/24	2 to 4	3		Reddish-brown fine SAND, damp, loose, SP		
3				4		grading to		
				10		Brown fine to coarse SAND, moist, loose, SP		
4				14				
5								
	S-3	24/18	5 to 7	7		Brown fine to coarse SAND, wet, loose, SP		
6				4				
				4				
7				5				
8								
9								
10								
	S-4	24/24	10 to 12	1		Olive brown fine to medium SAND, wet, loose, SP		
11				1				
				1				
12				2				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-8
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	81 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	3.4	78 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/16	0 to 2	WH		Dark brown Silty SAND, rootlets, humid, SM		TOPSOIL
1				1				
				WH				
2				1				MARINE DELTA
	S-2	24/24	2 to 4	4		Reddish-brown fine SAND, damp, loose, SP		
3				10		grading to		
				12		Brown fine to coarse SAND, moist, loose, SP		
4				8				
5								
	S-3	24/24	5 to 7	1		Brown fine to coarse SAND, wet, loose, SP		
6				3				
				5				
7				6				
8								
9								
10								
	S-4	24/24	10 to 12	WH		Brown fine to coarse SAND, wet, loose, SP		
11				WH				
				5				
12				4				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-10
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	81 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	2.9	78 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/16	0 to 2	1		Dark brown Silty SAND, rootlets, mulch, humid, SM		TOPSOIL
1				1				
				1				
2				1				MARINE DELTA
	S-2	24/24	2 to 4	3		Reddish-brown fine SAND, damp, loose, SP		
3				15		grading to		
				19		Brown fine to coarse SAND, moist, loose, SP		
4				24				
5								
	S-3	24/20	5 to 7	14		Brown fine to coarse SAND, wet, loose, SP		
6				10				
				9				
7				7				
8								
9								
10								
	S-4	24/24	10 to 12	WH		Brown fine to coarse SAND, wet, loose, SP		
11				WH				
				1				
12				2				
13								
14								
15								
	S-5	0/0	15 to 17	NA		No sample - running sands plugged casing		
16						(brown fine-coarse SAND, wet, SP in sampler)		
17								
18								
19								
20								
	S-6	24/24	20 - 22	WH		Olive brown fine SAND, trace Silt, wet, compact, SP		
21				6				
				5				
22				8				
						End of boring at 22', no refusal		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-11
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	81 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	3.2	78 ft +/-	Groundwater well measurement
4/26/2013	4.0	77 ft +/-	Groundwater well measurement

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/20	0 to 2	1		Black Silty SAND mixed with coal ash, humid, loose,		
1				3		SM		FILL
				4				
2				4				
	S-2	24/24	2 to 4	2		Brown SAND mixed with coal ash, damp,		
3				2		Reddish-brown fine SAND grading to		
				1		brown fine to coarse SAND, moist, loose, SP		MARINE DELTA
4				2				
								1" PVC Well
5								Screen 3.5' to 8.5'
	S-3	24/16	5 to 7	9		Brown fine to coarse SAND, wet, compact, SP	Gravel = 0.5%	
6				8			Sand = 93.9%	
				9			Fines = 5.6%	
7				10			MC = 22.7%	
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown fine to coarse SAND, wet, loose, SP	Gravel = 0.0%	
11				1			Sand = 99.6%	
				1			Fines = 0.4%	
12				2			MC = 21.5%	
13								
14								
15								
	S-5	24/24	15 to 17	WH		Olive brown fine SAND, little Silt, wet, very loose,	Gravel = 0.0%	
16				1		SP-SM	Sand = 91.0%	
				WH			Fines = 9.0%	
17				1			MC = 23.1%	
18								
19								
20								
	S-6	24/24	20 - 22	WH		Olive brown fine SAND, little Silt, wet, very loose,	Gravel = 0.0%	
21				1		SP-SM	Sand = 86.3%	
				1			Fines = 13.7%	
22				1			MC = 25.6%	
						End of boring at 22', no refusal		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-13
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	82 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	2.1	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/12	0 to 2	1		Black Sandy SILT mixed with black coal ash, humid,		TOPSOIL
1				2		soft, ML		
				2		Brown SAND, little gravel, trace Silt, humid, loose, SM		FILL
2				2		Gray Coal Ash		
	S-2	24/8	2 to 4	2		Reddish brown Sandy SILT, weakly cemented, humid,		
3				6		loose to compact, ML		MARINE DELTA
				11				
4				20				
5								
	S-3	24/24	5 to 7	10		Brown medium to fine SAND, mottled, wet,		
6				10		compact, SP		
				9				
7				8				
8								
9								
10								
	S-4	24/24	10 to 12	WH		Brown medium to coarse SAND, wet, loose, SP		
11				1				
				2				
12				3				
						End of Boring at 12 ft		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-14
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	83 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	3.8	79 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	WH		Dark brown Sandy SILT, trace rootlets, humid, ML		TOPSOIL
1				1		Brown medium to fine SAND, trace Silt, heavily		
				1		mottled, humid, very loose, SP		MARINE DELTA
2				1				
	S-2	24/18	2 to 4	2		Olive-tan SAND, little Silt, grading to dark brown Silty		
3				3		find Sand, humid, loose, SM		
				4				
4				6				
5								
	S-3	24/18	5 to 7	9		Brown medium to coarse SAND, wet, compact, SP		
6				8				
				6				
7				5				
8								
9								
10								
	S-4	24/20	10 to 12	2		Brown medium to coarse SAND, wet, compact, SP		
11				1				
				3				
12				4				
						End of Test Pit at 12 feet		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-15**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	83 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	3.3	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Brown SAND, humid, very loose, SP		TOPSOIL
1				1		Dark brown SILT mixed with organics		
				2		Reddish brown medium to fine SAND, little Silt		
2				3		humid, loose, SM		MARINE DELTA
	S-2	24/8	2 to 4	3				
3				6		Reddish brown fine Sandy SILT, humid, stiff, ML		
				9				
4				12				
5								
	S-3	24/20	5 to 7	4		Brown medium to coarse SAND, wet, loose, SP		
6				3				
				4				
7				4				
8								
9								
10								
	S-4	0/0	10 to 12	NA		No sample - running sands plugged casing		
11								
12								
13								
14								
15								
	S-5	24/24	15 to 17	2		Brown very fine SAND, little Silt, wet, loose, SM		
16				4				
				2		Dark brown SILT, little Clay and Sand, wet, soft,		
17				2		ML		
18								
19								
20								
	S-6	24/24	20 to 22	WH		Gray fine Sandy SILT, Clayey Silt in seams (4" to 6")		
21				4		wet, soft, ML		
				3				
22				1				
						End of Boring at 22 feet		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-16**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	84 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	4.1	80 ft +/-	Groundwater well measurement
4/26/2013	4.4	80 ft +/-	Groundwater well measurement

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/12	0 to 2	WH		Dark brown SILT, little Sand and Gravel, trace		TOPSOIL
1				2		organics, humid, soft, ML		
				3		Brown medium to fine SAND, humid, very loose,		
2				1		SP		MARINE DELTA
	S-2	24/6	2 to 4	1				
3				2				
				4				1" PVC Well
4				3				Screen 3' to 8'
5								
	S-3	24/20	5 to 7	11		Reddish brown fine SAND, little Silt, wet, compact,		
6				8		SM		
				10		Brown medium to coarse SAND, wet, compact, SP		
7				10				
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown medium to coarse SAND, wet, loose, SP		
11				2				
				4				
12				3				
13								
14								
15								
	S-5	24/24	15 to 17	WH		Brown medium to fine SAND, trace Silt, wet, loose,		
16				2		SM		
				3				
17				3				
18								
19								
20								
	S-6	24/24	20 to 22	1		Brown medium to fine SAND, tr. Silt, wet, loose, SM		
21				1		Gray SILT, little fine Sand or Clay in seams, wet,	LL = 24	
				1		very soft, CL-ML	PI = 7	
22				3			MC = 26.1%	
						End of Boring at 22 feet		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-17**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	82 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	3.4	79 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/20	0 to 2	WH		Black Sandy SILT mixed with black coal ash, humid,		TOPSOIL
1				2		soft, ML		
				1		Brown SAND, little gravel, trace Silt, humid, loose, SM		FILL
2				3		Gray Coal Ash		
	S-2	24/24	2 to 4	3		Reddish-brown fine SAND grading to		
3				5		brown fine to coarse SAND, moist, loose, SP		MARINE DELTA
				7				
4				8				
5								
	S-3	24/16	5 to 7	6		Brown fine to coarse SAND, wet, loose, SP		
6				5				
				4				
7				5				
8								
9								
10								
	S-4	24/18	10 to 12	3		Brown fine to coarse SAND, wet, loose, SP		
11				3				
				4		Olive brown Sandy SILT, little Clay with thin		
12				4		gray Silt seams, wet, firm, ML		
13								
14								
15								
	S-5	24/24	15 to 17	1		Olive brown Sandy SILT, little Clay, wet, very loose,	Sand = 45.1%	
16				2		ML	Silt = 43.1%	
				1			Clay = 11.8%	
17				2			MC = 22.2%	
18								
19								
20								
	S-6	24/24	20 - 22	WH		Olive brown fine SAND, little Silt, wet, very loose,		
21				WH		SP-SM		
				WH				
22				1				
						End of boring at 22', no refusal		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-18**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	82 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/23/2013	Date Completed: 4/23/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/23/2013	3.7	78 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Black Silty SAND mixed with coal ash, humid, loose,		
1				1		SM		FILL
				3				
2				2				
	S-2	24/24	2 to 4	1		Reddish-brown fine SAND grading to		
3				3		brown fine to coarse SAND, moist, loose, SP		MARINE DELTA
				6				
4				11				
5								
	S-3	24/16	5 to 7	8		Brown fine to coarse SAND, wet, compact, SP		
6				8				
				7				
7				8				
8								
9								
10								
	S-4	24/24	10 to 12	2		Brown fine to coarse SAND, wet, loose, SP		
11				3				
				3				
12				5		Olive brown Sandy SILT, little Clay with thin		
						gray Silt seams, wet, firm, ML		
13								
14								
15								
	S-5	24/24	15 to 17	WH		Gray Sandy SILT, little Clay, wet, very loose, ML	Sand = 31.0%	
16				WH			Silt = 46.5%	
				2			Clay = 15.5%	
17				2			MC = 23.7%	
18								
19								
20								
	S-6	24/24	20 - 22	1		Gray Sandy SILT, little Clay, wet, very loose, ML	Sand = 36.0%	
21				1			Silt = 48.5%	
				2			Clay = 12.5%	
22				3			MC = 22.7%	
						End of boring at 22', no refusal		

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-21**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	84 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	4.7	79 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Dark brown Sandy SILT, trace organics and coal		TOPSOIL
1				3		ash, humid, soft, ML		
				4		Brown SAND, humid, compact, SW		
2				6				MARINE DELTA
	S-2	24/24	2 to 4	4		Brwon medium to coarse SAND, mottled in seams,		
3				3		loose, SP		
				2				
4				2				
5								
	S-3	24/24	5 to 7	12		Brown medium to fine SAND, trace Silt, wet,		
6				14		compact, SM		
				9				
7				8				
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown medium to fine SAND, wet, loose, SP		
11				3				
				4				
12				4				
						End of Boring at 12 feet		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-22
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	85 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	5.0	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/24	0 to 2	2		Dark brown to black Silty fine SAND, trace organics,		FILL
1				3		trace coal ash, humid, loose, SP		
				4		Brown medium to fine SAND, slightly mottled,		
2				4		humid, loose, SP		
	S-2	24/24	2 to 4	2				
3				2				
				1				
4				2		Dark brown SILT, little fine Sand, tr, organics & coal		
						ash, humid, very soft, ML		
5								
	S-3	24/18	5 to 7	12		Brown medium to coarse SAND, heavily mottled,		MARINE DELTA
6				12		wet, compact, SP		
				10				
7				9				
8								
9								
10								
	S-4	24/24	10 to 12	2		Dark brown medium to coarse SAND, trace Silt,		
11				4		heavilly mottled, wet, compact, SP		
				7				
12				7				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-23
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	86 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	6.0	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/20	0 to 2	1		Dark brown Sandy SILT, rootlets, humid, ML		TOPSOIL
1				2		Black Silty SAND, trace coal ash, humid, loose, SM		FILL
				3		Brown medium to fine SAND, trace Silt, slightly		
2				3		mottled, humid loose, SM		MARINE DELTA
	S-2	24/24	2 to 4	3		Reddish-brown Silty fine SAND, mottled, humid,		
3				3		loose, SM		
				4				
4				5				
5								
	S-3	24/18	5 to 7	6				
6				6		Olive-brown fine Sandy SILT, wet, compact, ML		
				5				
7				6		Brown medium to coarse SAND, wet, compact, SP		
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown medium to coarse SAND, wet, loose, SP		
11				3				
				6				
12				7				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-24
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	87 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	6.2	81 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Black Silty SAND mixed with coal ash, humid, loose,		FILL
1				2		SM		
				3				
2				4		Brown medium to fine SAND, trace Silt, humid,		
	S-2	24/18	2 to 4	3		loose, SM		MARINE DELTA
3				4				
				5		Brown medium to fine SAND, trace Silt, humid,		
4				6		compact, SP		
5								
	S-3	24/24	5 to 7	9		Brown SAND, wet, compact, SP		
6				9				
				9				
7				8				
8								
9								
10								
	S-4	24/24	10 to 12	WH		Brown medium to fine SAND, wet, loose, SP		
11				4				
				3				
12				4				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-25
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	84 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	4.2	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Dark brown Silty SAND, trace rootlets and organics,		TOPSOIL
1				1		humid, very loose, SM		
				2		Brown medium to fine SAND, trace Silt, humid,		
2				2		loose, SP		MARINE DELTA
	S-2	24/8	2 to 4	4				
3				4				
				5				
4				6				
5								
	S-3	24/18	5 to 7	4		Brown medium to coarse SAND, wet, compact, SP		
6				6				
				6				
7				5				
8								
9								
10								
	S-4	24/24	10 to 12	2		Brown medium to coarse SAND, wet, loose to		
11				3		compact, SP		
				6				
12				6				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-26**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	88 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/25/2013	Date Completed: 4/25/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/25/2013	6.7	81 ft +/-	Groundwater well measurement
4/26/2013	6.8	81 ft +/-	Groundwater well measurement

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/24	0 to 2	1		Dark brown Silty SAND, trace rootlets and coal ash,		FILL
1				1		humid, very loose, SM		
				3				
2				3				MARINE DELTA
	S-2	24/18	2 to 4	3		Brown SAND, humid, compact, SP	Gravel = 1.5%	
3				4			Sand = 96.9%	
				8			Fines = 1.6%	
4				9			MC = 6.9%	2" PVC Well
								Screen 3.5' to 13.5'
5								
	S-3	24/18	5 to 7	9		Brown SAND, damp to moist, compact, SP		
6				9				
				8				
7				9		Mottling at 6.5'		
	S-4	24/24	7 to 9	7		Brown medium to coarse SAND, wet, compact, SP	Gravel = 2.0%	
8				7			Sand = 96.5%	
				5			Fines = 1.5%	
9				4			MC = 17.7%	
10								
	S-5	24/24	10 to 12	1		Brown medium to coarse SAND, wet, compact, SP		
11				2				
				4				
12				3				
13								
14								
15								
	S-6	24/24	15 to 17	WH		Olive brown SILT, little Sand and Clay, wet, soft, ML	Sand = 9.0%	
16				WH			Silt = 77.2%	
				1			Clay = 13.8%	
17				1			MC = 26.5%	
						End of boring at 17 feet, no refusal		
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Boring #: **B-27**

Project:	NNEPRA Amtrak Layover Facility	Project #:	13057
Location:	Church Road	Sheet:	1 of 1
City, State:	Brunswick, Maine	Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	87 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Peterlein, P.E.	Date started: 4/24/2013	Date Completed: 4/24/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/24/2013	7.4	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/24	0 to 2	1		Black Sandy SILT mixed with coal ash, trace rootlets,		
1				2		humid, very soft, ML		FILL
				2				
2				1		Brown medium to fine SAND, humid, very loose, SP		
	S-2	24/24	2 to 4	2				MARINE DELTA
3				2				
				2				
4				3				
5								
	S-3	24/24	5 to 7	5		Brown SAND, humid, compact, SP		
6				6				
				6				
7				6				
8								
9								
10								
	S-4	24/24	10 to 12	1		Brown medium to fine SAND, wet, very loose, SP		
11				2				
				2				
12				2				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

SUMMIT
GEOENGINEERING SERVICES

SOIL BORING LOG

Project:	NNEPRA Amtrak Layover Facility	Boring #:	B-28
Location:	Church Road	Project #:	13057
City, State:	Brunswick, Maine	Sheet:	1 of 1
		Chkd by:	CWC

Drilling Co:	Summit Geoengineering Services, Inc.	Boring Elevation:	89 ft +/-
Driller:	C. Coolidge, P.E.	Reference:	Estimated from siteplan topography
Summit Staff:	B. Haiss, E.I.	Date started: 4/25/2013	Date Completed: 4/25/2013

DRILLING METHOD		SAMPLER	
Vehicle:	PowerProbe	Length:	24" SS
Model:	9500 VTR	Diameter:	2"OD/1.5"ID
Method:	3.5" Casing	Hammer:	140 lb
Hammer Style:	Auto Drop	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
4/25/2013	9.4	80 ft +/-	In borehole at completion

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N_{60}	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	1		Dark brown Silty SAND, trace rootlets and coal ash,		
1				2		humid, very loose, SM		FILL
				2				
2				2		Brown medium to fine SAND, humid, loose, SP		
	S-2	24/22	2 to 4	2				MARINE DELTA
3				4				
				6				
4				6				
5								
	S-3	24/16	5 to 7	3		Brown SAND, damp to moist, loose, SP		
6				2				
				2				
7				2				
8								
9								
10								
	S-4	24/24	10 to 12	WH		Brown medium to fine SAND, wet, loose, SP		
11				1		grading to olive brown Sandy SILT, trace Clay, wet,		
				4		firm, ML		
12				4				
						End of boring at 12 feet, no refusal		
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Granular Soils		Cohesive Soils		% Composition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D2487
0-4	V. Loose	<2	V. soft	
5-10	Loose	2-4	Soft	< 5% Trace
11-30	Compact	5-8	Firm	5-15% Little
31-50	Dense	9-15	Stiff	15-30% Some
>50	V. Dense	16-30	V. Stiff	> 30% With
		>30	Hard	

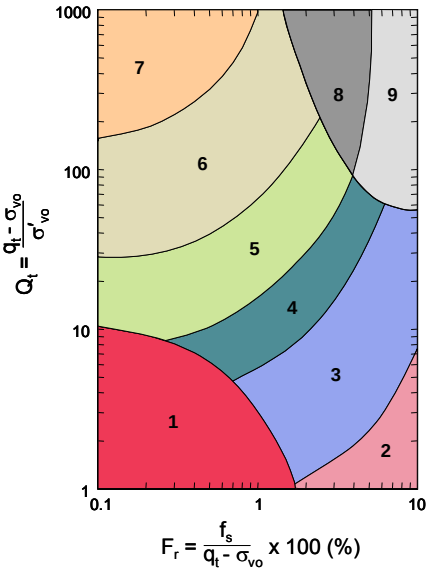
NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index

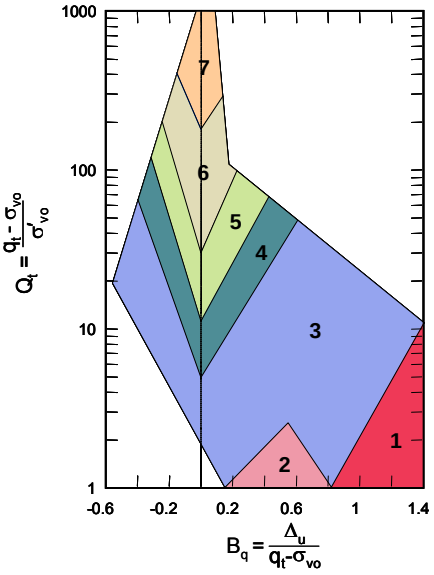
Bedrock Joints
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches
Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200

Soil Moisture Condition
Dry: S = 0%
Humid: S = 1 to 25%
Damp: S = 26 to 50%
Moist: S = 51 to 75%
Wet: S = 76 to 99%
Saturated: S = 100%

CPT Soil Behavior Type Legend
(Robertson et al. 1990)





Zone	Soil Behavior Type
1	Sensitive, Fine Grained
2	Organic Soils-Peats
3	Clays; Clay to Silty Clay
4	Silt Mixtures; Clayey Silt to Silty Clay
5	Sand Mixtures; Silty Sand to Sandy Silt
6	Sands; Clean Sands to Silty Sands
7	Gravelly Sand to Sand
8	Very Stiff Sand to Clayey Sand*
9	Very Stiff Fine Grained*

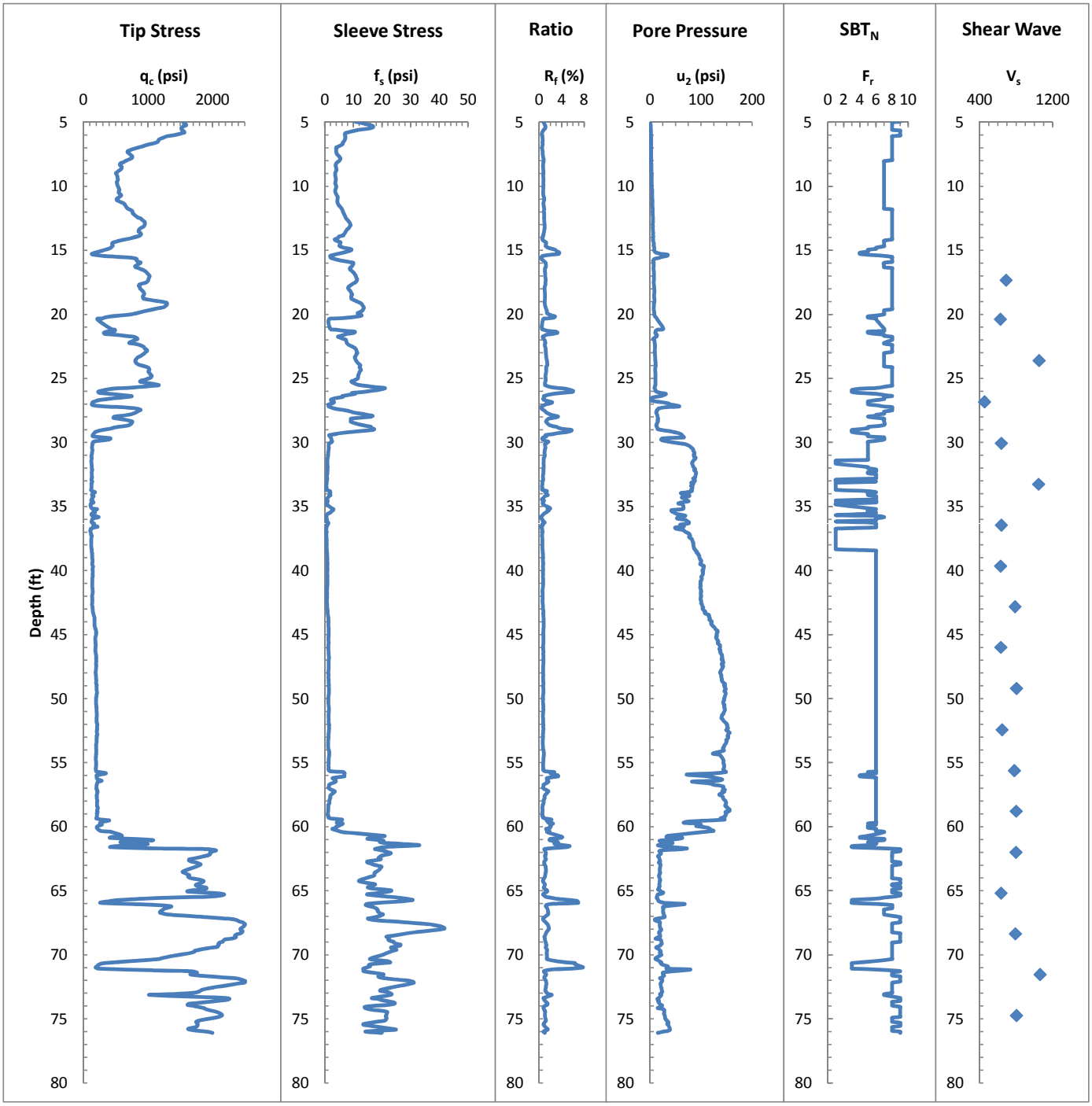
*Overconsolidated or Cemented

SUMMIT
GEOENGINEERING SERVICES

PIEZOCONE PENETRATION LOG

Project:	Amtrak Layover Facility	Test Number:	CPT-B9
Location:	Lombard Street	Project Number:	13057
	Brunswick, Maine	Method:	ASTM D5778
		Weather:	Sunny, 45* F

Cone ID:	Vertek #4644.108xx	Test Elevation:	80 ft +/-
Cone Type:	VTK 10 Ton Digital Cone	Reference:	Estimated from siteplan topography
Piezocone:	Silicone Single Filter	Date started:	4/26/2013 Date Completed: 4/26/2013
Push Rig:	AMS Power Probe 9500 VTR	ESTIMATED GROUND WATER DEPTH	
Anchor Style:	Single Point Hollow Stem Anchor	Date / Depth / Elevation / Reference	
Performed By:	Craig Coolidge, P.E.	4/26/2013 / 3.9 ft / 76 ft +/- / Cone borehole groundwater depth	



NOTES:

Soil Behavior Type (SBT_N) based on Normalized Friction Ratio (F_r) per Robertson 1990

Shear Wave Velocity test (V_s) performed at 3.3 feet (1-meter) increments

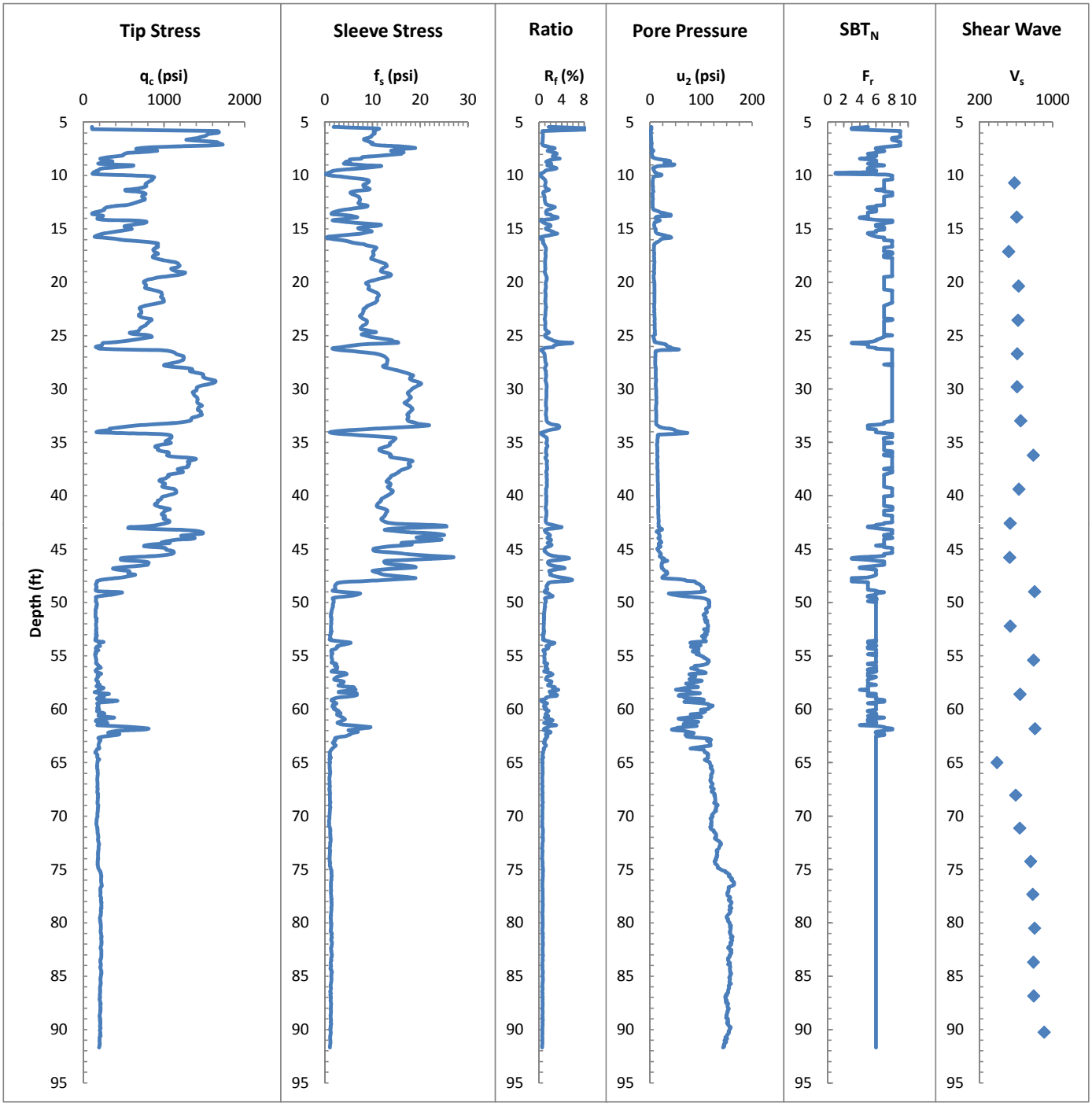
Anchor failure end of push encountered at depth of 76 feet

SUMMIT
GEOENGINEERING SERVICES

PIEZOCONE PENETRATION LOG

Project:	Amtrak Layover Facility	Test Number:	CPT-B12
Location:	Lombard Street	Project Number:	13057
	Brunswick, Maine	Method:	ASTM D5778
		Weather:	Sunny, 45* F

Cone ID:	Vertek #4644.108xx	Test Elevation:	82 ft +/-
Cone Type:	VTK 10 Ton Digital Cone	Reference:	Estimated from siteplan topograph
Piezocone:	Silicone Single Filter	Date started:	4/26/2013 Date Completed: 4/26/2013
Push Rig:	AMS Power Probe 9500 VTR	ESTIMATED GROUND WATER DEPTH	
Anchor Style:	Single Point Hollow Stem Anchor	Date / Depth / Elevation / Reference	
Performed By:	Craig Coolidge, P.E.	4/26/2013 / 3.8 ft / 78 ft +/- / Cone borehole groundwater depth	



NOTES:

Soil Behavior Type (SBT_N) based on Normalized Friction Ratio (F_r) per Robertson 1990

Shear Wave Velocity test (V_s) performed at 3.3 feet (1-meter) increments

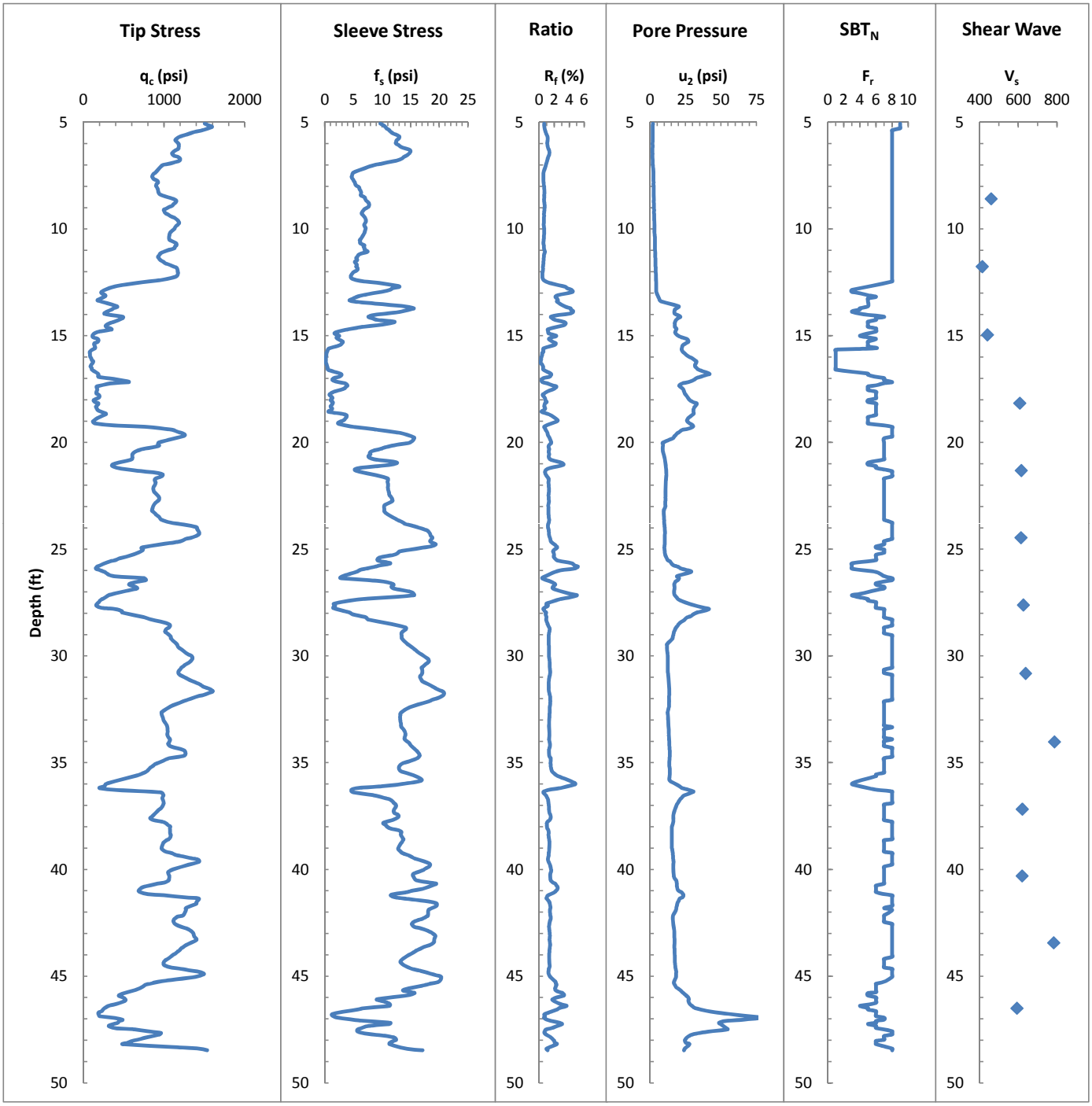
Anchor failure end of push encountered at depth of 92 feet

SUMMIT
GEOENGINEERING SERVICES

PIEZOCONE PENETRATION LOG

Project:	Amtrak Layover Facility	Test Number:	CPT-B19
Location:	Lombard Street	Project Number:	13057
	Brunswick, Maine	Method:	ASTM D5778
		Weather:	Overcast, 55* F

Cone ID:	Vertek #4644.108xx	Test Elevation:	83 ft +/-
Cone Type:	VTK 10 Ton Digital Cone	Reference:	Estimated from siteplan topography
Piezocone:	Silicone Single Filter	Date started:	4/25/2013 Date Completed: 4/25/2013
Push Rig:	AMS Power Probe 9500 VTR	ESTIMATED GROUND WATER DEPTH	
Anchor Style:	Single Point Hollow Stem Anchor	Date / Depth / Elevation / Reference	
Performed By:	Craig Coolidge, P.E.	4/25/2013 / 3.9 ft / 79 ft +/- / Cone borehole groundwater depth	



NOTES:

Soil Behavior Type (SBT_N) based on Normalized Friction Ratio (F_r) per Robertson 1990

Shear Wave Velocity test (V_s) performed at 3.3 feet (1-meter) increments

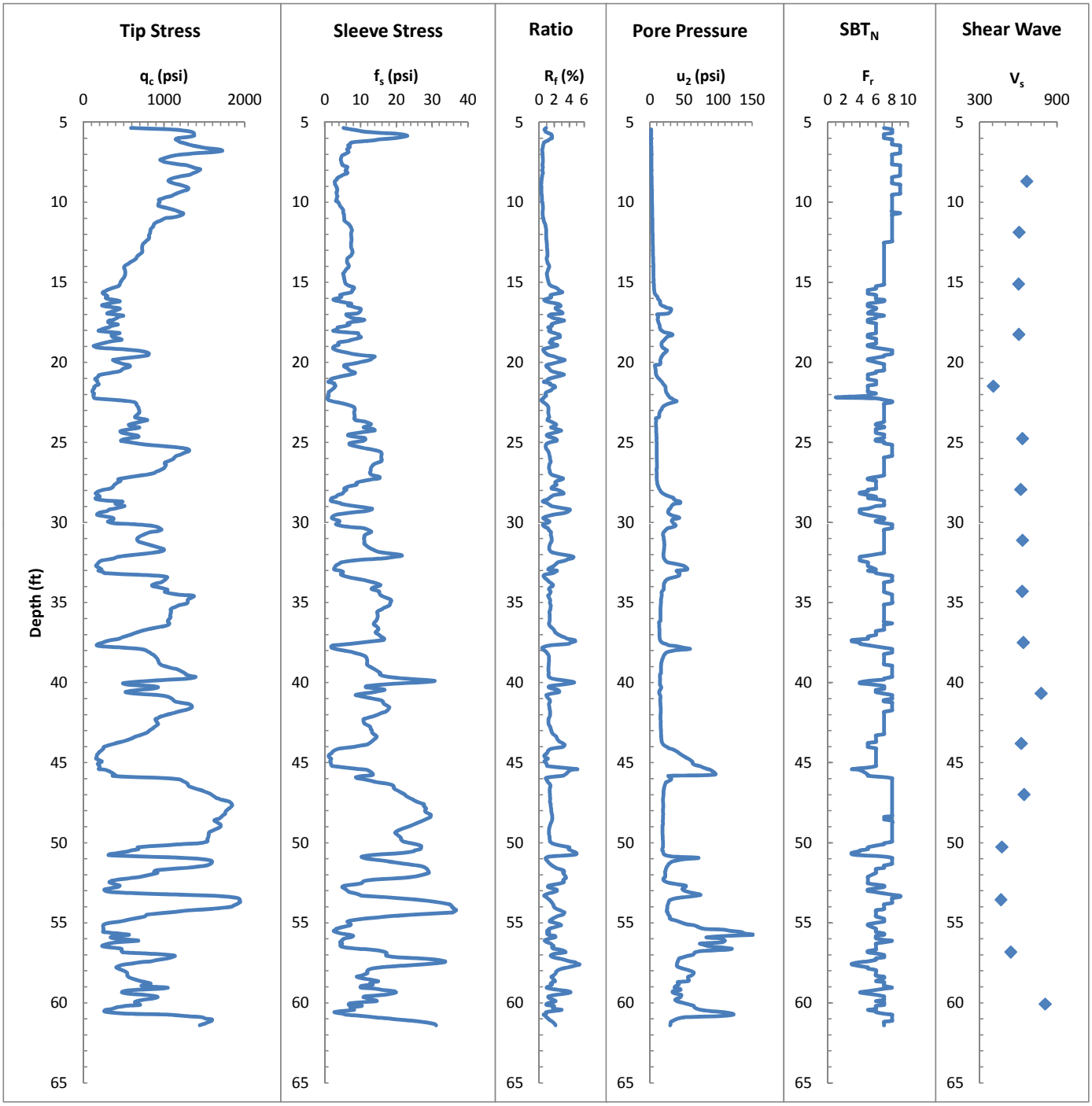
Anchor failure end of push encountered at depth of 49 feet

SUMMIT GEOENGINEERING SERVICES

PIEZOCONE PENETRATION LOG

Project:	Amtrak Layover Facility	Test Number:	CPT-B20
Location:	Lombard Street	Project Number:	13057
	Brunswick, Maine	Method:	ASTM D5778
		Weather:	Overcast, 55* F

Cone ID:	Vertek #4644.108xx	Test Elevation:	84 ft +/-
Cone Type:	VTK 10 Ton Digital Cone	Reference:	Survey located by TKM Land Surveyors, Inc.
Piezocone:	Silicone Single Filter	Date started:	4/25/2013 Date Completed: 4/25/2013
Push Rig:	AMS Power Probe 9500 VTR	ESTIMATED GROUND WATER DEPTH	
Anchor Style:	Single Point Hollow Stem Anchor	Date / Depth / Elevation / Reference	
Performed By:	Craig Coolidge, P.E.	4/25/2013 / 3.9 ft / 80 ft +/- / Cone borehole groundwater depth	



NOTES:

Soil Behavior Type (SBT_N) based on Normalized Friction Ratio (F_r) per Robertson 1990

Shear Wave Velocity test (V_s) performed at 3.3 feet (1-meter) increments

Anchor failure end of push encountered at depth of 62 feet

SUMMIT
GEOENGINEERING SERVICES

WENNER 4 PIN RESISTIVITY FIELD REPORT

Date: 4/26/2013

Project: Subgrade Resistivity Testing - Amtrak Layover Facility

Project #: 13057

Summit Personnel: Craig Coolidge, P.E. - Senior Geotechnical Engineer

Site Location: Amtrak Layover Facility - Lombard Street Brunswick, Maine

Work Activities: Performed Wenner 4-Pin resistivity testing within proposed building footprint. Test performed within building center. Test was aligned and performed east to west.

Test Procedure: Resistivity testing was performed using the Wenner Four Probe method in accordance with ASTM G57-06. Probe spacing ranged from 2 to 100 feet. Resistivity results for the pin spacing are presented in the following table. Resistivity values were calculated using the following equations:

Resistivity (p) in ohm-cm = $2*\pi*a*R$ (a=electrode spacing in cm, R=resistance in ohms)

Resistivity (p) in ohm-cm = $191.5*a*R$ (a=electrode spacing in ft, R=resistance in ohms)

Test Results:

Wenner 4 Pin Resistivity Test

Material	Spacing (feet)	Dial	Reading	Resistivity (ohm-cm)
Coal Ash	2	100	9.7	371,500
Gravel-Sand	5	100	2.1	201,100
Sand	10	10	6.2	118,700
Sand	15	10	3.4	97,700
Sand-Silt	20	10	2.1	80,400
Silt-Clay	25	10	1.2	57,500
Sand-Silt	30	10	1.5	86,200
Sand	35	10	1.4	93,800
Silt-Clay	40	1	7.0	53,600
Sand	45	10	1.1	94,800
Sand	50	10	1.1	105,300
Sand-Silt	55	1	7.0	73,700
Gravel-Sand	60	10	1.4	160,900
Sand-Silt	65	1	6.0	74,700
Silt-Clay	70	1	3.0	40,200
Silt-Clay	75	1	2.5	35,900
Sand	80	1	7.0	107,200
Sand	85	1	6.5	105,800
Sand	90	1	7.5	129,300
Gravel-Sand	95	1	9.0	163,700
Gravel-Sand	100	1	10.0	191,500

MIN	35,900
MAX	371,500
AVG	103,600
STD	46,478

Remarks: The average resistivity for the subgrade profile from 5 to 100 feet is 103,600 ohm-cm

Cone Penetration Tests (CPTu) performed by Summit Geoengineering Services indicates the subgrade consists of sand overlying interlayered sand-silt-clay. Groundwater was present at a depth of 4 feet.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 1

Date: 4-22-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing west.

Photo No. 2

Date: 4-22-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing east.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 3

Date: 4-25-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing west.

Photo No. 4

Date: 4-25-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing east.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 5

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing west.

Photo No. 6

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of site facing east.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 7

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of cone penetration testing CPTu.

Photo No. 8

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of cone penetration testing CPTu.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 9

Date: 4-23-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of SPT split spoon sampler showing coal ash fill overlying marine delta sand.

Photo No. 10

Date: 4-25-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of test boring B-28.

SUMMIT
GEOENGINEERING SERVICES

PHOTOGRAPHIC LOG

Client Name:	**Project No.**
Consigli Construction Company, Inc.	13057

Photo No. 11

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of Wenner 4-pin soil resistivity testing facing west.

Photo No. 12

Date: 4-26-2013

Site Location:

Amtrak Layover Facility
Brunswick, Maine

Description:

Photograph of Wenner 4-pin soil resistivity testing facing west.

APPENDIX C
LABORATORY RESULTS

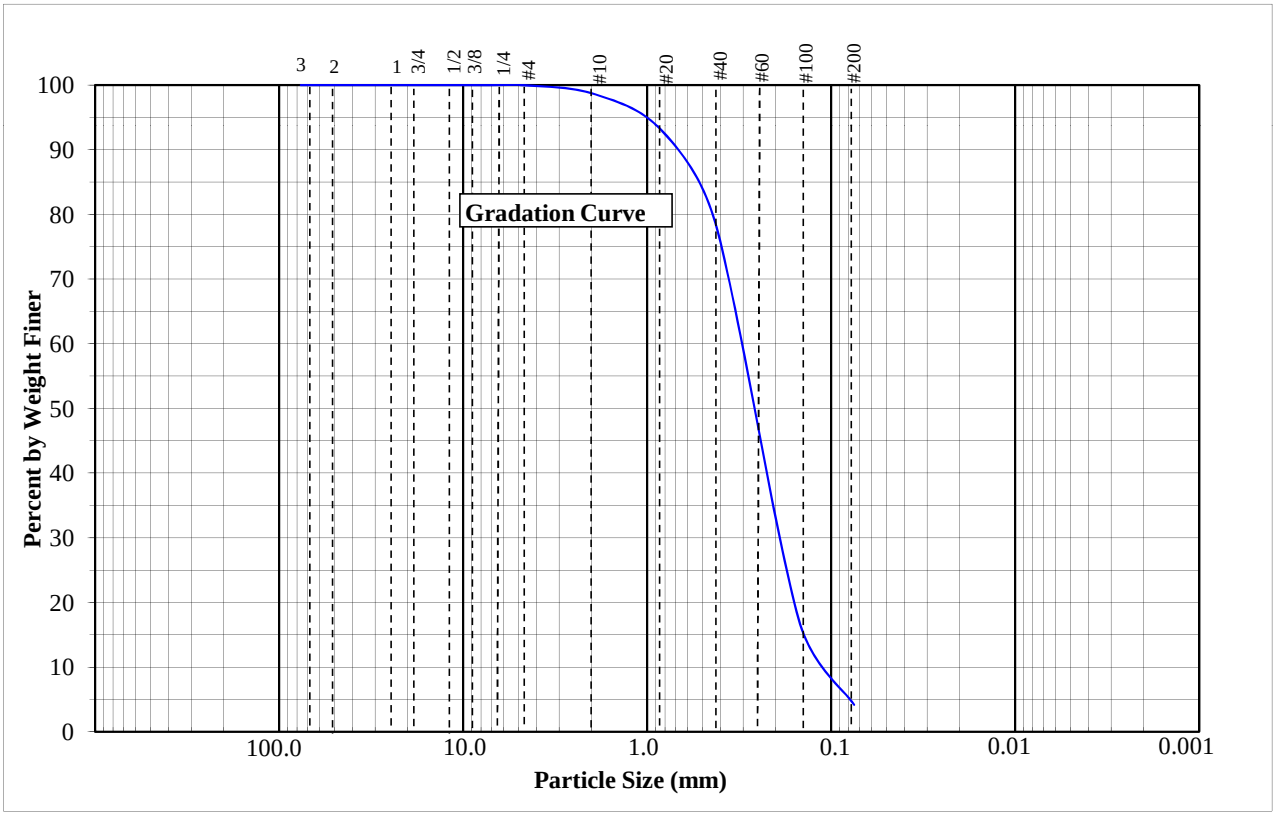
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B3, 2' to 8.5'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	98.7
0.85	(No. 20)	93.2
0.43	(No. 40)	78.6
0.15	(No. 100)	17.3
0.075	(No. 200)	4.2



REMARKS: Moisture Content: 15.4%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

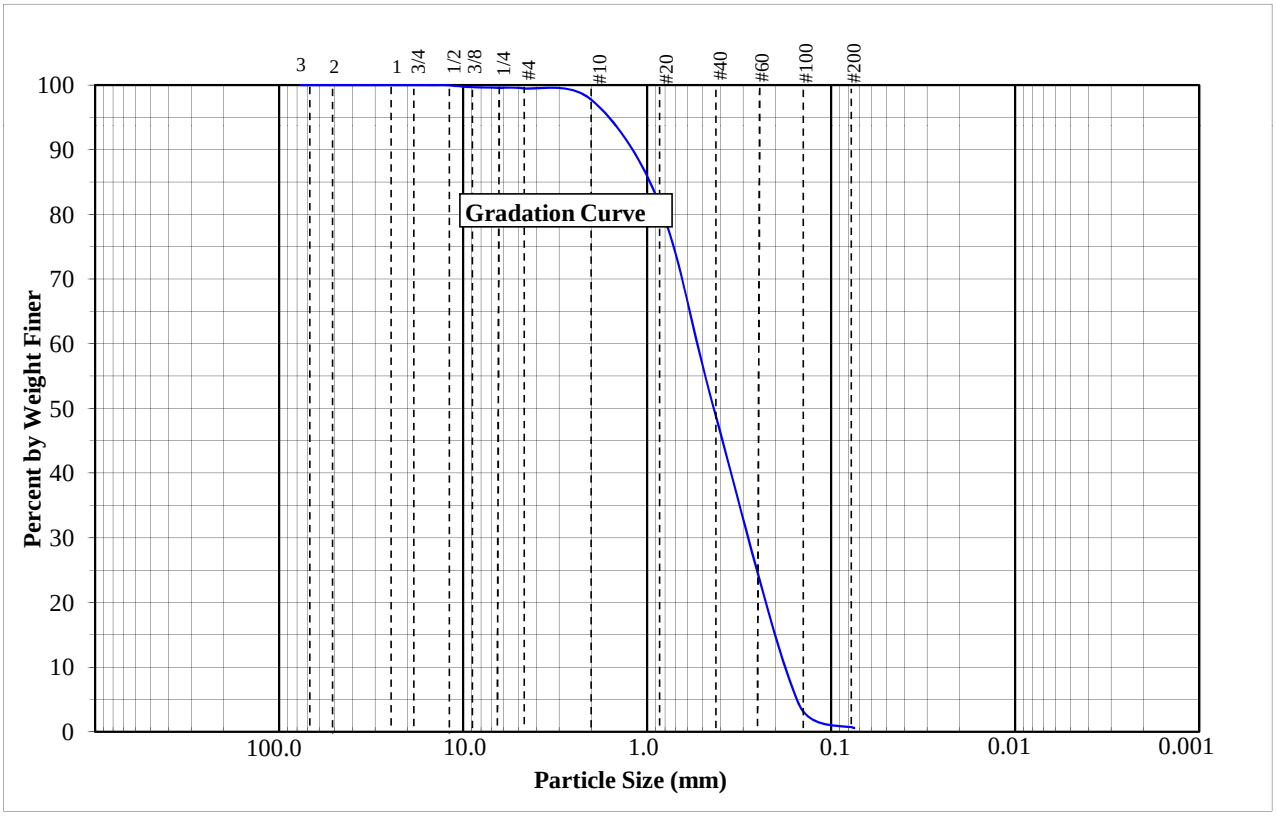
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B3, 10' to 12'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	99.7
6.35	(1/4 in)	99.6
4.75	(No. 4)	99.5
2.00	(No. 10)	97.7
0.85	(No. 20)	81.3
0.43	(No. 40)	49.0
0.15	(No. 100)	4.3
0.075	(No. 200)	0.6



REMARKS: Moisture Content: 23.8%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

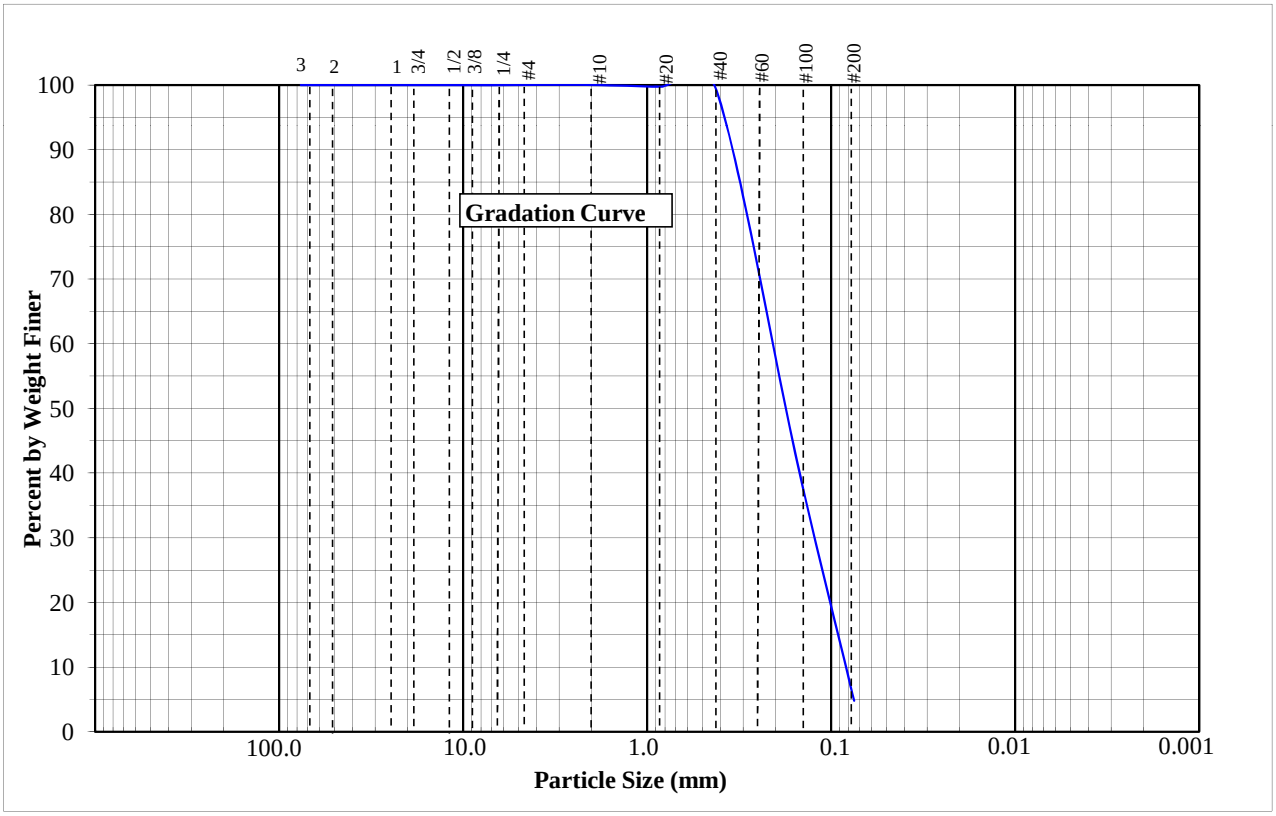
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B3, 15' to 17'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	99.7
0.43	(No. 40)	99.6
0.15	(No. 100)	40.6
0.075	(No. 200)	4.8



REMARKS: Moisture Content: 24.8%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

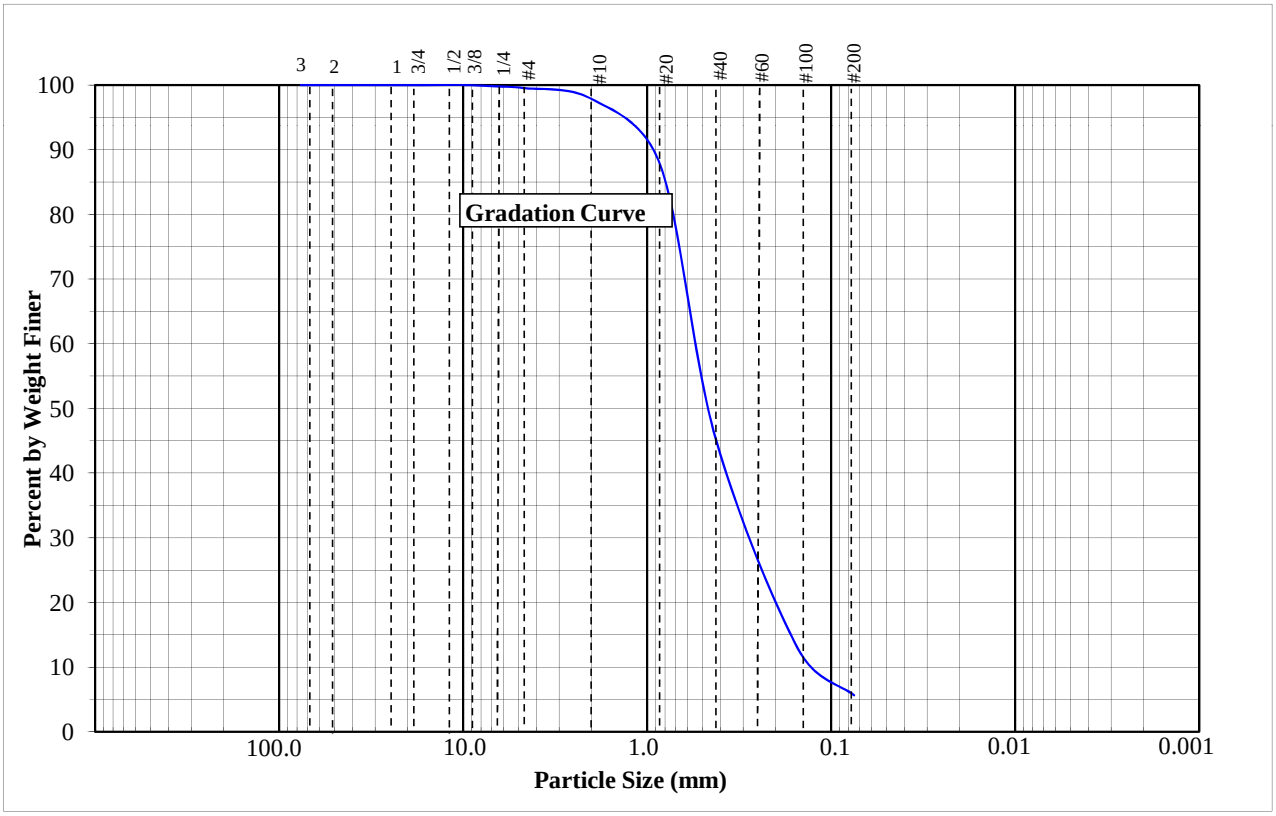
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B11, 5' to 7'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	99.8
4.75	(No. 4)	99.5
2.00	(No. 10)	97.8
0.85	(No. 20)	87.7
0.43	(No. 40)	45.4
0.15	(No. 100)	12.6
0.075	(No. 200)	5.6



REMARKS: Moisture Content: 22.7%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

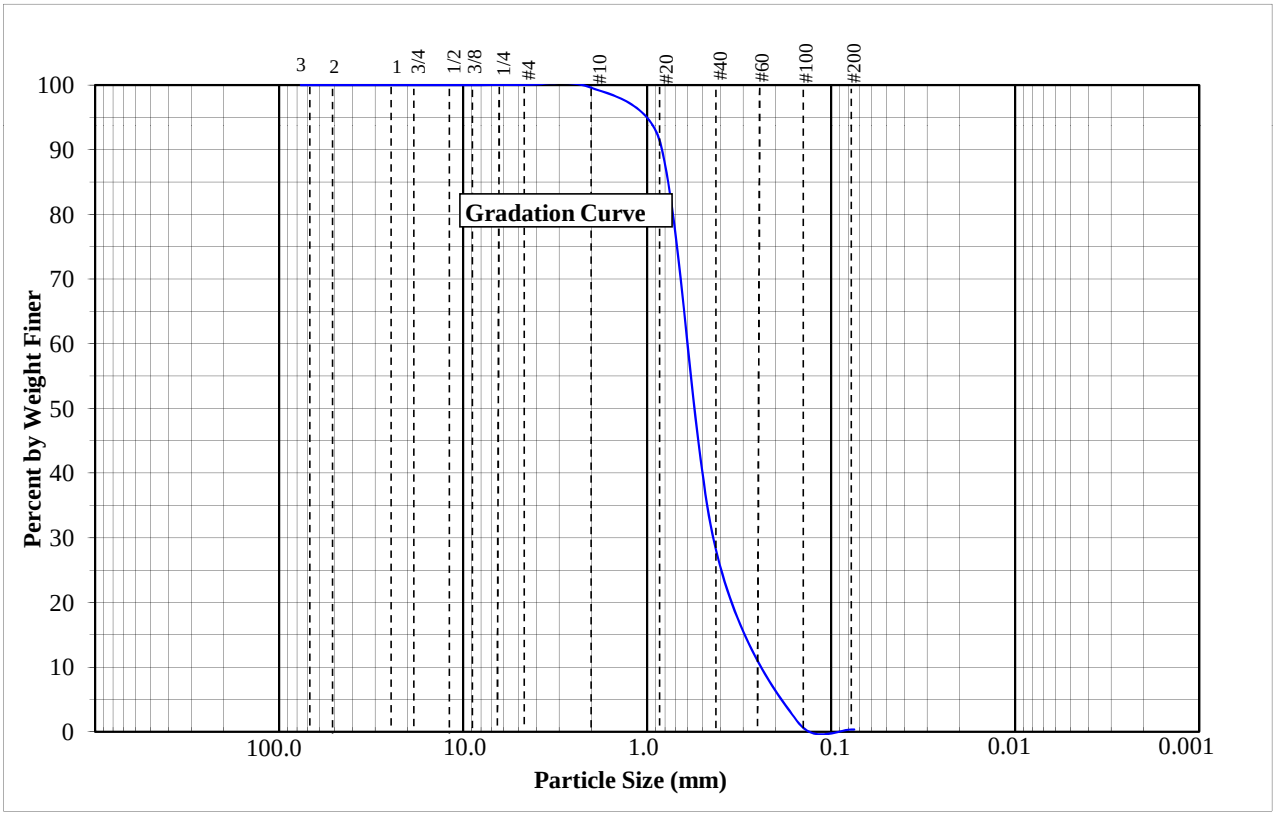
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B11, 10' to 12'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	99.5
0.85	(No. 20)	91.1
0.43	(No. 40)	28.4
0.15	(No. 100)	1.4
0.075	(No. 200)	0.4



REMARKS: Moisture Content: 21.5%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

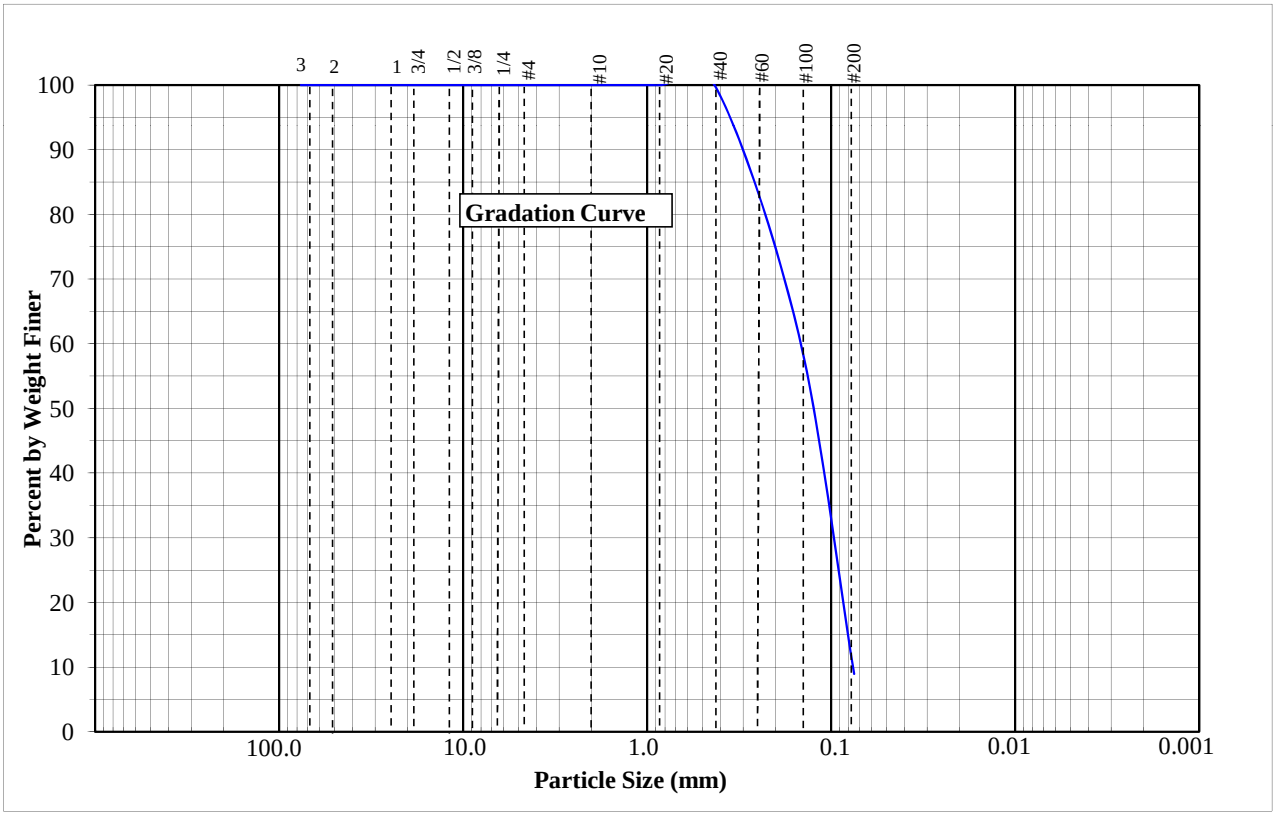
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B11, 15' to 17'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	99.8
0.15	(No. 100)	61.4
0.075	(No. 200)	9.0



REMARKS: Moisture Content: 23.1%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

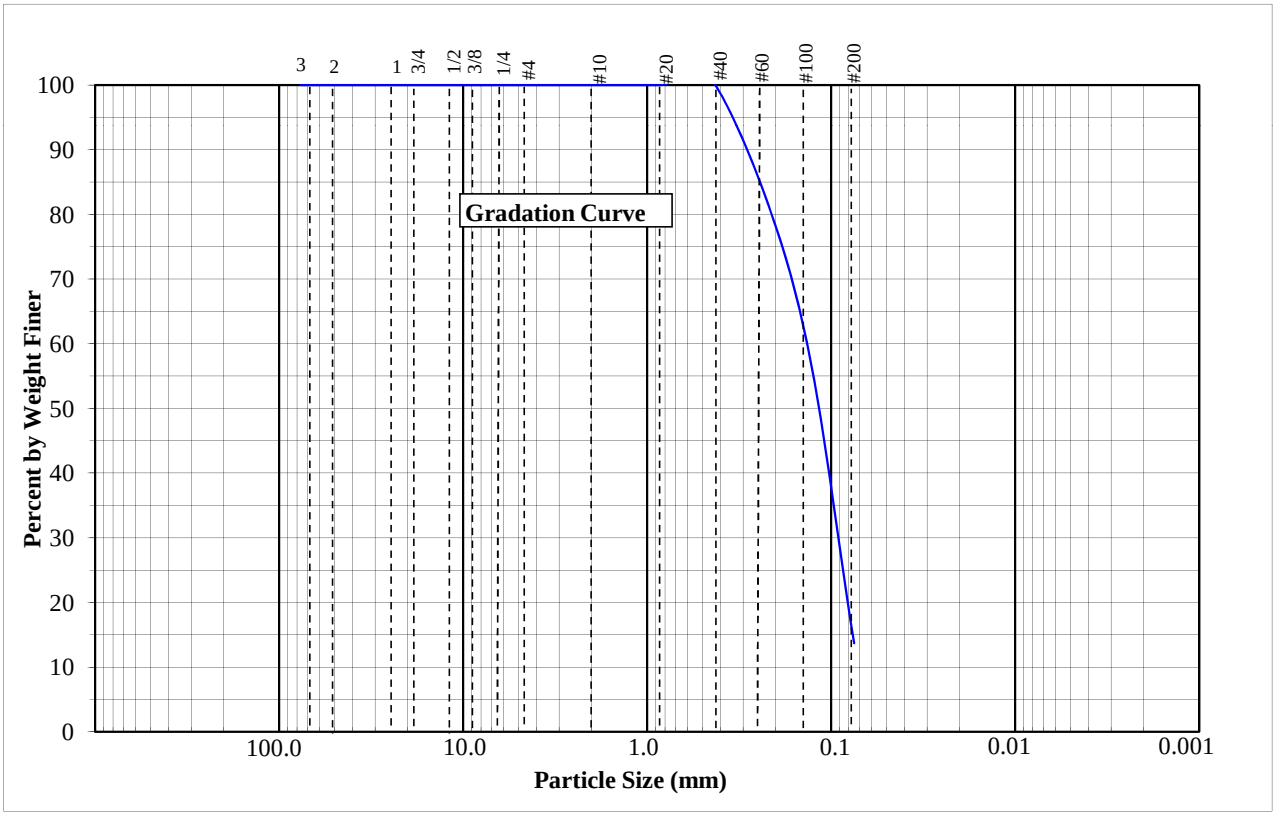
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Silty Sand	INTENDED USE:	Investigation
SOURCE:	Boring B11, 20' to 22'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	100.0
0.15	(No. 100)	65.8
0.075	(No. 200)	13.7



REMARKS: Moisture Content: 25.6%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone: (207) 621-8334 Fax: (207) 626-9094

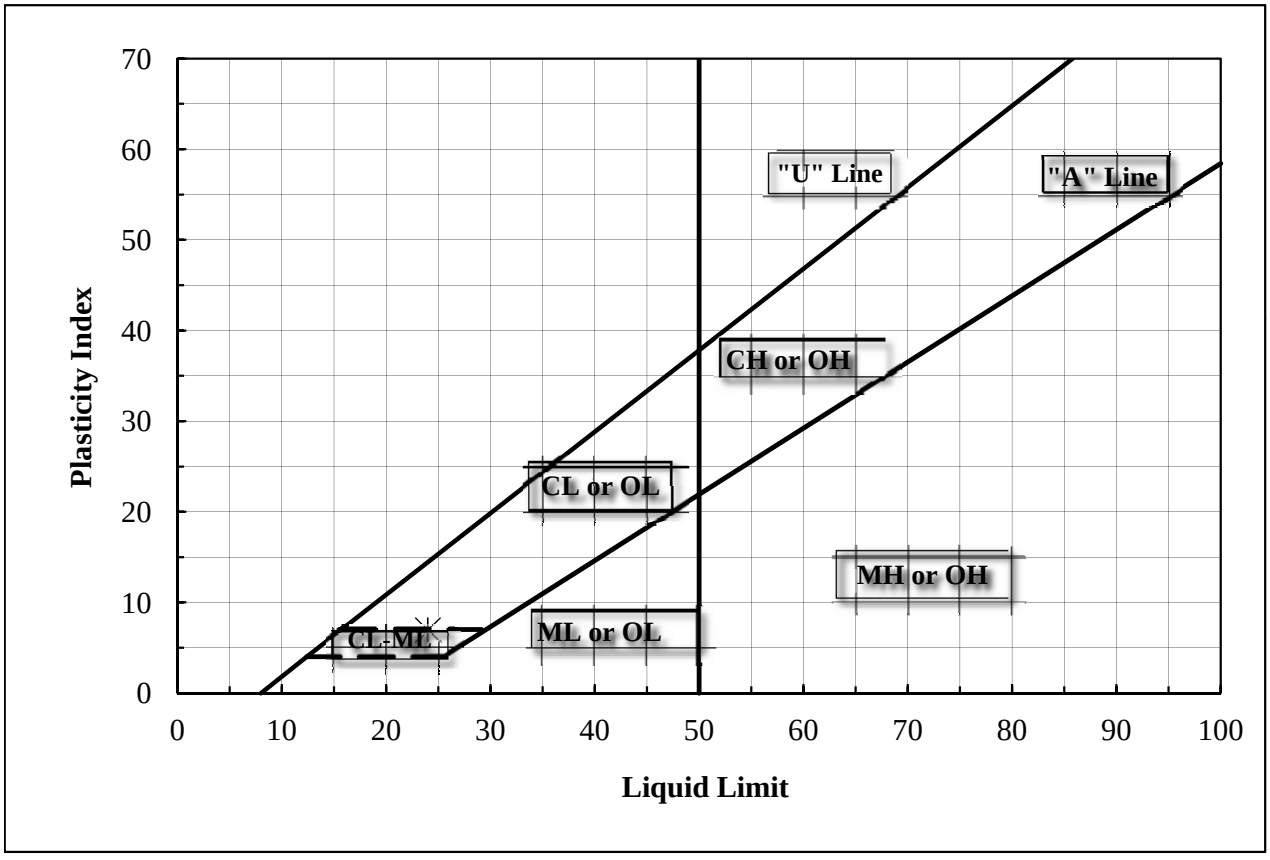
ATTERBERG LIMIT TEST - ASTM D4318

Method "A" (Multi-point)

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SAMPLE #:	
PROCEDURE:	A	DEPTH:	20' to 22'
INTENDED USE:	Investigation	DATE:	5/2/13
SAMPLE SOURCE:	Boring B16	TECHNICIAN:	N. Davis

DATA

Source	Depth	LL	PL	PI	Classification
Boring B16	20' to 22'	24	17	7	Silty Clay (CL-ML)



Notes: Moisture Content: 26.1%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/2013

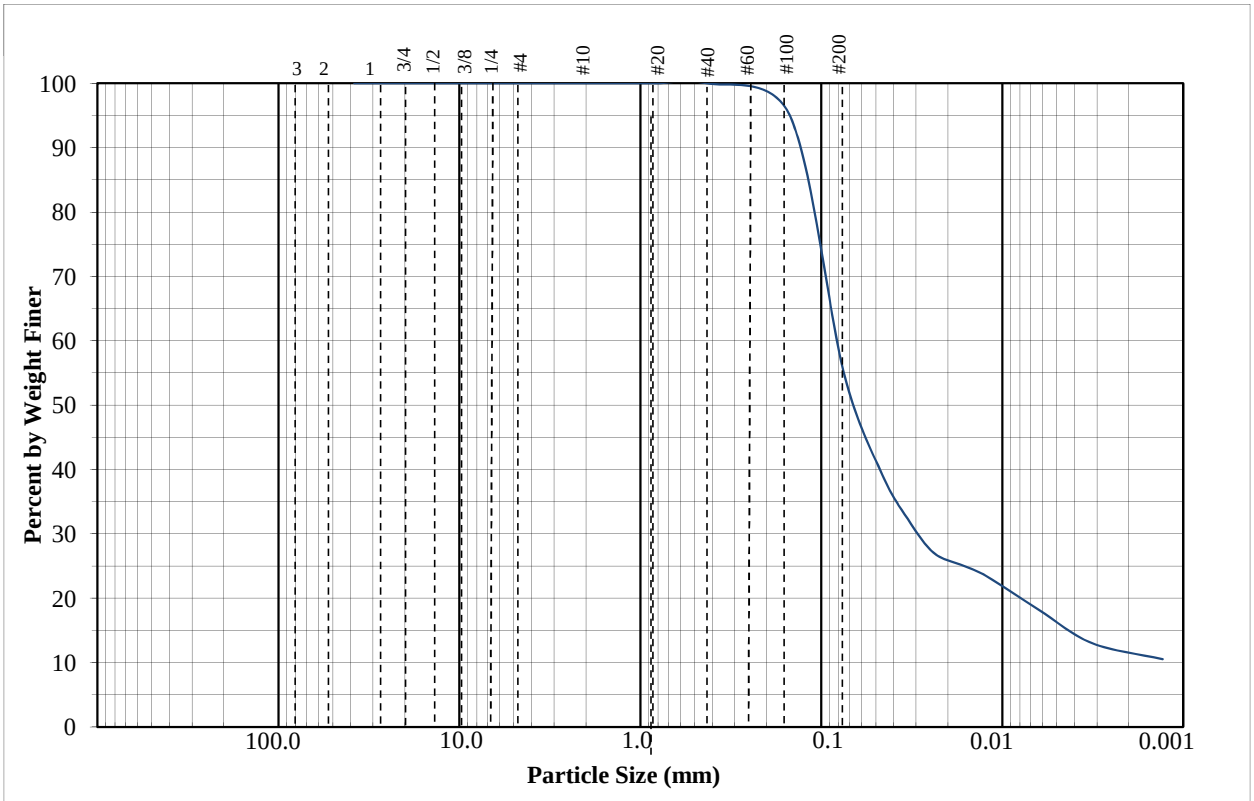
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone: (207) 621-8334 Fax: (207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering Services	SAMPLE #:	B17,S5
SOIL DESCRIP:	Silty Sand	DATE:	5/1/13
INTENDED USE:	Investigation	SOURCE:	B17, 15'-17'

DATA

PARTICLE SIZE mm		% BY WT FINER
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	100.0
0.15	(No. 100)	95.1
0.075	(No. 200)	54.9
0.0463		39.3
0.0333		32.3
0.0239		27.0
0.0170		25.2
0.0124		23.5
0.0063		18.2
0.0032		13.0
0.0013		10.5



REMARKS: Moisture Content: 22.2%

Reviewed: Darrell Gilman, CMT Manager
Date: 5/6/13

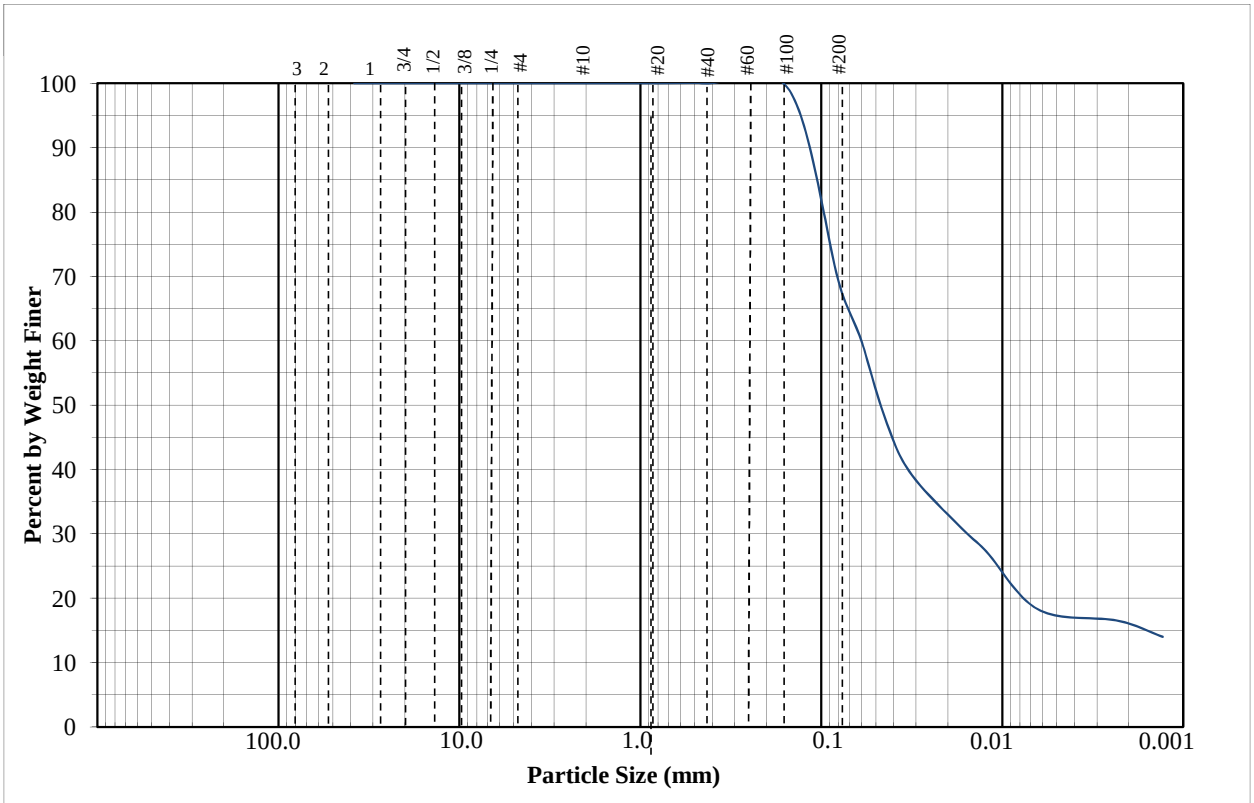
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone: (207) 621-8334 Fax: (207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering Services	SAMPLE #:	S5
SOIL DESCRIP:	Silty Sand	DATE:	5/1/13
INTENDED USE:	Investigation	SOURCE:	B18, 15'-17'

DATA

PARTICLE SIZE mm		% BY WT FINER
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	100.0
0.15	(No. 100)	98.9
0.08	(No. 200)	69.0
0.0611		60.6
0.0449		48.3
0.0325		39.6
0.0167		30.8
0.0123		27.3
0.0063		18.2
0.0023		16.5
0.0013		14.0



REMARKS: Moisture Content: 23.7%

Reviewed: Darrell Gilman, CMT Manager
Date: 5/6/13

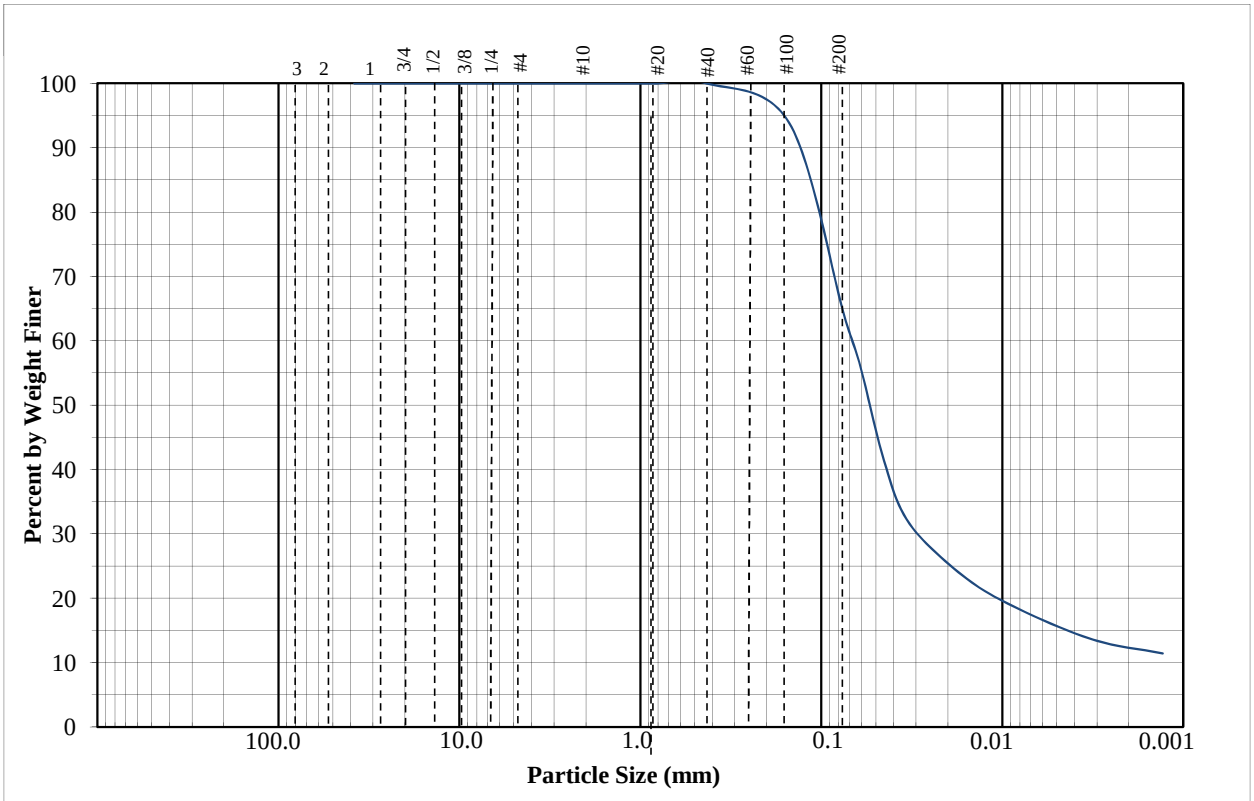
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone: (207) 621-8334 Fax: (207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering Services	SAMPLE #:	B18, S6
SOIL DESCRIP:	Silty Clay	DATE:	5/1/13
INTENDED USE:	Investigation	SOURCE:	B18, 20'-22'

DATA

PARTICLE SIZE mm		% BY WT FINER
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	100.0
0.15	(No. 100)	93.8
0.075	(No. 200)	64.0
0.0611		56.2
0.0453		41.6
0.0330		31.8
0.0169		23.7
0.0088		18.8
0.0032		13.6
0.0013		11.4



REMARKS: Moisture Content 22.7%

Reviewed: Darrell Gilman, CMT Manager
Date: 5/6/13

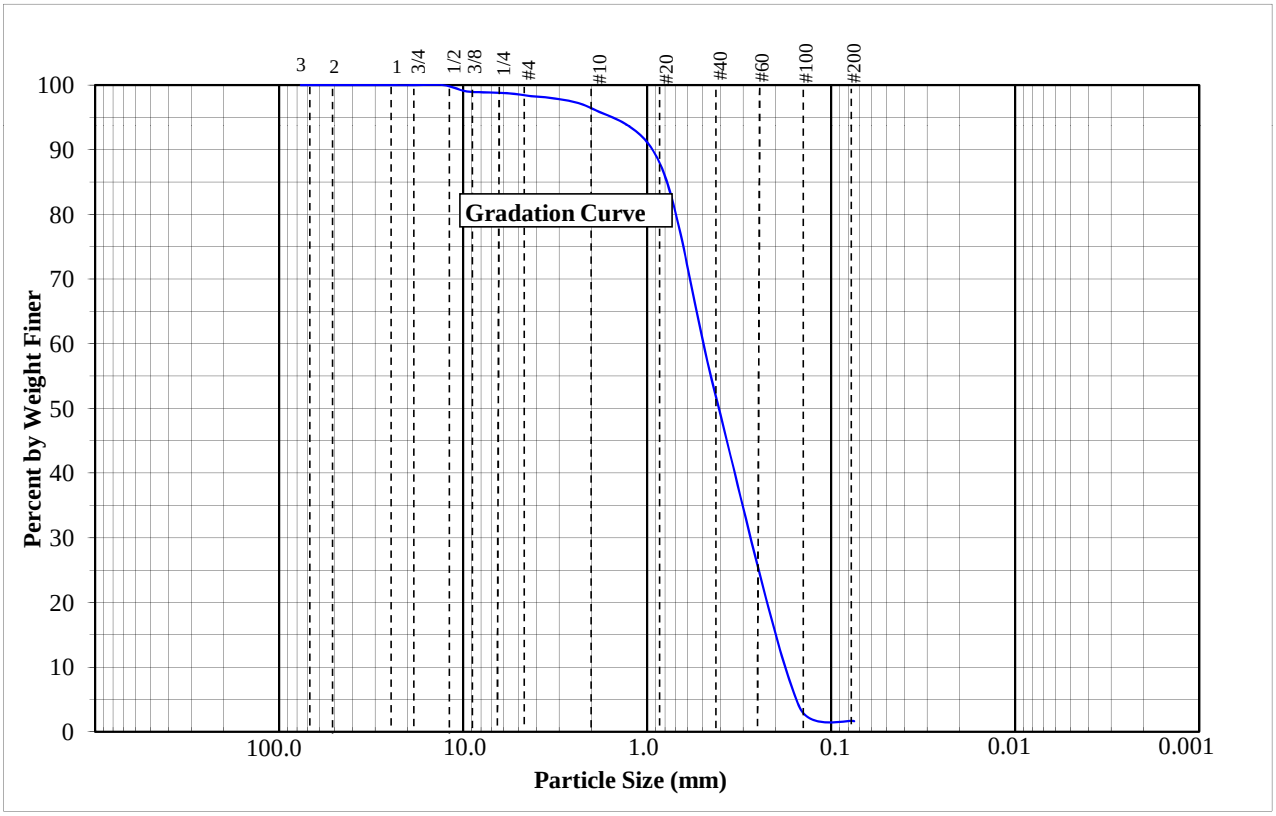
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B26, 2' to 7'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	99.0
6.35	(1/4 in)	98.8
4.75	(No. 4)	98.5
2.00	(No. 10)	96.4
0.85	(No. 20)	87.8
0.43	(No. 40)	52.0
0.15	(No. 100)	4.0
0.075	(No. 200)	1.6



REMARKS: Moisture Content: 6.9%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

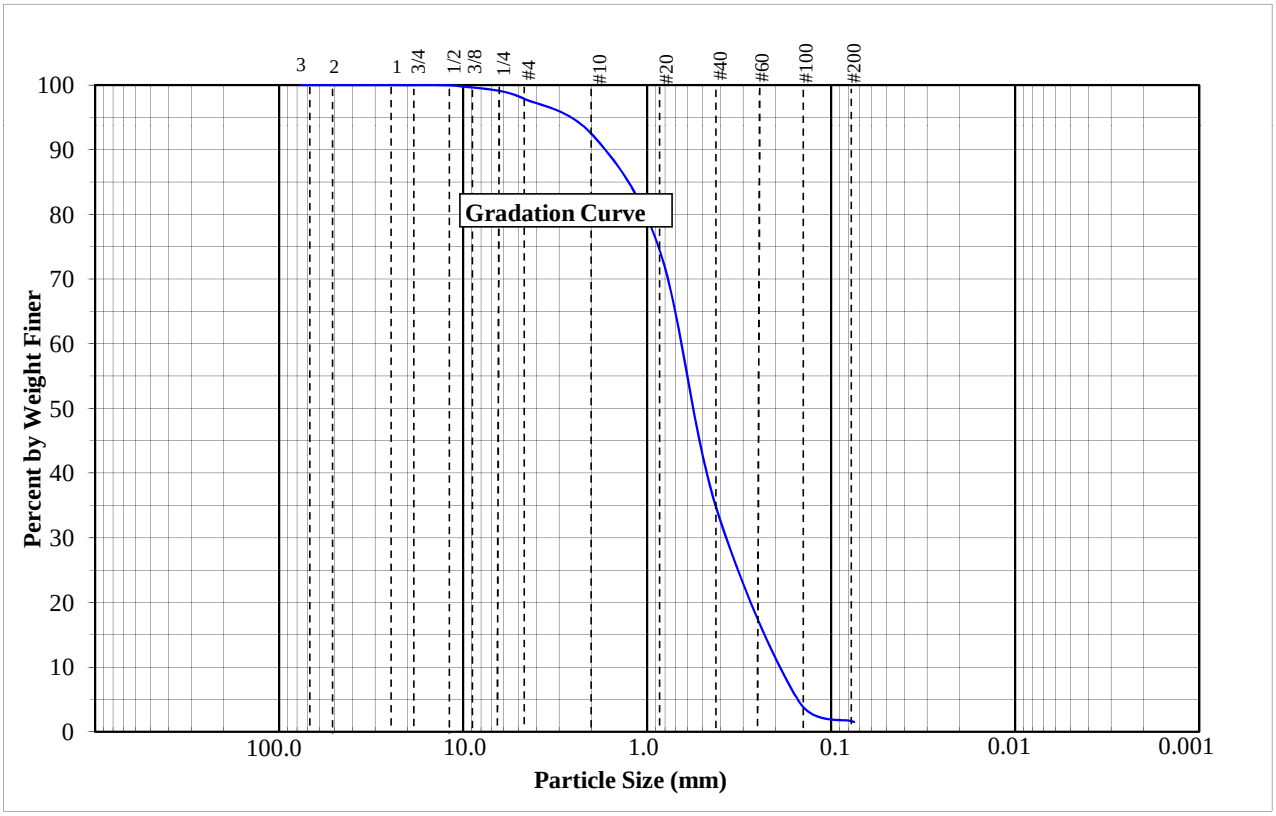
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover Facility - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SUMMIT SAMPLE:	
CLIENT SOIL DES:	Sand	INTENDED USE:	Investigation
SOURCE:	Boring B26, 7' to 12'	SPECIFICATION:	
DATE:	May 2, 2013	TECHNICIAN:	A. Higgins

DATA

PARTICLE SIZE mm		% BY WT FINER
76.20	(3 in)	100.0
50.80	(2 in)	100.0
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	99.7
6.35	(1/4 in)	99.1
4.75	(No. 4)	98.0
2.00	(No. 10)	92.4
0.85	(No. 20)	74.2
0.43	(No. 40)	35.0
0.15	(No. 100)	4.7
0.075	(No. 200)	1.5



REMARKS: Moisture Content: 17.7%

Reviewed: Darrell A. Gilman, CMT Manager
Date: 5/2/13

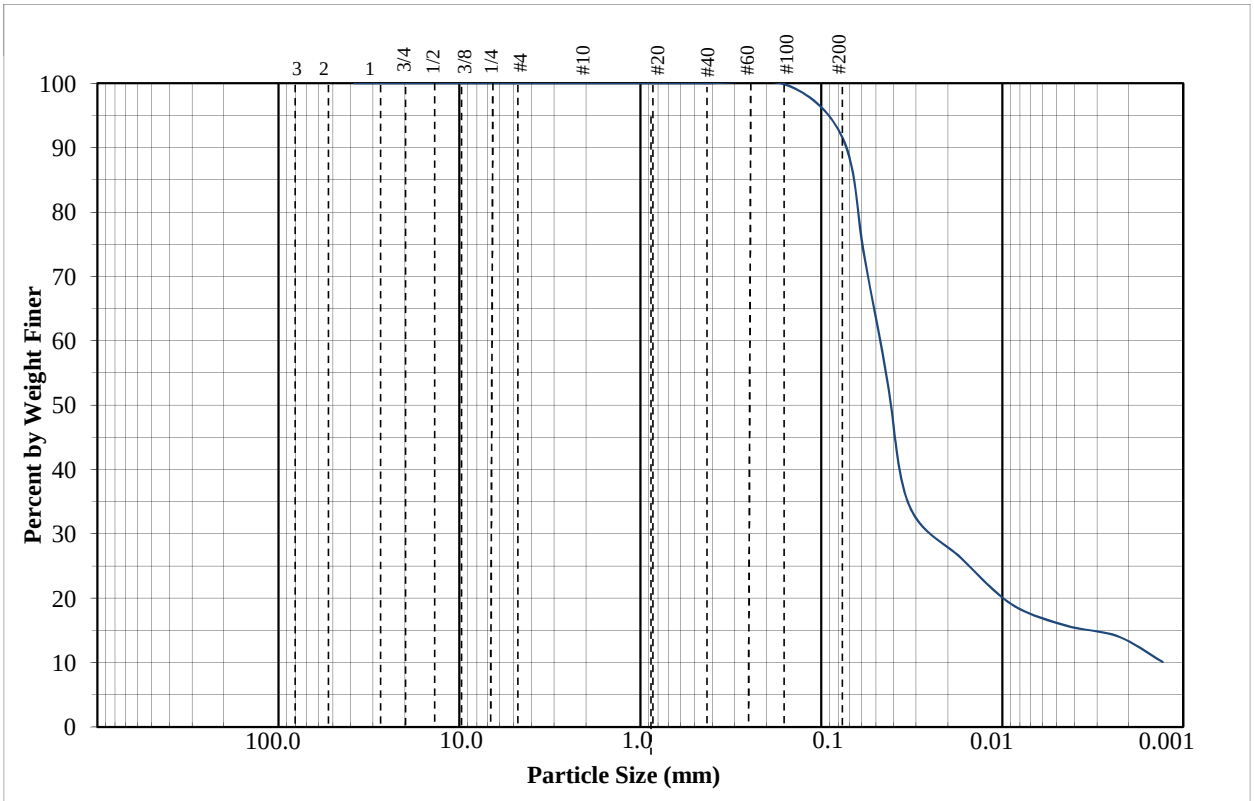
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone: (207) 621-8334 Fax: (207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	Amtrak Layover - Brunswick, ME	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering Services	SAMPLE #:	B26,S6
SOIL DESCRIP:	Clayey Silt	DATE:	5/1/13
INTENDED USE:	Investigation	SOURCE:	B26, 15'-17'

DATA

PARTICLE SIZE mm		% BY WT FINER
38.10	(1-1/2 in)	100.0
25.40	(1 in)	100.0
19.05	(3/4 in)	100.0
12.70	(1/2 in)	100.0
9.53	(3/8 in)	100.0
6.35	(1/4 in)	100.0
4.75	(No. 4)	100.0
2.00	(No. 10)	100.0
0.85	(No. 20)	100.0
0.43	(No. 40)	100.0
0.15	(No. 100)	99.6
0.075	(No. 200)	91.0
0.0579		73.1
0.0437		54.7
0.0329		34.6
0.0168		26.2
0.0089		19.1
0.0045		15.8
0.0023		14.1
0.0013		10.1



REMARKS: Moisture Content: 26.5 %

Reviewed: Darrell Gilman, CMT Manager
Date: 5/6/13