SUMMIT
GEOENGINEERING SERVICES

Geotechnical Report

cPort Credit Union
285 Forest Avenue
Portland, Maine

Prepared for:

Northeast Civil Solutions
Scarborough, Maine

Prepared by:

Summit Geoengineering Services
Project #11204
September 2011

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

SUMMIT
GEOENGINEERING SERVICES

October 3, 2011
SGS #11204

Lee Allen
Northeast Civil Solutions, Inc.
153 US Route 1
Scarborough, ME 04074

Reference: Geotechnical Investigation, Proposed cPort Credit Union
285 Forest Ave, Portland, Maine

Dear Lee:

Summit Geoengineering Services (SGS) has completed the geotechnical investigation for the proposed new building at the above referenced site. Our scope of services included coordinating and observing the excavation of 4 test pits at the site at the proposed building corners and preparing this letter summarizing our findings and geotechnical recommendations.

1.0 Project and Site

The project consists of the construction of a new building with a footprint of approximately 3,600 square feet. Ancillary to the building will be the construction of a parking lot and drive thru. The proposed building will be at or near the existing ground surface. The proposed construction is steel framing on a conventional spread footing foundation.

The site is the location of an existing restaurant. The majority of the site is pavement or existing building. A small landscaped area is located on the south side of the existing building. The site is relatively flat. We understand that the existing building will be demolished.

2.0 Subsurface Exploration and Laboratory Testing

The subsurface conditions were explored by excavating 4 test pits at the site on September 16, 2011. The test pits were excavated to a depth of 9 feet by Chase Excavation under contract to SGS. The location of the test pits (premarked by others) are shown on the Test Pit Location Plan in Appendix A. SGS was at the site to coordinate and log the test pits and collect the samples. Logs of the borings are included in Appendix A.

A sample of soil taken at a depth of 6 to 8 inches in TP-2 was tested for grain size analysis in accordance with ASTM D422. The results of this test are presented in Appendix C.

3.0 Subsurface Conditions

The soil at the site consisted of topsoil (TP-1) or pavement (TP-2,3,and 4) overlying fill overlying a native silty glacial marine deposit.

The pavement was 2-1/2 inches thick.

The fill varied from brown gravelly sand to silt mixed with coal ash, brick fragments, and cobbles and boulders. A more detailed description is presented in the table below. The fill was generally loose to compact.

FILL THICKNESS AND DESCRIPTION		
TP	**Depth (ft)**	**Fill Description**
TP-1	3.1	Silty sand mixed with coal ash & clinker
TP-2	5.5	Gravelly sand (2 ft), over sandy silt mixed with ash
TP-3	7.0	Gravelly sand (1.5 ft), over silty sand (2 ft), over reworked silt, sand, clay mix
TP-4	6.5	Gravelly sand (1.5 ft), over silt mixed with ash, bricks, few cobbles

The native glacial marine soil varied from compact to firm brown silty sand/sandy silt to stiff olive-brown clayey silt. More detailed descriptions are presented on the test pit logs.

Groundwater was not observed in the test pits and bedrock was not encountered.

4.0 Foundation Recommendations

A. Allowable Bearing Pressures

Based on the proposed finished floor elevation and, interior spread footings (if any) will be constructed on the existing fill soil. Based on the required frost protection depth, exterior footings will be constructed on the existing fill (TP-3 and TP-4) or the native glacial marine soil (TP-1 and TP-2). With proper preparation, these soils are suitable for supporting the anticipated footing loads. We recommend that the following allowable bearing pressures be used for proportioning footings at this site.

ALLOWABLE BEARING PRESSURES	
Subgrade Condition	**Allowable Bearing Pressure (psf)**
Existing Proofrolled/Improved Fill	3,000 psf
Native silty glacial marine soil	4,000 psf

The above bearing pressures are based on the following:

- All topsoil (landscaped area) and pavement is removed from within the building area prior to proof-rolling or the placement of fill.

- The existing fill at the footing subgrade is proofrolled using a minimum of 5 passes with a large walk behind vibratory roller. Soft, unstable areas and unsuitable organic materials (if encountered) are removed and replaced with Structural Fill.

- Structural fill beneath the slab is compacted to a minimum of 95% of ASTM D1557.

The column loads were not available for this report. Based on a typical column load and spacing for this type of building, we estimate that the total settlement for the above conditions will be less than 3/4 inch. Differential settlement will be negligible.

B. Frost Protection

The minimum recommended footing depth for frost protection of exterior foundation elements is 4 feet for footings constructed at this site. This is based on a design air freezing index of 1,200 degree days for the Portland, Maine area.

In order to protect foundations from the potentially damaging effects of frost heave, we recommend that the foundation walls be backfilled with Foundation Backfill. Foundation backfill shall have less than 7% of material by weight passing a #200 sieve. The maximum particle size should be 4 inches for Foundation Backfill placed directly adjacent to foundation walls. Foundation Backfill should be compacted to a minimum of 90 percent of its maximum dry density determined in accordance with ASTM D1557, Modified Proctor Density, unless the backfill is placed in a paved area. For backfill against walls beneath paved areas, the compaction requirement should be increased to 95 percent.

C. Seismic Design

The depth to refusal was not determined in the explorations, therefore a numerical analysis to determine the soil Site Class for seismic design purposes could not be performed. Based on the condition of the soils encountered in the test pits, it is our opinion that the soil at this site can be considered Site Class D, stiff soil profile. Based on this, the following site seismic design parameters can be used.

SITE SEISMIC DESIGN COEFFICIENTS - IBC	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.314
1 second spectral response (S_1)	0.077
Site coefficient (F_a)	1.55
Site Coefficient (F_v)	2.4
Design short period spectral response (S_{DS})	0.324
Design 1 second spectral response (S_{D1})	0.123

Soils susceptible to liquefaction during seismic events were not encountered within the explorations.

D. Slabs-on-Grade

We recommend that topsoil and pavement pavement in the proposed building area be removed and the existing subgrade soil prepared as follows.

- Proof-roll the existing slab subgrade soil by making a minimum of three passes in each of two perpendicular directions using a roller with a minimum operating weight of 10 tons.

- Place a minimum of 8 inches of Structural Fill on the proofrolled subgrade soil. Structural Fill should be compacted to 95% of its maximum dry density in accordance with ASTM D1557. Structural Fill should meet the following gradations requirements.

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

Reference: MDOT Specification 703.06, Type F

For the above conditions, slabs can be designed using a subgrade modulus value of 150 pci.

E. Groundwater Considerations

Groundwater was not observed the test pits. Based on this, foundation underdrains are not strictly necessary for footings constructed at this site. We recommend exterior grades slope away from the building footprint to reduce runoff water from infiltrating the Foundation Backfill. We recommend that roof runoff be prevented from entering the Foundation Backfill zone.

It is generally good practice to install perimeter underdrains to account for unanticipated changes in hydrogeologic conditions at the site and regionally and to protect foundations from surface water entering the foundation backfill. Perimeter underdrains, if used, 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.

F. Pavement Section Recommendations

We anticipate the subgrade for the pavement subbase soil will consist of existing fill soil. The upper layer of the fill soil is generally good quality gravel (exception TP-2, see grain size test results in Appendix C). This gravel should be stockpiled and reused. The mean annual freezing index for the Portland area is estimated at 850 degree days with an associated mean annual frost penetration depth of 30 inches.

Based on the above, we recommend a minimum total pavement section thickness of 60% of the mean annual frost penetration depth or 18 inches. We further recommend that the pavement section consist of the following materials:

PAVEMENT SECTION RECOMMENDATIONS		
MATERIAL	**THICKNESS (in)**	**SPECIFICATION**
Asphalt Surface Course	1	MDOT Superpave
Asphalt Binder Course	2	MDOT Superpave
Base Soil	3	MDOT 703.06 Type A
Subbase Soil	12	MDOT 703.06 Type D

We recommend that the existing soil beneath the Subbase soil be proofrolled as described in Section 4.0D above.

Underdrains are not necessary at this site below the pavement areas.

G. Light Pole Bases

We recommend that the following parameters be used to design light pole bases.

LIGHT POLE BASE SOIL DESIGN PARAMETERS		
Parameter	**Existing Granular Fill**	**Foundation Backfill**
Total Natural Unit Weight	120 pcf	125 pcf [1]
Friction Coefficient	0.40	0.45
Passive Earth Pressure Coefficient	3.00	3.25
Active Earth Pressure Coefficient	0.33	0.31
Friction Angle	30^0	32^0 [1]
Cohesion	0	0
Uplift Lateral Earth Pressure Coefficient	0.8	0.9
Allowable Bearing Pressure	3,000 psf	NA

[1] Compacted to 95% of ASTM D1557

Light pole bases should be constructed at the minimum frost protection depth of 4 feet. We recommend that light pole bases be backfilled with Foundation Backfill as specified in Section 4.0B above.

5.0 Construction Considerations

Earthwork construction at this site should be straight forward. Some unsuitable materials may be encountered in the fill at the site. These materials should be removed and replaced within the proposed building footprint.

The upper layer of existing fill soil may meet the requirements for the materials specified in this report. We recommend that grain size analyses be performed on representative samples prior to its use to confirm conformance to the Project specifications.

We recommend that the banks of dry open cuts deeper than 4 feet in the existing fill soil be sloped at a maximum of 1.5H:1V. Slopes in the glacial marine soil can be sloped up to a maximum of 1H:1V. If an excavation extends below the groundwater table, the slope should be reduced to 1.5H:1V. These recommended slopes are based on the current OSHA guidelines.

6.0 Closure

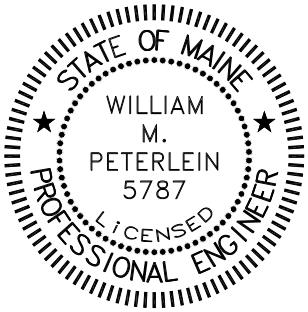
Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering and general project information provided by others. Some changes in subsurface conditions from those presented in this report may occur.

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.

Thank you for this opportunity to provide these preliminary recommendations. If there are any questions, please do not hesitate to call.

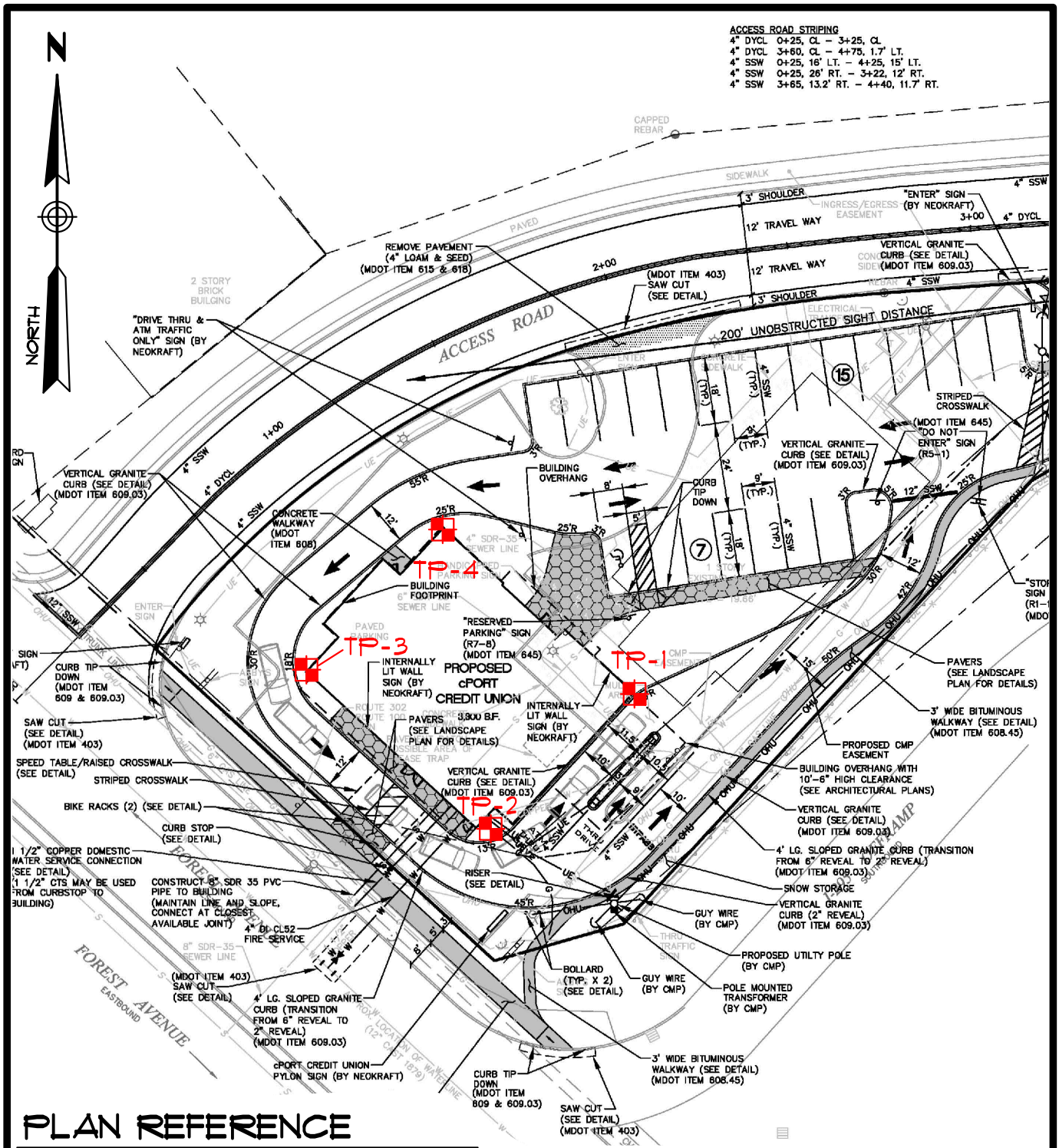
Sincerely yours,
Summit Geoengineering Services, Inc.

William M. Peterlein
President & Principal Engineer



APPENDIX A

TEST PIT LOCATION PLAN



PLAN REFERENCE

"SITE PLAN - cPORT CREDIT UNION" PREPARED BY NORTHEAST CIVIL SOLUTIONS.

LEGEND

TP-4 SUMMIT TEST PIT (9-16-11)

TEST PIT LOCATION PLAN
cPORT CREDIT UNION

FOREST AVENUE - PORTLAND, MAINE

PREPARED FOR

NORTHEAST CIVIL SOLUTIONS

DATE: SEPT. 2011	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 11204	SCALE: 1" = 40'	FILE: 11204 TP

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APPENDIX B

EXPLORATION LOGS

EXPLORATION REPORT COVER SHEET

The exploration report has been prepared by the geotechnical engineer from both field and laboratory data. Differences between field logs and exploration reports may exist.

It is common practice in the soil and foundation engineering profession that field logs and laboratory data sheets not be included in engineering reports, because they do no represent the engineer's final opinion as to appropriate descriptions for conditions encountered in the exploration and testing work. The field logs will be retained in our office for review. Results of laboratory tests are generally shown on the borings logs or are described in the text of the report as appropriate.

Drilling and Sampling Symbols:

SS = Split Spoon
ST = Shelby Tube – 2" OD, disturbed
UT = Shelby Tube – 3" OD, undisturbed
HSA = Hollow Stem Auger
CS = Casing – size as noted
Sv = Vane Shear
PP = Pocket Penetrometer
RX = Rock Core – size as noted
Hyd = Hydraulic advance of probes
WOH = Weight of Hammer
WOR = Weight of Rod
GS = Grain Size Data
PI = Plasticity Index
LL = Liquid Limit
w = Natural Water Content
USCS = unified Soil Classification System

Water Level Measurements:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations; additional evidence of groundwater elevations via observation or monitoring wells must be sought.

Gradation Description and Terminology:

Boulders:	Over 8 inches	Trace:	Less than 5%
Cobbles:	8 inches to 3 inches	Little:	5% to 15%
Gravel:	3 inches to No.4 sieve	Some:	15% to 25%
Sand:	No.4 to No. 200 sieve	Silty, Sandy, etc.:	Greater than 25%
Silt:	No. 200 sieve to 0.005 mm		
Clay:	less than 0.005 mm		

Density of Granular Soils and Consistency of Cohesive Soils:

CONSISTENCY OF COHESIVE SOILS		**DENSITY OF GRANULAR SOILS**	
SPT N-value blows/ft	**Consistency**	**SPT N-value blows/ft**	**Relative Density**
0 to 2	Very Soft	0 to 3	Very Loose
3 to 4	Soft	4 to 9	Loose
5 to 8	Firm	10 to 29	Compact
9 to 16	Stiff	30 to 49	Dense
17 to 32	Very Stiff	50 to 80	Very Dense
>32	Hard		

SUMMIT GEOENGINEERING SERVICES	TEST PIT LOG	Test Pit # TP-1
	Project: cPort Credit union 285 Forest Avenue Portland, Maine	Project #: 11204 Groundwater: None Observed
Contractor: Chase Excavation	Ground Surface Elevation:	
Equipment: Volvo EC160B	Reference:	
Summit Staff: B. Peterlein, P.E.	Date: 9/16/2011	Weather: Sunny

Depth (ft)	DESCRIPTION	
	ENGINEERING	**GEOLOGIC/GENERAL**
1	Dark brown Sandy SILT, trace rootlets and organics, moist, loose, ML	TOPSOIL
2	Brown Silty SAND, moist, loose, SM	FILL
3	Black to gray Sandy SILT mixed with coal ash and clinker, dry, loose, ML	
4		GLACIAL MARINE
5	Brown Silty SAND, moist, loose to compact, SM	
6	Becomes weakly cemented	
7	Olive-brown Sandy SILT, mottled, firm, damp, ML	
8		
9		
10	End of Test Pit at 9 ft	
11		
12		
13		
14		
15		
16		
17		

SUMMIT GEOENGINEERING SERVICES	TEST PIT LOG	Test Pit # TP-2
	Project: cPort Credit union 285 Forest Avenue Portland, Maine	Project #: 11204 Groundwater: None Observed
Contractor: Chase Excavation	Ground Surface Elevation:	
Equipment: Volvo EC160B	Reference:	
Summit Staff: B. Peterlein, P.E.	Date: 9/16/2011	Weather: Sunny

Depth (ft)	DESCRIPTION	
	ENGINEERING	**GEOLOGIC/GENERAL**
1	2-1/2" Pavement Brown Gravelly SAND, trace to little Silt, moist, compact, SM	FILL
2		
3	Dark brown Sandy SILT mixed with coal ash, moist, firm, ML	
4	Olive-brown Silty fine SAND, weakly cemented, moist, compact, SM	GLACIAL MARINE
5		
6	Olive-brown SILT, little very fine Sand, moist, firm, ML	
7		
8	Olive-gray Clayey SILT, trace fine Sand in seams, humid, firm to stiff, ML	
9		
10	End of Test Pit at 9 ft	
11		
12		
13		
14		
15		
16		
17		

SUMMIT GEOENGINEERING SERVICES	TEST PIT LOG	Test Pit # TP-3
	Project: cPort Credit union 285 Forest Avenue Portland, Maine	Project #: 11204 Groundwater: None Observed
Contractor: Chase Excavation	Ground Surface Elevation:	
Equipment: Volvo EC160B	Reference:	
Summit Staff: B. Peterlein, P.E.	Date: 9/16/2011	Weather: Sunny

Depth (ft)	DESCRIPTION	
	ENGINEERING	**GEOLOGIC/GENERAL**
1	2-1/2" Pavment Brown Gravelly SAND, trace to little Silt, moist, compact, SM	FILL
2		Concrete demo debris and small boulders
3	Brown Silty fine SAND, moist, loose to compact, SM	
4		1-1/2" metal pipe at 3 ft
5	Olive-brown fine SAND mixed with Silt, Clay, & Gravel, moist, compact, SM	
6		
7		
8	Olive-brown Clayey SILT, trace fine Sand, mottled, moist, stiff, ML	GLACIAL MARINE
9		
10	End of Test Pit at 9 ft	
11		
12		
13		
14		
15		
16		
17		

SUMMIT GEOENGINEERING SERVICES	TEST PIT LOG	Test Pit # TP-4
	Project: cPort Credit union 285 Forest Avenue Portland, Maine	Project #: 11204 Groundwater: None Observed
Contractor: Chase Excavation	Ground Surface Elevation:	
Equipment: Volvo EC160B	Reference:	
Summit Staff: B. Peterlein, P.E.	Date: 9/16/2011	Weather: Sunny

Depth (ft)	DESCRIPTION	
	ENGINEERING	**GEOLOGIC/GENERAL**
1	2-1/2" Pavement Brown Gravelly SAND, trace to little Silt, dry, compact, SM	FILL
2		
3	Dark gray SILT mixed with coal ash, brick fragments, few Cobbles and Boulders, moist, compact, ML	
4		
5		
6		
7		
8	Olive-brown fine Sandy SILT, little Clay, moist, firm, ML	GLACIAL MARINE
9		
10	End of Test Pit at 9 ft	
11		
12		
13		
14		
15		
16		
17		

APPENDIX C

LABORATORY TEST RESULTS

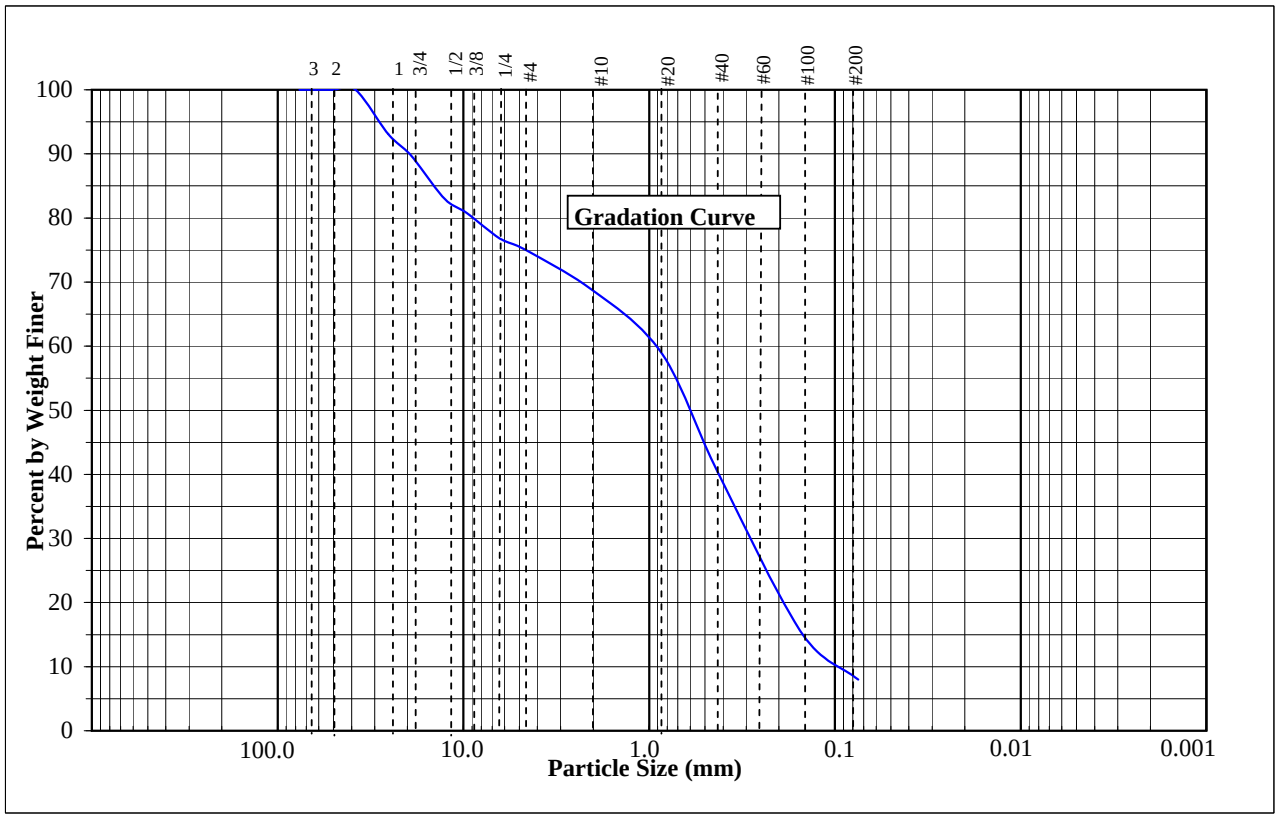
SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road, Augusta, Maine 04330
Phone:(207) 621-8334 Fax:(207) 626-9094

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT NAME:	2011 Laboratory Testing Services	PROJECT #:	14381 / 11204
CLIENT:	Summit Geoengineering Services	SUMMIT SAMPLE:	TP2
CLIENT SOIL DES:	cPort Credity Union, Portland	INTENDED USE:	Investigation
SOURCE:	TP-2; 6"-8"	SPECIFICATION:	
DATE:	September 22, 2011	TECHNICIAN:	K. Bennett

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)	93.1
19.05	(3/4 in)	89.7
12.70	(1/2 in)	83.1
9.53	(3/8 in)	80.7
6.35	(1/4 in)	76.8
4.75	(No. 4)	75.2
2.00	(No. 10)	68.6
0.85	(No. 20)	58.8
0.43	(No. 40)	40.2
0.15	(No. 100)	15.2
0.08	(No. 200)	8.0



REMARKS:

Reviewed: Darrell A. Gilman, CMT Manager
Date: 9/29/11