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



PREPARED BY **PREPARED BY BRINCKERHOFF**

December 2011

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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 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 W	ell										
Top of PV	C = 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





Appendix A Boring Logs

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Appendix B Monitoring Wel I

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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



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,

Trug N. Tartidge

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



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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 $51,000 \text{ ft}^2$
- 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	0%	24.8%
B-11, 5 to 7 ft	SP	0.5%	93.9%	5.6	0%	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	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	0%	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 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		

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:

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)

¹Based 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 ³/₄ 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	
¹ / ₄ 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	
¹ / ₄ 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 proofrolling 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/ft³.

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:

Sigua Designation	Percent Passing a 3-inch Sieve		
Sieve Designation	MDOT Type A (Base)	MDOT Type D (Subbase)	
3 Inch	100	100	
2 Inch	100		
¹ / ₂ Inch	45 - 70		
¹ / ₄ 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	
³ / ₄ inch	60 to 90	
¹ / ₂ 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 ³/₄ 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





			TRACK		topha
FIGURE:	PROJ.*; 1	434 CONY ROAD AUGUSTA, ME 04330 Fax: (207) 318-7761 Fax: (207) 629-9094	TEST B	ORINGS ON PLAN	PROJECT: AMTRAK LAYOVER FACILITY CHURCH ROAD - BRUNGWICK, MAINE
	3 <i>0</i> 57	GEOENGINEERING SERVICES	9CALE: 1" = 150' DATE: MAY 11, 2013	DRAWN BY: KRF APPR BY: WAP	CLIENT: CONSIGLI CONSTRUCTION CO., INC.







PLAN REFERENCE

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

LEGEND

Onp

Oma MOUNT ARARAT FORMATION

- NEHUMKEAG POND FORMATION
- OCP PEAKS ISLAND MEMBER



APPENDIX B EXPLORATION LOGS PHOTO LOGS



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

> Less than 5% 5% to 15% 15% to 30% Greater than 30%

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:
Cobbles:	12 inches to 3 inches	Little:
Gravel:	3 inches to No.4 sieve	Some:
Sand:	No.4 to No. 200 sieve	Silty, Sandy, etc.:
Silt:	No. 200 sieve to 0.005 mm	
Clav:	less than 0.005 mm	

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF C	OHESIVE 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					

						S	OIL BORI	NG LOG	Boring #:	B-1
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Ma	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	igineering Ser	vices, Inc.		Boring Elevation:		79 ft +/-		
Driller:	Chaff	C. Coolidge, P	.E.			Reference:	4/22/2012	Estimated from siteplan to	opography	
Summit		B. Haiss, E.I.	6			Date started:				
Vehicles	TLLING	PowerProbe	Lenath:	21" SS		Date	Denth	ESTIMATED GROUND W		forence
Model.		9500 VTR	Diameter:	24 33 2"0D/1 5"	ID	$4/22/2013$ 6.2 73 ft $+/_{-}$ In horehole at completion				
Method:		3.5" Casing	Hammer:	140 lb		172272010	0.2	/01(1)		
Hammer	Style:	Auto Drop	Method:	ASTM D15	i86					
Depth	j	•					SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum
	S-1	24/20	0 to 2	1		Dark brown Silty	SAND, trace ro	otlets and coal ash,		FILL
1				1		humid, very loos	e, SM			
				2						
2_		0.1.10	<u>.</u>	4		Brown SAND, hu	mid, compact, s	SP		MARINE DELTA
2	S-2	24/2	2 to 4	4		-				
3-				4		1				
4				3		1				
l ⁻						1				
5]				
	S-3	24/24	5 to 7	2		Olive brown Silty	SAND, moist, o	compact, SM		
6				5		grading to				
_				8		Mottled brown S	AND, moist, cor	npact, SW		
· · -				5		-				
8										
						-				
9										
_										
10										
	S-4	24/24	10 to 12	2		Brown fine to coa	arse SAND, wei	, loose, SP		
11_				2		-				
12				2		Olivo grav Silt Cl	av at spoon tin			
12				2		End of boring at	12 feet, no refi	Isal		
13						Lind of Soring at	12 1000, 110 101			
_	1									
14										
15_						-				
14						-				
10						1				
17						1				
I]				
18										
						4				
19						4				
20						4				
20_						1				
21						1				
-	1					1				
22										
						4				
<u> </u>				0.5		NOTEC			l	
Granula Blows /f/	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
BIOWS/ft.	V	ыows/tt.		ASIMD	2487	Bedrock laints	LL = LIQUID LIMIT	, PT = Plastic Index		Dry: $S = 0\%$ Humid: $S = 1 + 25\%$
5-10		<2 2-4	soft	< 5%	Frace	Shallow = 0 to 35	dearees			Damp: $S = 26 \text{ to } 50\%$
11-30	Compact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51$ to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With	Vith Wet: S = 76 to 99% Saturated: S = 100%				
	>30 V. Dense 10-30 V. Sun > 30 With >30 Hard				Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches					
						Gravel = < 3 inch a	and > No 4, Sand	$I = \langle No \ 4 \text{ and } \rangle No \ 200$, Silt.	/Clay = < No 200	

	\sim					S	OIL BORI	NG LOG	Boring #:	B-2
		SILA	TILA			Project:	NNEPRA Amtra	ak Layover Facility	Project #:	13057
		SUIVI	IVIII			Location:	Church Road	<u> </u>	Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Ma	ine	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	rvices, Inc.		Boring Elevation:		78 ft +/-		
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan t	opography	
Summit	Staff:	B. Haiss, E.I.				Date started:	4/22/2013	Date Completed:	4/22/2013	
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5'	'ID	4/22/2013 6.1 72 ft +/- In borehole at completion			letion	
Method:		3.5" Casing	Hammer:	140 lb						
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth			•				SAMPI	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	ΓΙΟΝ	Test Data	Stratum
	S-1	24/10	0 to 2	2		Dark brown Silty	SAND, trace ro	otlets and coal ash,		FILL
1				4		humid, loose, SM	1			
-				3		Brown SAND, hu	mid, loose, SP			
2				3						
-	S-2	24/18	2 to 4	4		Brown SAND mix	ed with coal as	sh, humid, loose, SM		
3				5		Reddish-brown f	ine SAND, dam	p, loose, SP		
		T		3	1	1				MARINE DELTA
4		1		3	İ	1				
1 -						1				
5						1				
1 -	S-3	24/18	5 to 7	6		Brown fine to co	arse SAND, mo	ist to wet, loose, SP		
6				5						
-				5						
7				4						
8										
9										
						_				
10										
	S-4	24/24	10 to 12	1		Brown fine to co	arse SAND, we	t, loose, SP		
11				2						
				1						
12				5		-				
						-				
13				-		-				
14						+			+	
14						-				
15										
15	S F	24/24	15 to 17	\\/LI		Olivo brown fino	SAND traco Si	It wat vary loosa		
16	3-3	24/24	13 10 17	WH		SD	SAND, trace Si	it, wet, very loose,		
10				WH						
17		1		1	<u> </u>	1				
· · ·	1	1			<u> </u>	End of boring at	17 feet. no refi	usal	1	
18		1			1	g at a set ang at	,			
l		1			1	1				
19				t	İ – – – – – – – – – – – – – – – – – – –	1				
l ⁻	1				1	1				
20						1				
1										
21]				
22		ļ				1				
	L	ļ			ļ	4				
Granul	Granular Soils Cohesive Soils % Composition			NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition		
Blows/ft. Density Blows/ft. Consistency ASTM D2487			l	LL = Liquid Limit	t, PI = Plastic Index		Dry: S = 0%			
0-4	V. Loose	e <2	V. soft		-	Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%	I race	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compac	5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51 \text{ to } 75\%$
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 c	iegrees			wet: $S = 76 \text{ to } 99\%$
>50	v. Dense	16-30	v. Stiff	> 30%	with	Boulders	or 10 lead 0	obblog disesses 40 '	and a Direktor	Saturated: S = 100%
1	>30 Hard					Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches				
I						oraver = < 3 INCN	anu > 110 4, 5aN(a – ≤ inu 4 atiu >inu 200, Slit	roiay = < 1NU 2UU	

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-3
		SIINA	MAN			Project:	NNEPRA Amtra	ak Layover Facility	Project #:	13057
		SUIVI				Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Ma	ine	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Sei	rvices, 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	
DF	RILLING	METHOD	S	AMPLER		ESTIMATED GROUND WATER DEPTH				
Vehicle:		PowerProbe	Length:	24" SS		Date Depth Elevation Re			Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5	'ID	4/22/2013 7.7 71 ft +/- Groundwater well n			leasurement	
Method:	<u>.</u>	3.5" Casing	Hammer:	140 lb		4/26/2013	7.7	71 ft +/-	Groundwater well m	leasurement
Hammer	Style:	Auto Drop	Method:	ASTM DT	686				Coole sie al (Cooloring!
Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀	_	DESCRIP	LE TION	Test Data	Stratum
	S-1	24/9	0 to 2	1		Dark brown Silty	SAND, rootlets	s, mulch,		TOPSOIL
1				1		humid, very loos	se, SM			
				2		-				
2		0.1/10	<u>.</u>	3						MARINE DELTA
2	5-2	24/18	2 to 4	2		Brown medium-f	ine SAND, dam	p, loose, SP		
3-				2		-				
4		ł		2		1				2" PVC Woll
4-				3					Gravel - 0.0%	Screen 3 5' to 13 5'
5	5-3	24/24	45-65	2		Brown and mottl	led SAND dam	o to moist loose SP	Sand = 95.8%	30 661 3.3 10 13.3
<u> </u>	5.5	27/27	4.5 0.5	2		brown and mott			Fines = 4.2%	
6				2					MC = 15.4%	
- -				2						
7	S-4	24/24	6.5 - 8.5	3		Brown and mottl				
-				6						
8				6						
-				7						
9										
10										
	S-5	24/24	10 to 12	1		Brown fine to co	arse SAND, we	t, loose, SP	Gravel = 0.5%	
11				2		-			Sand = 98.9%	
				2		-			Fines $= 0.6\%$	
12	-			2		-			MC = 23.8%	
10						-				
13	-					-				
14						-				
14										
15						-				
10	S-6	24/24	15 to 17	WH		Olive brown med	dium-fine SAND	wet loose SP	Gravel = 0.0%	
16		!		1	1			,,	Sand = 95.2%	
· · ·				WH		1			Fines = 4.8%	
17				1	1	1			MC = 24.8%	
						End of boring at	17 feet, no refe	usal		1
18]				
						1				
19		ļ				4				
				ļ		4				
20						4				
21						4				
21	+	<u> </u>				1				
22						1				
	1	1		1		1				
					1					
Granul	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture C	ontent	Soil Moisture Condition
Blows/ft.	Granular Soils Cohesive Soils % Composition Blows/ft. Density Blows/ft. Consistency ASTM D2487				LL = Liquid Limit	t, PI = Plastic Index		Dry: S = 0%		
0-4 V. Loose <2 V. soft			Bedrock Joints				Humid: S = 1 to 25%			
5-10	Loose	2-4	Soft	< 5%	Trace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compac	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	o degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 c	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With	Vith Saturated: S = 100%				Saturated: S = 100%
	>30 Hard			Boulders = diamet	er > 12 inches, C	obbles = diameter < 12 inch	ies and > 3 inches			
	250 Haiu				Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200					

						SOIL BORING LOG			Boring #:	B-4
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		80 ft +/-		
Driller:	Ctoff.	C. Coolidge, P	.E.			Reference:	4/22/2012	Estimated from siteplan to	opography	
Summit	Starr:	B. Haiss, E.I.	<u> </u>			Date started:	4/22/2013			
Vehicles	TLLING	PowerProbe	Length:	AIVIPLER		ESTIWATED GROUND WATER DEPTH				
Model.		9500 VTR	Diameter:	24 33 2"0D/1 5"	'ID	4/22/2013	5.9	74 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb		172272010	0.7	, , , , , , , , , , , , , , , , , , , ,		
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth			8				SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum
	S-1	24/16	0 to 2	3		Dark brown Silty	SAND, trace ro	otlets and coal ash,		FILL
1				5		humid, loose, SN	1			
				6		Brown SAND, hu	mid, loose, SP			
2_				4						
2	S-2	24/24	2 to 4	3	-	Brown SAND mix	ed with coal as	h, humid, loose, SM		
3				4		Reaction of the second s	THE SAIND, Uam	J, 10058, SP		
4				6		1				
- ⁻						1				
5						1				
	S-3	24/16	5 to 7	6		Brown fine to co	arse SAND, mo	ist to wet, loose, SP		
6				6						
				5						
7_				6						
						-				
8_						-				
o										
						-				
10										
-	S-4	24/24	10 to 12	2		Brown fine to co	arse SAND, wet	, loose, SP		
11				2		1			L	
				3		Olive brown SILT	, little Clay and	l Sand, wet, firm, ML		
12				4						
10						End of boring at	12 feet, no refu	isal		
13						-				
14						-				
· · · -										
15										
1 -]				
16						1				
						4				
17						4				
10						1				
18						1				
19				1		1				
I				1		1				
20]				
						4				
21						4				
22						4				
22						1				
						1				
Granula	ar Soils	Cohesiv	ve Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft	1		Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51$ to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	egrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
					Gravel = < 3 inch a	and > No 4, Sand	$a = \langle No \ 4 \ and \rangle No \ 200, Silt$	/ciay = < No 200		

		\wedge				SOIL BORING LOG			Boring #:	B-5		
		CIINA	AAT			Project: NNEPRA Amtrak Layover Facility			Project #:	13057		
		SUIVI	IVIII			Location:	Church Road		Sheet:	1 of 1		
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC		
Drilling (co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		79 ft +/-				
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan t	opography			
Summit	Staff:	B. Haiss, E.I.				Date started:	4/22/2013	Date Completed:	4/22/2013			
DF	ILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH			
Vehicle:		PowerProbe	Length:	24" SS		Date Depth Elevation Reference						
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/22/2013 5.6 73 ft +/- In borehole at completion						
Method:		3.5" Casing	Hammer:	140 lb								
Hammer	Style:	Auto Drop	Method:	ASTM D15	586							
Depth (ft)	No	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		SAMPL DESCRIP	E LON	Geological/ Test Data	Geological Stratum		
()	S-1	24/16	0 to 2	5	00	Dark brown Silty	SAND trace ro	otlets and coal ash	. cot Butu	FILL		
1	51	21/10	0102	5		humid, loose, SM	1					
-				5		Brown SAND, hu	mid, loose, SP					
2				4								
_	S-2	24/24	2 to 4	3		Brown SAND mix	ed with coal as	h, humid, loose, SM				
3				2								
1				2		Reddish-brown fi	ine SAND, dam	o, loose, SP				
4				2						MARINE DELTA		
_	S-3	24/18	4 to 6	2		Brown fine to co	arse SAND, mo	st to wet, loose, SP				
5_				2		4						
6				2								
0_	S_1	24/24	6 to 8	3		Brown fine to coarse SAND, wet, compact, SP						
7	3-4	24/24	0100	8		mixed with fine 9	SAND wet com	nact SP				
· -				9								
8				9								
-												
9												
10												
	S-4	24/24	10 to 12	1		Brown fine to co	arse SAND, wet	, loose, SP				
11_				3		-						
10				4		-						
12				4		End of boring at	12 foot no rofi	ical				
13	-					Life of boring at	12 1001, 110 101	1301				
14												
-												
15												
1						4						
16						4						
17						4						
- ''-						1						
18						1						
						1						
19						1						
1 7												
20												
						4						
21						4						
						-						
22						1						
1						1						
Granula	ar Soils	Cohesia	re Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ontent	Soil Moisture Condition		
Blows/ft.	Densitv	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: $S = 0\%$		
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: S = 1 to 25%		
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%		
11-30	Compac	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%		
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%		
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%		
1	>30 Hard				Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches							
						Gravel = < 3 inch a	and > No 4, Sand	$i = \langle No \ 4 and \rangle No \ 200$, Sil	t/Clay = < No 200			

		\wedge				SOIL BORING LOG			Boring #:	B-6	
		SIINA	INAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057	
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1	
		GEGENGINEERI	ING SERVICES			City, State:	Brunswick, Ma	ne	Chkd by:	CWC	
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:	:	78 ft +/-			
Driller:	Chaff	C. Coolidge, P	.E.			Reference:	4/22/2012	Estimated from siteplan to	opography		
Summit		B. Haiss, E.I.	6			Date started:	4/22/2013				
Vohiclor	TLLING	PoworProbo	Jongth:	AIVIPLER		Dato	Dopth	ESTIMATED GROUND W		foronco	
Model.		9500 VTR	Diameter:	24 33 2"0D/1 5"	'ID	4/22/2013 7.9 70 ft +/- In borehole at completion					
Method:		3.5" Casing	Hammer:	140 lb		172272010	7.7	/01(1)			
Hammer	Style:	Auto Drop	Method:	ASTM D15	586						
Depth	j	•					SAMPI	E	Geological/	Geological	
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum	
	S-1	24/19	0 to 2	3		Dark brown Silty	SAND, trace ro	otlets and coal ash,		FILL	
1				4		humid, loose, SN	1				
				3		Brown SAND, hu	mid, loose, SP				
2				4		-					
	S-2	24/16	2 to 4	3		Brown SAND mix	ed with coal as	h, humid, loose, SM			
3_				2		Reddish-brown fi	ine SAND, dam	o, loose, SP			
4				2		-				MARINE DELTA	
	S-3	24/16	4 to 6	1		Brown fine to co	arse SAND mo	ist to wet, loose, SP			
5		21/10	1.00	1		Drown time to coarse saind, moist to wel, loose, SP					
- ^۳				1		1					
6				1]					
_	S-4	24/23	6 to 8	1		Brown fine to co	arse SAND, we	, compact, SP			
7				1		mixed with fine S	SAND, wet, con	npact, SP			
				1		-					
8_	0.5	04/10	0.1. 10	2		Denne fine to come CAND and Leave CD					
0	5-5	24/19	8 to 10	1		Brown fine to coarse SAND, wet, loose, SP					
9_				1							
10				1							
	S-6	24/24	10 to 12	3		Brown fine to co	arse SAND, we	, loose, SP			
11				4			· · · · ·	,,			
-				6		Olive brown Silty	fine Sand, wet	, compact, SM	T		
12				6							
						End of boring at	12 feet, no refu	lsal			
13						-					
14											
						-					
15						-					
-											
16											
						1					
17						4					
10						-					
8	-					1					
19						1					
''-	1					1					
20]					
21						1					
						-					
22						-					
						4					
Granula	ar Soils	Cohesin	l ve Soils	% Comp	osition	NOTES	PP = Pocket Pon	etrometer MC – Moisturo Co	I Intent	Soil Moisture Condition	
Blows/ft.	Densitv	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: $S = 0\%$	
0-4	V. Loose	<2	V. soft	1		Bedrock Joints	1			Humid: $S = 1$ to 25%	
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%	
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%	
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%	
>50	V. Dense	16-30	V. Stiff	> 30%	With	"ith Saturated: S = 100%				Saturated: S = 100%	
		>30	Hard			Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches					
					Gravel = < 3 inch a	and > No 4, Sand	$a = \langle NO 4 and \rangle NO 200, Silt$	/ciay = < No 200			

						S	OIL BORI	NG LOG	Boring #:	B-7
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		80 ft +/-		
Driller:	0. ((C. Coolidge, P.	.E.			Reference:	1/00/0010	Estimated from siteplan to	opography	
Summit	Staff:	B. Haiss, E.I.	0			Date started:	4/23/2013	Date Completed:	4/23/2013	
Vehicles	ILLING	METHOD DoworDroho	5/	AMPLER		Data	Dopth	ESTIMATED GROUND W		foronco
Model·		9500 VTR	Diameter:	24 33 2"0D/1 5"	חוי	$1/23/2013$ A 8 75 ft $\pm/_{-}$ In borehole at completion				
Method.		3.5" Casing	Hammer [.]	2 0D/1.5	ID	4/23/2013	4.0	7511 +7-		letion
Hammer	Style	Auto Drop	Method [.]	ASTM D15	686					
Depth							SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	- FION	Test Data	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 fi	ine SAND, dam	o, loose, SP		
3_				4		grading to				
4				10		Brown fine to co	arse SAND, mo	ISI, 100SE, SP		
4				14		1				
5				1		1				
- [–]	S-3	24/18	5 to 7	7		Brown fine to co	arse SAND, wet	, loose, SP		
6				4						
-				4						
7				5						
						-				
8_						-				
0						-				
9_										
10						-				
	S-4	24/24	10 to 12	1		Olive brown fine	to medium SAN	ND, wet, loose, SP		
11				1				, ., ., ., .		
_				1						
12				2						
						End of boring at	12 feet, no refu	lsal		
13										
14						-				
						-				
15										
16										
						4				
17						4				
10						4				
18						1				
19						1				
l	1					1				
20]				
						1				
21						4				
						4				
22						1				
						1				
Granula	ar Soils	Cohesiv	ve Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	Intent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: $S = 0\%$
0-4	V. Loose	<2	V. soft	1		Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compac	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With	/ith Saturated: S = 100%				
	>30 Hard					Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches				
						Graver = < 3 inch a	ano > No 4, Sano	$a = \langle NO 4 and \rangle NO 200, Silt$	/uay = < No 200	1

						S	OIL BORI	NG LOG	Boring #:	B-8
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Ma	ne	Chkd by:	CWC
Drilling (co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		81 ft +/-		
Driller:	C1	C. Coolidge, P	.E.			Reference:	4/22/2012	Estimated from siteplan to	opography	
Summit	Statt:	B. Haiss, E.I.	6			Date started:	4/23/2013		4/23/2013	
Vehicle:	ILLING	PowerProbe	Jenath:	21" SS		Date	Denth	ESTIMATED GROUND W		ference
Model.		9500 VTR	Diameter:	24 33 2"0D/1 5"	ID	4/23/2013	3.4	78 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb		172072010	0.1	/01(1)		
Hammer	Style:	Auto Drop	Method:	ASTM D15	i86					
Depth							SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum
	S-1	24/16	0 to 2	WH		Dark brown Silty	SAND, rootlets	, humid, SM		TOPSOIL
1				1						
				WH						
2_				1						MARINE DELTA
2	S-2	24/24	2 to 4	4		Reddish-brown fi	ine SAND, dam	o, loose, SP		
3_				10		grauing to Brown find to co		st looso SP		
4				8		brown nne to co	arse sand, mo	IST, 10036, 3F		
-				0		-				
5										
_	S-3	24/24	5 to 7	1		Brown fine to co	arse SAND, wet	, loose, SP		
6				3						
				5						
7				6		-				
0										
8_						-				
9						-				
· -										
10										
_	S-4	24/24	10 to 12	WH		Brown fine to coa	arse SAND, wet	, loose, SP		
11				WH						
10				5		-				
12				4		Fuel of bosings of	10 fact as act			
13						End of boring at	12 leet, no reit	ISAI		
15						-				
14										
15						-				
						4				
16						4				
17						-				
· · / -						1				
18						1				
·				1		1				
19]				
						4				
20						4				
21						4				
21						1				
22						1				
I						1				
Granula	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Blows/ft. Density Blows/ft. Consistency ASTM D2487			4	LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%		
0-4	V. Loose	<2	V. soft		-	Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%]	race	Shallow = 0 to 35	degrees			Damp: $S = 26 \text{ to } 50\%$
11-30	Compact	5-8	Firm Stiff	5-15%	Little	Dipping = $35 \text{ to } 55$	aegrees			Moist: $S = 51$ to 75%
>50		7-10 16-30	V Stiff	> 30%	With	312ep = 55 10 40 0	icyi ees			Saturated: S = 100%
~ 30	V. Dense	>30	Hard	- 3070	****	Boulders = diameter	er > 12 inches. C	obbles = diameter < 12 inche	es and > 3 inches	Saturateu. 5 - 10070
	>30 Hard					Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200				

						S	OIL BORI	NG LOG	Boring #:	B-10	
		SIINA	TILA			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057	
		SUIVI	IVIIN			Location:	Church Road		Sheet:	1 of 1	
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ine	Chkd by:	CWC	
Drilling (Co:	Summit Geoen	igineering Ser	vices, Inc.		Boring Elevation:	:	81 ft +/-			
Driller:		C. Coolidge, P.	E.			Reference:		Estimated from siteplan to	opography		
Summit	Staff:	B. Haiss, E.I.				Date started:	4/23/2013	Date Completed:	4/23/2013		
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH		
Vehicle:		PowerProbe	Length:	24" SS		Date Depth Elevation Reference					
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/23/2013 2.9 78 ft +/- In borehole at co				letion	
Method:		3.5" Casing	Hammer:	140 lb							
Hammer	Style:	Auto Drop	Method:	ASTM D15	586						
Depth			(-)			-	SAMPL	.E	Geological/	Geological	
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum	
	S-1	24/16	0 to 2	1		Dark brown Silty	SAND, rootlets	, mulch, humid, SM		TOPSOIL	
1				1							
2				1		-					
2 -	6.2	24/24	2 to 4	2		Doddich brown fi	ing SAND dam			MARINE DELTA	
3	3-2	24/24	2 10 4	ა 15		aradina to	ine sand, uam	D, 100se, SP			
- ³				19		Brown fine to co	arse SAND mo	ist, loose, SP			
4	<u> </u>			24							
l ^{'-}						1					
5	<u> </u>			1		1					
-	S-3	24/20	5 to 7	14		Brown fine to coarse SAND, wet, loose, SP					
6				10							
				9							
7				7		_					
8						-					
9											
10						-					
10	5.4	24/24	10 to 12	\//LI		Prown find to coarse SAND wat loose SP					
11	3-4	24/24	10 10 12	WH		BIOWIT TITLE LO CO	aise sand, wei	l, 100se, sp			
l ''-			-	1		-					
12				2							
						-					
13						-					
_											
14											
15						_					
	S-5	0/0	15 to 17	NA		No sample - runr	ning sands plug	ged casing			
16						(brown fine-coar	se SAND, wet,	SP in sampler)			
	<u> </u>					-					
1/						4					
10						1					
10						1					
19	<u> </u>			1		t	· — - — - — - —		+		
''-						1					
20	<u> </u>		-	1		1					
-	<u>S-6</u>	24/24	<u> 20 - 22</u>	WH		Olive brown fine	SAND, trace Si	lt, wet, compact, SP			
21				6							
1				5							
22				8							
						End of boring at	22', no refusal				
<u> </u>						NOTES					
Granula	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES: PP = Pocket Penetrometer, MC = Moisture Content				Soil Moisture Condition	
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	02487	87 LL = Liquid Limit, PI = Plastic Index				Dry: $S = 0\%$	
U-4	V. LOOSE	<2	V. SOFT	, E0/ T	Fraco	Bedrock Joints Hu			Humid: $S = 1 \text{ to } 25\%$		
11 20	Compact	∠-4 5.Ω	SUIL	< 5% 5 150/	Frace Shallow = 0 to 35 degrees Damp: S = 2 Little Dinning = 35 to 55 degrees Maist: S =			Damp. 5 = 20 10 50% Moist: S = 51 to 75%			
31-50	Dense	9-15	Stiff	15-30%	Little Dipping = 35 to 55 degrees Moist: S = 51 to 90 degrees Wet: S = 76 to 90 degrees			Wet: $S = 76 \text{ to } 99\%$			
>50	V. Dense	16-30	V. Stiff	> 30%	5 Some Steep = 55 to 90 degrees Wet: S = 76 to 95			Saturated: S = 100%			
		>30	Hard	- 5070		Boulders = diameter	er > 12 inches. C	obbles = diameter < 12 inche	es and > 3 inches		
						Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inch Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 2					

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-11
		SILA	TINA			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIIN			Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation	:	81 ft +/-		
Driller:		C. Coolidge, P	.E.			Reference:		Estimated from siteplan to	opography	
Summit	Staff:	B. Haiss, E.I.				Date started:	4/23/2013	Date Completed:	4/23/2013	
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5'	'ID	4/23/2013	3.2	78 ft +/-	Groundwater well m	easurement
Method:		3.5" Casing	Hammer:	140 lb		4/26/2013	4.0	77 ft +/-	Groundwater well m	easurement
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth							SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	ION	Test Data	Stratum
	S-1	24/20	0 to 2	1		Black Silty SAND	mixed with coa	I ash, humid, loose,		
1				3		SM				FILL
-				4						
2				4						
-	S-2	24/24	2 to 4	2		Brown SAND mix	ed with coal as	h, damp,		
3				2		Reddish-brown f	ine SAND gradi	ng to		
1 -	L			1		brown fine to co	arse SAND, moi	st, loose, SP		MARINE DELTA
4				2]				
I -]				1" PVC Well
5]				Screen 3.5' to 8.5'
I -	S-3	24/16	5 to 7	9		Brown fine to co	arse 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 co	arse SAND, wet	, loose, SP	Gravel = 0.0%	
11				1					Sand = 99.6%	
				1					Fines $= 0.4\%$	
12				2					MC = 21.5%	
13										
									L	
14										
						_				
15						_				
	S-5	24/24	15 to 17	WH		Olive brown fine	SAND, little Sil	, wet, very loose,	Gravel = 0.0%	
16				1		SP-SM			Sand = 91.0%	
				WH		4			Fines = 9.0%	
17				1		4			MC = 23.1%	
					<u> </u>	4				
18	$\left \right $				-	4				
10					-	4				
19					<u> </u>	4				
20						4				
20	C 4	24/24	20 22	\\/LI		Olive brown fine	SAND little Sile	wat vary loose	Gravel = 0.00	
21	3-0	24/24	20-22	vvп 1		SP_SM	SAND, IIIIE SII		Sand = 96.3%	
<u></u>				1	<u> </u>	31-31/1			Fines = 12.702	
22				1		1			MC = 25.6%	
	-			1		End of boring at	22' no refusal		1010 - 20.070	
							Le, no rerusal			
Granul	ar Soils	Cohesiv	re Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer. MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Densitv	Blows/ft.	Consistency	ASTM D	02487		LL = Liquid Limit	, PI = Plastic Index		Dry: $S = 0\%$
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: S = 1 to 25%
5-10	Loose	2-4	Soft	< 5%	Trace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	- degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 c	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diamet	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
						Gravel = < 3 inch	and > No 4, Sand	$I = \langle No 4 and \rangle No 200$, Silt	/Clay = < No 200	

	SUMMIT. GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-13
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIIN			Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		82 ft +/-		
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan to	opography	
Summit	Staff:	B. Peterlein, P	.E.			Date started:	4/24/2013	Date Completed:	4/24/2013	
DF	RILLING	METHOD	Si	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VIR	Diameter:	2"0D/1.5"	ID	4/24/2013	2.1	80 ft +/-	In borehole at comp	letion
Method:	Ctulor	3.5" Casing	Hammer:		04					
Hammer	Style:	Auto Drop	wethod:	ASTIM DT5	080		CAMPI	F	Coological/	Coological
Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀	-	DESCRIP	ΓΙΟΝ	Test Data	Stratum
	S-1	24/12	0 to 2	1		Black Sandy SILT	mixed with bla	ack coal ash, humid,		TOPSOIL
1_				2		soft, ML		0111 1 1 1 0 0		
2				2		Brown SAND, litt	le gravel, trace	Silt, numid, loose, Sivi	-	FILL
2_	5.2	24/9	2 to 4	2		Gray Coar Ash Poddish brown S	andy SILT woo	kly comonted burnid		
3	<u> </u>	24/0	2 10 4	6		loose to compact	anuy Si∟i, wea ⊧MI	ikiy cementeu, numiu,		MARINE DELTA
				11		loose to compact	, WE			
4	-			20		-				
-										
5										
	S-3	24/24	5 to 7	10		Brown medium to	o fine SAND, m	ottled, wet,		
6				10		compact, SP				
_				9		-				
7_				8						
0						-				
°_										
9	-					-				
· -										
10						-				
-	S-4	24/24	10 to 12	WH		Brown medium to	o coarse SAND,	wet, loose, SP		
11				1						
				2		_				
12				3						
10						-	End of Boring a	at 12 ft		
13						-				
14										
l										
15										
l -						1				
16										
						4				
17						-				
18						1				
10						1				
19]				
20						-				
21						-				
21						1				
22	-					-				
l				1		1				
1				1		1				
Granul	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487	1	LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: S = 1 to 25%
5-10	Loose	2-4	Soft	< 5% 1	Frace	Shallow = 0 to $35 \circ$	degrees			Damp: S = 26 to 50%
11-30	Compac	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51 \text{ to } 75\%$
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			wet: $S = 76 \text{ to } 99\%$
>50	v. Dense	10-3U	V. SUIT	> 30%	אאונה	Boulders - diamate	ar > 12 inches C	obbles - diamotor - 12 inche	a_{a} and a_{a} inches	saturated: S = 100%
1		>30	riai û			Gravel = < 3 inch < 3	and > No & Sand	$1 = < N_0 4 \text{ and } > N_0 200 \text{ Silt}$		
L		1		1						1

	SUMMIT. GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-14
		SILA	NANT			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIII			Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ine	Chkd by:	CWC
Drilling (Co:	Summit Geoer	igineering Ser	vices, Inc.		Boring Elevation:		83 ft +/-		
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan t	opography	
Summit	Staff:	B. Peterlein, P	.E.			Date started:	4/24/2013	Date Completed:	4/24/2013	
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/24/2013	3.8	79 ft +/-	In borehole at comp	bletion
Method:		3.5" Casing	Hammer:	140 lb						
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀	-	SAMPL DESCRIP	.E FION	Geological/ Test Data	Geological Stratum
	S-1	24/18	0 to 2	WH		Dark brown Sand	lv SILT, trace re	ootlets, humid, ML		TOPSOIL
1				1		Brown medium to	o fine SAND, tra	ace 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, gradir	ng to dark brown Silty		
3				3		find Sand, humid	, loose, SM			
				4						
4				6						
_	L					4				
5_	6.2	24/10	F 4a 7	0		Dura una una alluma d		wet compact CD		
6	5-3	24/18	5 10 7	9		Brown mealum to	o coarse sand,	wet, compact, SP		
0				0 6		-				
7				5		-				
· -				0						
8										
-										
9										
_										
10						-				
	S-4	24/20	10 to 12	2		Brown medium to	o coarse SAND,	wet, compact, SP		
11				1		-				
10				3		-				
12				4			End of Toot Dit	at 10 fact		
13						-	End of Test Pit			
15						-				
14										
-										
15										
16										
	L					4				
1/						4				
10						1				
10						1				
19	<u> </u>					1				
l						1				
20]				
1]				
21						4				
	L					4				
22						4				
1						4				
C=+		0.1. · ·		04.0	oolti	NOTES	DD Deelect D	atramator MO		Coll Moleture Collection
Blows /ft	a JUIIS	Conesiv Blows /ft	Consistency	≫ comp	051110N 12/187	NUTES:	rr = POCKET PEN	enometer, MC = MOISTURE CC PI - Plastic Index	JILEIIL	Sui woisture condition
0-4	V. Loose	<2	V soft	ASTIVI D	2701	Bedrock loints				Humid: $S = 1 \text{ to } 25\%$
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35°	degrees			Damp: $S = 26 \text{ to } 50\%$
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	egrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diameter	er > 12 inches, C	obbles = diameter < 12 inch	es and > 3 inches	
	>30 Hard					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				

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-15
		SIINA	TILA			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIIN			Location:	Church Road	<u> </u>	Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling	Co:	Summit Geoer	ngineering Ser	rvices, Inc.		Boring Elevation:		83 ft +/-		
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan to	pography	
Summit	Staff:	B. Peterlein, P	.E.			Date started:	4/24/2013	Date Completed:	4/24/2013	
DI	RILLING	METHOD	Si	AMPLER				ESTIMATED GROUND W	ATER DEPTH	-
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VIR	Diameter:	2"OD/1.5"	TD	4/24/2013	3.3	80 ft +/-	In borehole at comp	letion
Method:	Chula	3.5" Casing	Hammer:		-0/					
Dopth	style:		wethou:	ASTIVIDIS	080		CAMDI		Coological/	Coological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀	-	DESCRIP	LION	Test Data	Stratum
	S-1	24/18	0 to 2	1		Brown SAND, hu	mid, very loose	, SP		TOPSOIL
1				1		Dark brown SILT	mixed with or	janics		
-				2		Reddish brown n	nedium to fine s	SAND, little Silt		
2				3		humid, loose, SN	1			MARINE DELTA
	S-2	24/8	2 to 4	3		_				
3				6		Reddish brown fi	ine Sandy SILT,	humid, stiff, ML		
4				9						
4	-			12		-				
5						+				
5	S-3	24/20	5 to 7	4		Brown medium t	o coarse SAND	wet, loose, SP		
6	0.0	21720	0107	3		bi own mediain t				
-				4		-				
7				4						
-										
8						_				
						-				
9_						-				
10						-				
10	5.4	0/0	10 to 12	NΛ		No samplo rupr	ning sands nlug	and casing		
11	3-4	0/0	10 10 12	NA		No sample - runi	ing sands plug	yeu casiliy		
l										
12										
-										
13						_				
						-				
14	-			-						
15										
15	S-5	24/24	15 to 17	2		Brown very fine	SAND little Silt	wet loose SM		
16		2.721	10 10 17	4						
				2		Dark brown SILT	, little Clay and	Sand, wet, soft,		
17				2		ML	J			
1										
18	<u> </u>					4				
10	<u> </u>					-				
19	+			+		1				
20						1				
	S-6	24/24	20 to 22	WH		Gray fine Sandv	SILT, Clavey Sil	t in seams (4" to 6")		
21				4		wet, soft, ML	5.5	. ,		
				3						
22				1						
							End of Boring a	at 22 feet		
Crow	or Soil-	0-4	ro Soils	0/ 0	ocition	NOTES	DD - Dookst D	atramator MC Maintena 2		Soil Moisture Caralitia
Granul Blows /ft	ar SOIIS Doncitu	Conesiv Blows/ft	Consistency	% Comp астм г	051110N 12487	NUTES:	rr = rocket Pen	PI = Plastic Index	ment	Soli indisture condition $Dry: S = 0\%$
0-4	V. Loose	<2	V. soft	AUTIVI L	10/	Bedrock Joints	Liquiù Littili			Humid: $S = 1 \text{ to } 25\%$
5-10	Loose	2-4	Soft	< 5%	Trace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
1		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	s and > 3 inches	
L						Gravel = < 3 inch a	and > No 4, Sand	$I = \langle No \ 4 \text{ and } \rangle No \ 200, \ Silt/$	'Clay = < No 200	

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-16
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI				Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling	Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:	:	84 ft +/-		
Driller:	Chaff	C. Coolidge, P	. <u>E.</u>			Reference:	4/24/2012	Estimated from siteplan to	pography	
Summit	Starr:	B. Peteriein, P	.E.			Date started:	4/24/2013			
Vehicle	TLLING	PowerProbe	Lenath.	24" SS		Date	Denth	ESTIMATED GROUND W		ference
Model:		9500 VTR	Diameter:	2"0D/1.5	'ID	4/24/2013	4.1	80 ft +/-	Groundwater well m	easurement
Method		3.5" Casing	Hammer:	140 lb		4/26/2013	4.4	80 ft +/-	Groundwater well m	easurement
Hamme	⁻ Style:	Auto Drop	Method:	ASTM D15	586					
Depth			1	T			SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIPT	TION	Test Data	Stratum
	S-1	24/12	0 to 2	WH		Dark brown SILT	, little Sand and	d Gravel, trace		TOPSOIL
1				2		organics, humid,	soft, ML	mid yony looso		
2				3		SP	o fine sand, hu	imia, very ioose,		MARINE DELTA
2	S-2	24/6	2 to 4	1		51				
3				2						
				4						1" PVC Well
4				3		-				Screen 3' to 8'
-						-				
5	6.2	24/20	5 to 7	11		Poddish brown fi		Silt wat compact		
6	3-3	24/20	5107	8		SM	ine sand, inde	Siit, wet, compact,		
				10		Brown medium t	o coarse SAND,	wet, compact, SP		
7				10						
-										
8	-					-				
0						-				
9	+					1				
10										
	S-4	24/24	10 to 12	1		Brown medium t	o coarse SAND,	wet, loose, SP		
11				2						
				4						
12				3		-				
12						-				
13						-				
14										
-										
15										
	S-5	24/24	15 to 17	WH		Brown medium t	o fine SAND, tra	ace Silt, wet, loose,		
16				2		SM				
17				3		1				
· · · ·				Ŭ		1				
18]				
						4				
19						4				
20						4				
20	S-6	24/24	20 to 22	1		Brown medium t	o fine SAND tr	Silt, wet, loose, SM		
21		/		1		Gray SILT, little	fine Sand or Cla	y in seams, wet,	LL = 24	
				1		very soft, CL-ML			PI = 7	
22				3		ļ			MC = 26.1%	
						4	End of Boring a	at 22 feet		
Grapul	ar Soile	Cohoch	e Soils	% Com	osition	NOTES	PP - Pocket Per	etrometer MC - Moisture Co	atent	Soil Moistura Condition
Blows/ft	Densitv	Blows/ft.	Consistency	ASTM F	0311011	NOTES.	LL = Liquid Limit	, PI = Plastic Index	nom	Drv: $S = 0\%$
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%	Trace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	5 degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 c	degrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With	Pouldors -!	or > 10 inct 0	abblac - diamatar - 10 - 1	c and > 2 inch	Saturated: S = 100%
		>30	нага			Gravel = < 3 inch	$e_1 > 12$ incres, C and > No 4. Same	U_{U} using the second structure of the second stru	s and > s incres	
L		L		i			and - NO +, Jailt		5.3y - 1 NO 200	1

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-17
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIII			Location:	Church Road	<u> </u>	Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ine	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Se	rvices, Inc.		Boring Elevation:		82 ft +/-		
Driller:		C. Coolidge, P	.E.			Reference:		Estimated from siteplan to	opography	
Summit	Staff:	B. Haiss, E.I.				Date started:	4/23/2013	Date Completed:	4/23/2013	
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5'	'ID	4/23/2013	3.4	79 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb						
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth	No	Pon/Poc (in)	Depth (ft)	blows/6"	Nia		SAMPL	E LON	Geological/	Geological
(11.)	S-1	24/20	0 to 2	WH	00	Black Sandy SILT	mixed with bla	ack coal ash, humid,	Test Data	TOPSOIL
1				2		soft, ML				
				1		Brown SAND, litt	le gravel, trace	Silt, humid, loose, SM		FILL
2				3		Gray Coal Ash				
	S-2	24/24	2 to 4	3		Reddish-brown fi	ine SAND gradi	ng to		
3				5		brown fine to coa	arse SAND, mo	ist, loose, SP		MARINE DELTA
				7		-				
4				8		-				
-						-				
5	6.0	04/1/	54.7	,			CAND			
4	5-3	24/16	5 to 7	6		Brown fine to co	arse SAND, wei	I, 100SE, SP		
°_				C 0		-				
7				4						
· -				5		-				
8										
9						-				
-						-				
10										
-	S-4	24/18	10 to 12	3		Brown fine to co	arse SAND, wet	t, loose, SP		
11				3					L	
				4		Olive brown Sand	dy SILT, little C	lay with thin		
12				4		gray Silt seams,	wet, firm, ML			
						-				
13						-				
14										
14						-				
15										
15	S-5	24/24	15 to 17	1		Olive brown San	dv SII T little C	lav wet verv loose	Sand - 45.1%	
16	00	21/21	10 10 17	2		MI		lug, wet, verg loose,	Silt = 43.1%	
				1					Clay = 11.8%	
17				2		-			MC = 22.2%	
l ⁻]				
18]				
I -										
19										
	ļ					4				
20	-				ļ					
~ ~	S-6	24/24	20 - 22	WH		Olive brown fine	SAND, little Sil	t, wet, very loose,		
21				WH		5P-5M				
22				WH 1						
22						End of horing at 22' no refusal				
I				-		End of boring at 22', no refusal				
Granul	ar Soils	Cohosin	re Soils	% Comp	osition	sition NOTES: PP = Pocket Penetrometer MC = Moisture Content				Soil Moisture Condition
Blows/ft	Densitv	Blows/ft	Consistency	ASTM F	Dosition NOTES: PP = Pocket Penetrometer, MC = Moisture Content D2487 LL = Liquid Limit, PI = Plastic Index				Drv: $S = 0\%$	
0-4	V. Loose	<2	V, soft		/	Bedrock Joints	quiu Linin			Humid: $S = 1 \text{ to } 25\%$
5-10	Loose	2-4	Soft	< 5%	Trace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
1		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
						Gravel = < 3 inch a	and > No 4, Sand	$d = \langle No \ 4 \ and \rangle No \ 200$, Silt	/Clay = < No 200	

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-18
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIIN			Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Ma	ne	Chkd by:	CWC
Drilling	Co:	Summit Geoer	ngineering Sei	rvices, Inc.		Boring Elevation:		82 ft +/-		
Driller:		C. Coolidge, P	.E.			Reference:		Estimated from siteplan to	opography	
Summit	Staff:	B. Haiss, E.I.				Date started:	4/23/2013	Date Completed:	4/23/2013	
DI	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5'	'ID	4/23/2013	3.7	78 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb						
Hamme	Style:	Auto Drop	Method:	ASTM D15	586					
Depth (ft)	No	Pen/Rec (in)	Depth (ft)	blows/6"	N ₄₀	-	SAMPL	E LION	Geological/ Test Data	Geological Stratum
(11.)	S-1	24/18	0 to 2	1	60	Black Silty SAND	mixed with co	al ash, humid, loose,	Tost Bata	otratam
1	51	24/10	0102	1		SM	mixed with cot			FILL
· ·				3		0.01				
2				2						
	S-2	24/24	2 to 4	1		Reddish-brown f	ine SAND gradi	na to		
3				3		brown fine to co	arse SAND, mo	st, loose, SP		MARINE DELTA
-				6						
4				11						
-										
5										
	S-3	24/16	5 to 7	8		Brown fine to co	arse SAND, we	, compact, SP		
6				8						
				7						
7				8						
8										
						_				
9						_				
						-				
10				-						
	S-4	24/24	10 to 12	2		Brown fine to co	arse SAND, we	, loose, SP		
11				3		-				
10				3		Olivo brown San		low with thin	+	
12				5		Grov Silt sooms	uy SILT, III.lie C wot firm MI	lay with thin		
13						gray Sin Seams,				
13						-				
14										
· · ·										
15						-				
	S-5	24/24	15 to 17	WH		Grav Sandy SILT	, little Clav, we	t, verv loose, ML	Sand = 31.0%	
16				WH		1	<i>, 10</i>		Silt = 46.5%	
· · ·			1	2		1			Clay = 15.5%	
17				2		1			MC = 23.7%	
1	L				L]				
18]				
1]				
19						1				
1						4				
20						4				
	S-6	24/24	20 - 22	1		Gray Sandy SILT	, little Clay, we	t, very loose, ML	Sand = 36.0%	
21				1		4			Silt = 48.5%	
				2		4	Clay = 12.5%			
22				3		Final of here t				
1					<u> </u>	End of boring at 22', no refusal				
Cropert	or Seile	Coherin	ro Soils	9/ Corr-	l	sition NOTES: PP - Pocket Panatromater, MC - Mojetura Content				Soil Moisture Condition
Granul Blows /ft	Donsity	Conesiv Blows /ft	Consistency	% Comp	position NOTES: PP = Pocket Penetrometer, MC = Moisture Content D2487 LL = Liquid Limit. PL = Plastic Index				Soli Moisture Condition	
0 /		- 2	V soft	ASTIVIL	7240/	Bedrock Jointe	LL = LIQUIU LIMII	, FI = FIDSUL ITUEX		$D_1 y. \ 3 = 0.70$ Humid: S = 1 to 250/
0-4 5 10	V. LOOSE	<2 2 A	V. SUIL	- E0/ ·	Traco	Shallow - 0 to 25	dearees			$\frac{1}{10000000000000000000000000000000000$
11 20	Compac	∠-4 5.0	Firm	< 3% 5 150/	Littla	Dipping $= 25 \pm 55$	degrees			Damp. 3 = 20 10 30% Moist: S = 51 to 75%
31.50	Denso	0-0 0-15	FILLÍÍ Stiff	0-15% 15 20%	Somo	Steen = 55 to 90 c	loaroos			Wot: $S = 76 \text{ to } 00\%$
51-50	V Dense	7-10 16-30	V Stiff	× 200/	With	Steep = 55 to 40 t	icyi ees			Saturated: S = 1010 77%
-50	V. Delise	- 10-30 ->30	v. Sun Hard	- 30%	vvilli	Boulders = diamot	er > 12 inches C	obbles = diameter < 12 inch	inches	Jatarated. J = 100 / 0
		- 30	naru			Gravel = < 3 inch	and > No 4 Sand	$I = \langle No 4 \text{ and } > No 200 \text{ Silt}$	/C av = < No 200	
L		1		1		2.4.0. × 0 mon				

	SUMMIX GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-21
		SIINA	MAN			Project:	NNEPRA Amtra	ık Layover Facility	Project #:	13057
		GEOENGINEED				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Ma	ine	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:	:	84 ft +/-		
Driller:	Ctoff.	C. Coolidge, P	.E.			Reference:	4/24/2012	Estimated from siteplan to	opography	
Summit			.E.			Date started:	4/24/2013			
Vehicle	TLLING	PowerProbe	Lenath [.]	24" SS		Date	Depth	Flevation		ference
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/24/2013	4.7	79 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb						
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth			T	1	T		SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	LION	Test Data	Stratum
1	S-1	24/18	0 to 2	1		Dark brown Sand	dy SILT, trace o	rganics and coal		TOPSOIL
- '-				3		Brown SAND bu	mid compact	SW		
2				6		5.000 0, 100, 100	inia, compact,			MARINE DELTA
-	S-2	24/24	2 to 4	4		Brwon medium t	o coarse SAND	mottled in seams,		
3				3		loose, SP				
	-			2						
4_				2						
5						1				
	S-3	24/24	5 to 7	12		Brown medium t	o fine SAND, tr	ace Silt, wet,		
6				14		compact, SM				
				9						
7				8		-				
0										
°-						-				
9										
10										
11	S-4	24/24	10 to 12	1		Brown medium to	o fine SAND, w	et, loose, SP		
· ''-				4		-				
12				4						
_							End of Boring	at 12 feet		
13						-				
14						-				
14						-				
15										
16_						-				
17						1				
''-						1				
18]				
						4				
19						4				
20	<u> </u>					1				
]				
21						4				
22										
<u> </u>						1				
						1				
Granula	ar Soils	Cohesiv	ve Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft	. 50/ 5	Frace	Bedrock Joints	dogroc-			Humid: $S = 1 \text{ to } 25\%$
5-10 11-20	LOOSE	2-4 5.9	SOIT	< 5% 5 15%	Littlo	Snallow = 0 to 35	degrees			Damp: $S = 26 \text{ to } 50\%$
31-50	Dense	9-15	Stiff	5-15% 15-30%	Some	Steep = $55 \text{ to } 90 \text{ d}$	learees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With	-1000 - 0010 700	9. 000			Saturated: S = 100%
		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
>30 Hard Boulders = diameter > 12 inches, Cobb Gravel = < 3 inch and > No 4, Sand =						$d = \langle No \ 4 \ and \rangle No \ 200$, Silt	/Clay = < No 200			

		\wedge				S	OIL BORI	NG LOG	Boring #:	B-22
		SILA	TILA			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		SUIVI	IVIII			Location:	Church Road		Sheet:	1 of 1
		GEOENGINEERI	NG SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		85 ft +/-		
Driller:		C. Coolidge, P.	.E.			Reference:		Estimated from siteplan to	opography	
Summit	Staff:	B. Peterlein, P	.E.			Date started:	4/24/2013	Date Completed:	4/24/2013	
DF	RILLING	METHOD	S	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle:		PowerProbe	Length:	24" SS		Date	Depth	Elevation	Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/24/2013	5.0	80 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb						
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth					N	-	SAMPL	E	Geological/	Geological
(ft.)	NO.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	ION	Test Data	Stratum
	S-1	24/24	0 to 2	2		Dark brown to bl	ack Silty fine Si	AND, trace organics,		FILL
'-				3		trace coal ash, n	umia, ioose, SP			
2				4		burnid looso SD	u nne sand, si	gnuy motuea,		
2 -	S-2	24/24	2 to 4	4		numiu, ioose, sr				
3	J-2	24/24	2 10 4	2		-				
Ŭ -				1						
4				2		Dark brown SILT	, little fine Sand	d, tr, organics & coal		
-							ash, humid, ver	y soft, ML		
5						```		· · · · · · · · · · · · · · · · · · ·		
1 -	S-3	24/18	5 to 7	12		Brown medium to	o coarse SAND,	heavily mottled,		MARINE DELTA
6				12		wet, compact, SF	D			
				10						
7				9		_				
						-				
8_						-				
0										
9_						-				
10						-				
10	S-1	24/24	10 to 12	2		Dark brown med	ium to coarse S	AND trace Silt		
11	3-4	24/24	10 10 12	4		heavilly mottled	wet compact	SP		
l				7		neuving motileu,	wet, compact,			
12				7						
-						End of boring at	12 feet, no refu	ısal		
13						-				
14						_				
15						-				
						4				
16	-					4				
17						-				
						1				
18				1		1				
	<u> </u>			1		1				
19				1		1				
1 -]				
20]				
1										
21				ļ		4				
1	L					4				
22						4				
1				<u> </u>		-				
<u></u>		0 × 1 × 1		04.0	oolt!-	NOTES	DD Deeler D	atramator MO Million C	ntont	Soil Moisture Country
Granula Blown /ft	ar SOIIS	Cohesiv Blows/ft	Consistence	% Comp	051000	INUTES:	rr = Pocket Pen	enometer, MC = Moisture Col	ment	
0_4		200005/1L.	V soft	ASTIVIL	101	Redrock Joints	בב – בוקטום בווחונ	, II - FIASIL IIIUEX		$U_1 y. 3 = 0\%$ Humid: $S = 1 \text{ to } 25\%$
5-10	1 0000	2-4	v. suri Soft	< 5%	Frace	Shallow = 0 to 35 μ	dearees			Damp: $S = 26 \text{ to } 50\%$
11-30	Comnact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	dearees			Moist: $S = 51 \text{ to } 75\%$
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With		-			Saturated: S = 100%
>50 V. Dense 16-30 V. Stiff > 30% With >30 Hard Bo				Boulders = diameter	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches			
						Gravel = < 3 inch a	and > No 4, Sand	$I = \langle No \ 4 \text{ and } \rangle No \ 200, \text{ Silt/}$	/Clay = < No 200	

	SUMMIK GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-23
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEED				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (Co:	Summit Geoer	igineering Ser	vices, Inc.		Boring Elevation:		86 ft +/-		
Driller:	C1 - 55	C. Coolidge, P	. <u>E.</u>			Reference:	4/04/0010	Estimated from siteplan to	opography	
Summit	Starr:	B. Peteriein, P	.E.			Date started:	4/24/2013			
Vobiclos	ALLING	PoworProbo	Jonath:			Dato	Dopth	ESTIMATED GROUND W		foronco
Model·		9500 VTR	Diameter:	24 33 2"0D/1 5"	חו	4/24/2013	6 0	80 ft +/-	In horehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb		1/21/2010	0.0	001117		
Hammer	Style:	Auto Drop	Method:	ASTM D15	86					
Depth							SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIPT	TION	Test Data	Stratum
	S-1	24/20	0 to 2	1		Dark brown Sand	ly SILT, rootlets	s, humid, ML		TOPSOIL
1				2		Black Silty SAND	, trace coal ash	, humid, loose, SM		FILL
				3		Brown medium to	o fine SAND, tra	ace Silt, slightly		
2				3		mottled, humid lo	oose, SM		-	MARINE DELTA
	S-2	24/24	2 to 4	3		Reddish-brown S	ilty fine SAND,	mottled, humid,		
3_				3		loose, SM				
А				4		1				
4-				5		1				
5				1		1				
	S-3	24/18	5 to 7	6						
6				6		Olive-brown fine	Sandy SILT, we	et, compact, ML		
-				5		1				
7				6		Brown medium to	o coarse SAND,	wet, compact, SP		
8_						-				
0						-				
9_						-				
10						-				
10	S-4	24/24	10 to 12	1		Brown medium to	o coarse SAND.	wet, loose, SP		
11				3			,			
-				6						
12				7						
						End of boring at	12 feet, no refu	usal		
13						-				
14										
14_						-				
15						-				
10										
16										
-										
17										
						4				
18						4				
10						4				
19						1				
20						-				
21]				
I –										
22						4				
						4				
						NOTES			I	
Granula Blows //	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
BIOWS/TL	V	BIOWS/TT.	V coft	ASTML	248/	Bodrock laints	LL = LIQUIA LIMIT	, PT = Plastic Index		Dry: $S = 0\%$ Humid: $S = 1 \text{ to } 25\%$
0-4 5-10	v. LUUSE	<2 2-4	v. sull Soft	~ 5% 7	Frace	$\frac{\text{Deurock Joints}}{\text{Shallow} = 0 \text{ to } 35 \text{ f}}$	dearees			Damp: $S = 26 \text{ to } 50\%$
11-30	Compac	 5-8	Firm	5-15%	Little	Dipping = 35 to 55	dearees			Moist: $S = 51 \text{ to } 75\%$
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diameter	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
	>30 Hard					Gravel = < 3 inch a	and > No 4, Sanc	$I = \langle No \ 4 \text{ and } \rangle No \ 200$, Silt	/Clay = < No 200	

	SUMMIX GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-24
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEERI				Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Ma	ne	Chkd by:	CWC
Drilling (:0:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:	:	87 ft +/-		
Driller:	Stoff.	C. Coolidge, P.	. <u>E</u> .			Reference:	4/24/2012	Estimated from siteplan to	opography 4/24/2012	
			.E.			Date started:	4/24/2013			
Vehicle [.]	ILLING	PowerProbe	Lenath [.]	24" SS		Date	Depth	Flevation	Re Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/24/2013	6.2	81 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb						-
Hammer	Style:	Auto Drop	Method:	ASTM D15	586					
Depth		I	1	1			SAMPL	.E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	FION	Test Data	Stratum
1	S-1	24/18	0 to 2	1		Black Silty SAND	mixed with coa	al ash, humid, loose,		FILL
-'-				2		SIVI				
2				4		Brown medium t	o fine SAND, tra	ace Silt, humid,		
-	S-2	24/18	2 to 4	3		loose, SM				MARINE DELTA
3				4		1				
				5		Brown medium t	o fine SAND, tra	ace Silt, humid,		
4				6		compact, SP				
5						1				
Ŭ Ť-	S-3	24/24	5 to 7	9		Brown SAND, we	et, compact, SP			
6				9			•			
				9						
7_				8		-				
0						-				
°_						-				
9										
-										
10										
11	S-4	24/24	10 to 12	WH		Brown medium t	o fine SAND, w	et, loose, SP		
·''-				3		-				
12				4						
-						End of boring at	12 feet, no refu	ısal		
13						-				
14										
··-						-				
15										
						-				
16_										
17						1				
l -]				
18						4				
10						4				
19						1				
20]				
21						4				
22						1				
~~						1				
						1				
Granula	r Soils	Cohesiv	ve Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ontent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487	Bodrock Istati	LL = Liquid Limit	, PI = Plastic Index		Dry: $S = 0\%$
0-4 5-10	V. LOOSE	<2 2-4	v. sott Soft	< 5%	Frace	$\frac{\text{Deurock Joints}}{\text{Shallow} = 0 to 35}$	dearees			$\pi umia: S = 1 to 25\%$ Damp: S = 26 to 50%
11-30	Compact	2-4 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51 \text{ to } 75\%$
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	legrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
						Gravel = < 3 inch a	and > No 4, Sand	$i = \langle No \ 4 and \rangle No \ 200$, Silt	/Clay = < No 200	l

	SUMMIX GEOENGINEERING SERVICES					S	OIL BORI	NG LOG	Boring #:	B-25
		SIINA	MAN			Project:	NNEPRA Amtra	k Layover Facility	Project #:	13057
		GEOENGINEED	NG SERVICES			Location:	Church Road		Sheet:	1 of 1
		GEGENGINEERI	NO SERVICES			City, State:	Brunswick, Mai	ne	Chkd by:	CWC
Drilling (:0:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation:		84 ft +/-		
Driller:	Stoff.	C. Coolidge, P.	.E.			Reference:	4/24/2012	Estimated from siteplan to	opography 4/24/2012	
			.E.			Date started:	4/24/2013			
Vehicle [.]	ILLING	PowerProbe	Lenath [.]	24" SS		Date	Depth	Flevation	Re Re	ference
Model:		9500 VTR	Diameter:	2"OD/1.5"	ID	4/24/2013	4.2	80 ft +/-	In borehole at comp	letion
Method:		3.5" Casing	Hammer:	140 lb					·	
Hammer	Style:	Auto Drop	Method:	ASTM D15	i86					
Depth							SAMPL	E	Geological/	Geological
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIP	TION	Test Data	Stratum
1	S-1	24/18	0 to 2	1		Dark brown Silty	SAND, trace ro	otlets and organics,		TOPSOIL
'-				2		Brown medium to	e, Sivi o fine SAND tr:	ace Silt, humid		
2				2		loose, SP				MARINE DELTA
-	S-2	24/8	2 to 4	4						
3				4						
				5						
4_				6						
5						1				
	S-3	24/18	5 to 7	4		Brown medium to	o coarse SAND.	wet, compact, SP		
6				6						
-				6						
7				5						
						-				
8_						-				
9						-				
-										
10										
	S-4	24/24	10 to 12	2		Brown medium to	o coarse SAND,	wet, loose to		
11				3		compact, SP				
12				6						
				-		End of boring at	12 feet, no refu	ısal		
13										
14						-				
14_						-				
15						-				
-										
16						-				
17						4				
· · / -						1				
18						1				
19						4				
20						-				
20						1				
21]				
						4				
22						4				
						1				
Granula	n Soils	Cohesiv	ve Soils	% Comn	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	Intent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5% 1	Frace	Shallow = 0 to 35 of	degrees			Damp: S = 26 to 50%
11-30	Compact	5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: $S = 51$ to 75%
31-50	V Dense	9-15	Stiff V Stiff	15-30%	Some With	Steep = 55 to 90 d	legrees			Wet: $S = 76 \text{ to } 99\%$
>50 V. Dense 16-30 V. Stiff > 30% With					VVILII	Boulders = diameter	er > 12 inches. C	obbles = diameter < 12 inche	es and > 3 inches	Saturateu. $S = 100\%$
>30 Hard						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 BORING LOG			Boring #:	B-26
SILMANIT			Project: NNEPRA Amtrak Layover Facility			Project #:	13057			
		Location: Church Road			Sheet:	1 of 1				
		GEOENGINEERI	NG SERVICES			City, State: Brunswick, Maine			Chkd by:	CWC
Drilling	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								
DI	RILLING	METHOD	Si	AMPLER			I	ESTIMATED GROUND W	ATER DEPTH	
Vehicle:	Vehicle: PowerProbe Length: 24" SS		Date	Depth	Elevation	Re	ference			
Model:	Model: 9500 VTR Diameter: 2"0D/1.5"ID		4/25/2013	6.7	81 ft +/-	Groundwater well m	easurement			
Method:		3.5" Casing	Hammer:	140 lb		4/26/2013	6.8	81 ft +/-	Groundwater well measurement	
Hammei	r Style:	Auto Drop	Method:	ASTM D15	686			_	O sala si sal (O e e la reie e l
Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀	-	DESCRIP	E FION	Test Data	Stratum
	S-1	24/24	0 to 2	1		Dark brown Silty	SAND, trace ro	otlets and coal ash,		FILL
1				1		humid, very loos	humid, very loose, SM			
-				3						
2				3						MARINE DELTA
	S-2	24/18	2 to 4	3		Brown SAND, hu	mid, compact, s	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, da	mp to moist, co	mpact, SP		
6				9		-				
_				8						
/	6.4	24/24	7.1.0	9		Mottling at 6.5'	CAND		0	
0	5-4	24/24	7 to 9	/		Brown mealum t	o coarse SAND,	wet, compact, SP	Gravel = 2.0%	
8_				/		-			Sand = 96.5%	
0				3					MC = 17.7%	
				4		-			WIC - 17.776	
10										
10	S-5	24/24	10 to 12	1		Brown medium t	o coarse SAND	wet compact SP		
11	5.5	27/27	10 10 12	2		brown mealain t		wer, compact, or		
				4						
12				3						
-						-				
13						-				
-										
14						[
-										
15										
	S-6	24/24	15 to 17	WH		Olive brown SIL	Γ, little Sand an	d Clay, wet, soft, ML	Sand = 9.0%	
16				WH		_			Silt = 77.2%	
1				1		4			Clay = 13.8%	
17				1		Factor (1)	17.6	and the second	MC = 26.5%	
10						End of boring at	17 feet, no refu	ISBI		
18	+					4				
10	<u> </u>					-				
19	+					1				
20	-					1				
20										
21						1				
						-				
22				1		1				
-	1			1	İ	1				
L										
Granul	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: $S = 1$ to 25%
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compac	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	5 degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 c	degrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
		>30	Hard			Boulders = diameter	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
						Gravel = $<$ 3 inch and $>$ No 4, Sand = $<$ No 4 and $>$ No 200, Silt/Clay = $<$ No 200				

						SOIL BORING LOG			Boring #:	B-27
SILMANIT			Project: NNEPRA Amtrak Layover Facility			Project #:	13057			
			Location: Church Road			Sheet:	1 of 1			
		GEOENGINEERI	NG SERVICES			City, State: Brunswick, Maine			Chkd by:	CWC
Drilling (Co:	Summit Geoer	ngineering Ser	vices, 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	
DR	RILLING	METHOD	S/	AMPLER				ESTIMATED GROUND W	ATER DEPTH	
Vehicle: PowerProbe Length: 24" SS		Date	Depth	Elevation	Re	ference				
Model:		9500 VTR	Diameter:	2"0D/1.5"	ID	4/24/2013	7.4	80 ft +/-	In borehole at comp	letion
Nethod:	Ctulor	3.5" Casing	Hammer:		04					
Hammer	Style:	Auto Drop	Method:	ASTIVI DTS	080		CAMDI	r	Coological/	Coological
Depth (ft)	No	Don/Doc (in)	Dopth (ft)	blows/4"	N	-	DESCRIPT		Geological/	Stratum
(11.)	NU.		Deptil (It)	1	1460	Diank Canaly CILT	DESCRIP		Test Data	Silatum
1	3-1	24/24	0 10 2	1 2		black Salluy SILI		ai ash, liace fooliets,		EU 1
'-				2		numiu, very sort,	IVIL			FILL
2				1		Brown medium t	o fine SAND hi	imid verv loose SP		
	S-2	24/24	2 to 4	2		Di otti i noti di di i i				MARINE DELTA
3				2						
-				2		1				
4				3]				
]				
5						1				
	S-3	24/24	5 to 7	5		Brown SAND, hu	mid, compact, S	SP		
6				6						
_				6		-				
/				6						
						-				
°_						-				
9										
						-				
10										
	S-4	24/24	10 to 12	1		Brown medium t	o fine SAND, w	et, very loose, SP		
11				2						
_				2						
12				2						
						End of boring at	12 feet, no refu	usal		
13						-				
						-				
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15						-				
15						-				
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						4				
20						-				
- 21						4				
21-	<u> </u>					1				
22						1				
	<u> </u>					1				
1				1		1				
Granula	ar Soils	Cohesiv	e Soils	% Comp	osition	NOTES:	PP = Pocket Pen	etrometer, MC = Moisture Co	ntent	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index		Dry: S = 0%
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: S = 1 to 25%
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	egrees			Wet: S = 76 to 99%
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%
1		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches	
						Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200				

						SOIL BORING LOG			Boring #:	B-28	
SIIMANIT			Project: NNEPRA Amtrak Layover Facility			Project #:	13057				
GEOENGINEERING SERVICES			Location: Church Road			Sheet:	1 of 1				
		GEGENGINEERI	NO SERVICES			City, State: Brunswick, Maine C			Chkd by:	CWC	
Drilling (Co:	Summit Geoer	ngineering Ser	vices, Inc.		Boring Elevation: 89 ft +/-					
Driller: C. Coolidge, P.E.			Reference: Estimated from siteplan topography								
Summit	Statt:	B. Haiss, E.I.				Date started:	4/25/2013		4/25/2013		
Vohiclor	TLLING	PoworProbo	Jonath:			Dato	Dopth	ESTIMATED GROUND W		foronco	
Model: 9500 VTR Diameter: 2"OD/1 5"ID		4/25/2013	9.4	80 ft +/-	In borehole at comp	letion					
Method:		3.5" Casing	Hammer:	140 lb		1/20/2010	7.1	001117			
Hammer	Style:	Auto Drop	Method:	ASTM D15	586						
Depth			8				SAMPL	E	Geological/	Geological	
(ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		DESCRIPT	TION	Test Data	Stratum	
	S-1	24/18	0 to 2	1		Dark brown Silty	SAND, trace ro	otlets and coal ash,			
1				2		humid, very loos	e, SM			FILL	
				2							
2				2		Brown medium t	o fine SAND, hu	umid, loose, SP			
	S-2	24/22	2 to 4	2		-				MARINE DELTA	
3_				4		-					
4				6		-					
				0		-					
5											
	S-3	24/16	5 to 7	3		Brown SAND, da	mp to moist, lo	ose, SP			
6				2							
				2		-					
7_				2		-					
						-					
8_						-					
0											
7_						-					
10											
	S-4	24/24	10 to 12	WH		Brown medium t	o fine SAND, w	et, loose, SP			
11				1		grading to olive I	brown Sandy SI	LT, trace Clay, wet,			
				4		firm, ML					
12				4							
						End of boring at	12 feet, no refu	ısal			
13						-					
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						4					
Granula	ar Soils	Cohesin	re Soils	% Comp	osition	NOTES	PP = Pockat Pon	etrometer MC – Moisturo Co	I ntent	Soil Moisture Condition	
Blows/ft	Densitv	Blows/ft.	Consistency	ASTM D	2487		LL = Liquid Limit	, PI = Plastic Index	mont	Drv: $S = 0\%$	
0-4	V. Loose	<2	V. soft			Bedrock Joints				Humid: $S = 1$ to 25%	
5-10	Loose	2-4	Soft	< 5%	Frace	Shallow = 0 to 35	degrees			Damp: S = 26 to 50%	
11-30	Compact	t 5-8	Firm	5-15%	Little	Dipping = 35 to 55	degrees			Moist: S = 51 to 75%	
31-50	Dense	9-15	Stiff	15-30%	Some	Steep = 55 to 90 d	egrees			Wet: S = 76 to 99%	
>50	V. Dense	16-30	V. Stiff	> 30%	With					Saturated: S = 100%	
		>30	Hard			Boulders = diamete	er > 12 inches, C	obbles = diameter < 12 inche	es and > 3 inches		
						Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200					



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Soil Behavior Type



	\sim		PIEZO	CONE PEN	ETRATION LOG	Test Number:	CPT-B9
	SILVUN		Project: Amtrak Layover Facility			Project Number:	13057
<u> </u>			Location:	Lombard Stre	eet	Method:	ASTM D5778
GE	OENGINEERING SERVICES			Brunswick, N	laine	Weather:	Sunny, 45* F
Cone ID:	Vertek #4644.108xx		Test Elevation:		80 ft +/-		
Cone Type:	VTK 10 Ton Digital Cone		Reference:	Es	timated from siteplan top	ography	
Piezocone:	Silicone Single Filter		Date started:	4/26/2013	Date Completed:	4/26/2013	
Push Ria:	AMS Power Probe 9500 \	VTR			ESTIMATED GROUND	NATER DEPTH	
Anchor Style:	Single Point Hollow Stem	Anchor	Date	Depth	Elevation	Re	ference
Performed By:	Craig Coolidge, P.E.		4/26/2013	3.9 ft	76 ft +/-	Cone borehole groundwater depth	
	<u> </u>						
	Tip Stress	Sleeve	Stress	Ratio	Pore Pressure	SBT _N	Shear Wave
	q _c (psi)	f _s (j	osi)	R _f (%)	u ₂ (psi)	F,	V _s
0	1000 2000	0 10 20	30 40 50	048	0 100 200	0246810	400 1200
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NOTES:							
Soil Behav	vior Type (SBT _N) based on N	Normalized Friction	on Ratio (F _r) per	Robertson 199	0		
Shear Wa	ve Velocity test (V _s) perfor	med at 3.3 feet (1	L-meter) increm	ents			

Anchor failure end of push encountered at depth of 76 feet
			PIEZOC	CONE PEN	ETRATION LOG	Test Number:	CPT-B12
	CIINANANT		Project:	Amtrak Layo	ver Facility	Project Number:	13057
2	SOIVIIVIII		Location:	Lombard Stre	eet	Method:	ASTM D5778
GEC	ENGINEERING SERVICES			Brunswick, N	laine	Weather:	Sunny, 45* F
Cone ID:	Vertek #4644.108xx		Test Elevation:		82 ft +/-		
Cone Type:	VTK 10 Ton Digital Cone		Reference:	E۶	stimated from siteplan topr	ograph	
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		VATER DEPTH	
Anchor Style:	Single Point Hollow Sterr	Anchor	Date	Depth	Elevation	Re	ference
Performed By:	Craig Coolidge, P.E.	-	4/26/2013	3.8 ft	78 ft +/-	Cone borehole grou	undwater depth
	Tip Stress	Sleeve \$	Stress	Ratio	Pore Pressure	SBT _N	Shear Wave
0 5 10	q _c (psi) 1000 2000	f _s (p 0 10 5 10) Si) 20 30	R _f (%) 0 4 8 5	u ₂ (psi) 0 100 200 5	F _r 0 2 4 6 8 10 5 10	V _s 200 1000 5

	q _c (psi)	f _s (psi)	R _f (%)	u ₂ (psi)	Fr	V _s
(0 1000 2000	0 10 20 30	048	0 100 200	0246810	200 1000
5		5	5	5	5	5
10	E S	10	10	10	10	10
15	No.	15	15	15	15	15
20	5	20	20	20	20	20
25	- Second Second	25	25	25	25	25
30		30	30	30	30	30
35		35	35	35	35	35
40	Ę	40	40	40	40	40
45		45	45	45	45	45
6 bth (ft	F	50	50	50	50	50
D 55		55	55	55	55	55
60	and a second	60	60	60	60	60
65	F	65	65	65	65	65
70		70	70	70	70	70
75		75	75	75	75	75
80		80	80	80	80	80
85		85	85	85	85	85
90		90	90	90	90	90
95		95	95	95	95	95
NOTES: Soil Beh Shear V Anchor	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					

	\sim			PIEZO	оос	NE PEN	ETR/	ATION LOG	Test	Number:	CF	PT-B19
	SUMM	M		Project:		ntrak Layo	ver Fac	cility	Proje	ect Number:	۵۵'	13057 IM D5778
G	EOENGINEERING S	SERVICES		Location.	Br	unswick, N	laine		Wea	ther:	Over	cast, 55* F
Cone ID:	Vertek #4644.7	108xx		Test Elevation	n:			83 ft +/-				
Cone Type:	VTK 10 Ton Dig	gital Cone		Reference:		Es	timated	d from siteplan topo	graphy			
Piezocone:	Silicone Single	Filter	D.	Date started:		4/25/2013	Date	e Completed:				
Anchor Style:	Single Point Ho	ble 9500 VI	R Anchor	Date		Depth	ESTI	Elevation		Re	ference	
Performed By	: Craig Coolidge,	, P.E.		4/25/2013	3	3.9 ft		79 ft +/-	Cone	e borehole grou	Indwater	depth
	Tip Stress		Sleeve	Stress	1	Ratio	Ро	ore Pressure		SBT _N	Shea	ar Wave
0	q_c (psi) 1000	2000	f _s (r	osi) 15 20 25	5	R_f (%) 0 2 4 6	C 5	u ₂ (psi)) 25 50 75	0	F _r 2 4 6 8 10	400	V _s 600 800
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NOTES: Soil Beha Shear Wa Anchor fa	avior Type (SBT _N) b ave Velocity test (ailure end of push	based on No V _s) perform nencountere	rmalized Fricti ed at 3.3 feet (ed at depth of 4	on Ratio (F _r) pe L-meter) incre 19 feet	er Rob ments	ertson 199 ;	0					

			PIEZO	CON	E PEN	ETR	ATION LOG	Test	Number:	C	PT-B20
	SILVU VILLE		Project:	Amt	rak Layov	ver Fa	cility	Proje	ect Number:		13057
	SUIVIIVIII		Location:	Lom	bard Stre	et		Meth	nod:	A	STM D5778
6	EOENGINEERING SERVICES			Brur	nswick, M	aine		Wea	ither:	Ov	ercast, 55* F
Cone ID:	Vertek #4644.108xx		Test Elevation:				84 ft +/-				
Cone Type:	VTK 10 Ton Digital Cone	· · · · · · · · · · · · · · · · · · ·	Reference:		Survey	locate	ed by TKM Land Sur	veyors,	Inc.		
Piezocone:	Silicone Single Filter		Date started:	4/	/25/2013	Dat	e Completed:		4/25/2013		
Push Rig:	AMS Power Probe 9500 Y	VTR				EST	IMATED GROUND V	ATER I	DEPTH		
Anchor Style:	: Single Point Hollow Sterr	n Anchor	Date		Depth		Elevation		Re	ference	
Performed By	y: Craig Coolidge, P.E.		4/25/2013		3.9 ft		80 ft +/-	Cone	e borehole grou	Indwate	r depth
	Tip Stress	Sleeve	Stress	Ra	ntio	Po	ore Pressure		SBT _N	Sh	ear Wave
	q, (psi)	f. (psi)	F	R₄ (%)		u, (psi)		F,		v
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NOTES											
Soil Bob	avior Type (SBT) based on I	Normalized Fricti	on Patio (E) por	Pohor	tcon 100	n					
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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



WENNER 4 PIN RESISTIVITY FIELD REPORT

Date:	4/26/2013							
Project:	Subgrade Resistivi	Subgrade Resistivity Testing - Amtrak Layover Facility						
Project #:	13057	13057						
Summit Personnel:	Craig Coolidge, P.I	E Senior Geotech	nnical Engineer					
Site Location:	Amtrak Layover Fa	acility - Lombard S	Street Brunswick, Ma	ine				
Work Activities:	Performed Wenner center. Test was a	• 4-Pin resistivity to ligned and perform	esting within propose ed east to west.	d building footpri	nt. Test performed w	ithin building		
Test Procedure:	Resistivity testing spacing ranged fro Resistivity values	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 o Resistivity (p) in o	hm-cm = $2*\pi*a*R$ hm-cm = $191.5*a*$	k (a=electrode spacing	g in cm, R=resistat ing in ft, R=resista	nce in ohms) nce in ohms)			
Test Results:	Wenner 4 Pin	Resistivity Te	st					
	Material	Spacing			Resistivity			
		(feet)	Dial	Reading	(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	1.0	94 800			
	Sand	50	10	1.1	105 300			
	Sand-Silt	55	10	7.0	73 700			
	Gravel-Sand	60	10	1.0	160,900			
	Sand-Silt	65	1	6.0	74 700			
	Silt-Clay	70	1	3.0	4,700			
	Silt-Clay	70	1	2.5	35,900			
	Sand	80	1	2.5	107 200			
	Sand	85	1	6.5	105,800			
	Sand	90	1	7.5	129 300			
	Gravel Sand	90 05	1	7.5	163 700			
	Gravel-Sand	100	1	9.0 10.0	191 500			
	Gruver-Build	100		10.0	171,500			
				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.



Client Name:		Project No.
Consigli Construction Co	mpany, Inc.	13057
Photo No. 1		
Date: 4-22-2013		
Site Location:		
Amtrak Layover Facility Brunswick, Maine		
Description:		

Photograph of site facing west.





Date: 4-22-2013

Site Location:

Amtrak Layover Facility Brunswick, Maine

Description:

Photograph of site facing east.





Client Name:

Consigli Construction Company, Inc.

Photo No. 3

Date: 4-25-2013

Site Location:

Amtrak Layover Facility Brunswick, Maine

Description:

Photograph of site facing west.



Project No.

13057

Photo No. 4

Date: 4-25-2013

Site Location:

Amtrak Layover Facility Brunswick, Maine

Description:

Photograph of site facing east.





Client Name:

Project No. 13057

Consigli Construction Company, Inc.

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.





Client Name:

Project No.

13057

Consigli Construction Company, Inc.

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.





Client Name:

Photo No. 9

Consigli Construction Company, Inc.

Project No.

13057



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.







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



APPENDIX C LABORATORY RESULTS



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	_	

PARTICLI	E SIZE mm	<u>% BY WT FINER</u>
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



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



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	E SIZE mm	<u>% BY WT FINER</u>
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



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	E 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





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



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		<u>% BY WT FINER</u>
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



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



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



PROJECT NAME:	Amtrak Layover Facility - Brur	nswick, ME	PROJECT #:	14381 / 13057
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	<u>% BY WT FI</u>	<u>NER</u>	

PARTICL	E SIZE mm	<u>% BY WT FINER</u>
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



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, MI	PROJECT #:	14381 / 13057
CLIENT:	Summit Geoengineering	SAMPLE #:	
PROCEDURE:	А	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



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
PARTICL	<u>E SIZE mm</u>	% 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







Amtrak Layover	PROJECT #:	14381 / 13057
Summit Geoengineering Services	SAMPLE #:	S5
Silty Sand	DATE:	5/1/13
Investigation	SOURCE:	B18, 15'-17'
	Amtrak Layover Summit Geoengineering Services Silty Sand Investigation	Amtrak LayoverPROJECT #:Summit Geoengineering ServicesSAMPLE #:Silty SandDATE:InvestigationSOURCE:

		DATA
PARTICL	E 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







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
PARTICL	E 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





Moisture Content 22.7%



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	E 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



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	E 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



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
PARTICL	<u>E SIZE mm</u>	% 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



