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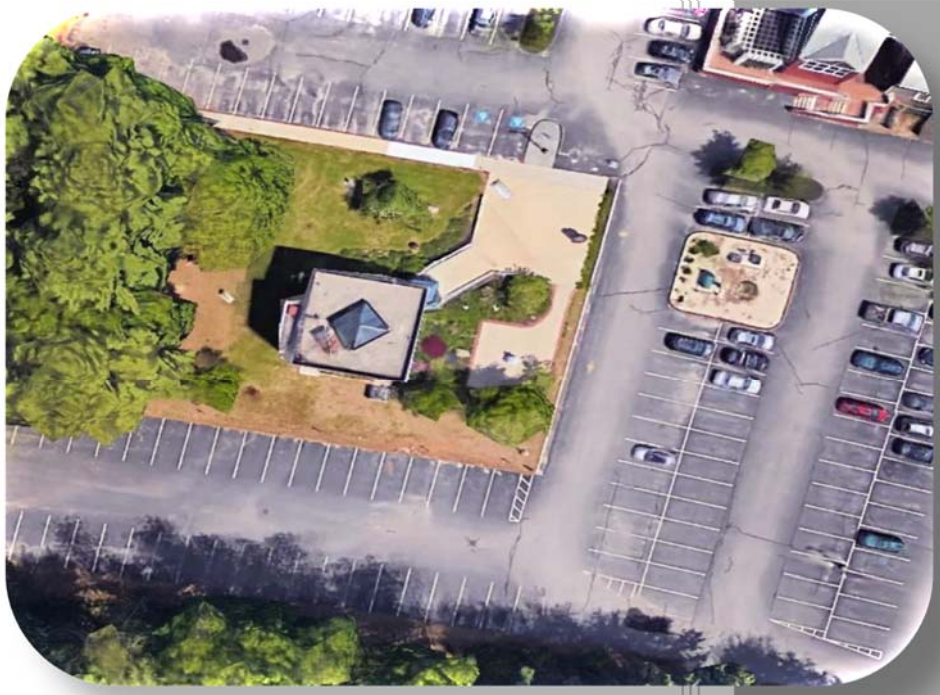
Geotechnical Report

Proposed Elevator Addition

UNE Art Gallery, Portland, Maine



Client

University of New England
11 Hills Beach Road
Biddeford, Maine

Project #: 17003
Date: 1/23/17

SUMMIT
GEOENGINEERING SERVICES

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January 23, 2017
Summit #17003

Al Thibeault
University of New England
11 Hills Beach Road
Biddeford, Maine 04005

Reference: Geotechnical Investigation, Art Gallery Addition
Stevens Avenue, Portland, Maine

Dear Al;

We have completed the geotechnical investigation for the proposed art gallery addition at the Portland Campus. Our scope of services included performing 1 test boring at the site and preparing this report summarizing our findings and geotechnical recommendations.

1.0 Project and Site Description

The project consists of the construction of an elevator addition to the art gallery building. The addition will be located on the north side of the building and will have a footprint of approximately 100 square feet. We anticipate that the slab of the elevator will be at a depth of approximately 4 feet below the existing grade. The exterior walls will be constructed of concrete.

2.0 Subsurface Exploration

Summit Geoengineering Services (SGS) observed the subsurface conditions with the drilling of 1 boring on January 16, 2017. The boring was located by taping from the existing building. East Coast Explorations, under contract to SGS, advanced the borings using 4-¼-inch hollow stem augers. The boring was drilled to a depth of 21 feet. Standard penetration tests (SPT) were performed and split spoon samples were obtained at 5-foot intervals.

Summit was on site to coordinate and observe the boring explorations. The location of the boring is shown on Boring Location Plan in Appendix A. A log of the boring is included in Appendix B.

3.0 Subsurface Conditions

The subsurface conditions generally consist of ***topsoil*** overlying a ***glacial marine deposit.***

The topsoil is 12 inches thick and is described as dark brown sandy silt with trace rootlets. The topsoil is loose and is visually classified as ML in accordance with the Unified Soil Classification System (USCS). The topsoil layer was frozen.

The glacial marine deposit varies from light brown silty fine sand to brown gravelly sand with a trace of silt and is visually classified as SM or SP in accordance with the Unified Soil Classification System (USCS). SPT-N values for the sand ranged from 16 to 53 blows per foot and averaged 32 blows per foot, indicating compact to very dense conditions. The glacial marine deposits were dry down to the bottom sample taken at a depth of 19 to 21 feet.

Neither groundwater nor bedrock were observed in our explorations.

4.0 Foundation Recommendations

The following recommendations apply to the design and construction of the proposed elevator addition foundation.

4.1 Allowable Bearing Pressure

Based on the existing exterior grade and the elevator pit slab depth, the foundation will be constructed on the brown silty fine sand soil. This soil is suitable to support the proposed building on conventional spread footing foundations.

We recommend that the foundations be designed using an allowable bearing pressure of 3,000 psf for interior and exterior isolated and continuous footings. For the proposed footing loads, the total settlement associated with the above bearing pressure will be less than ½".

We recommend that the building addition area be excavated using a smoothed edge bucket to minimize disturbance to the native soil. The footing subgrade should be proofrolled to re-densify the disturbed soil. Proofrolling should consist of making a minimum of 5 passes in each of two perpendicular directions using a large walk behind vibratory roller.

4.2 Frost Protection

The design air freezing index for the Portland area is approximately 1,200 degree F days (10 year, 90% probability). Based on this, exterior footings on the existing granular fill soil should be constructed at a minimum depth of 4 feet below the exterior finished grade. We anticipate that the required depth for the elevator pit will exceed this depth.

We recommend that the exterior of the foundation walls be backfilled with a granular soil having less than 6% by weight passing a #200 sieve

The maximum particle size should be limited to 6 inches. The Foundation Backfill should be compacted to a minimum of 90% percent of its maximum dry density, determined in accordance with ASTM D1557.

The existing native sand soil at the site is expected to meet the above criteria. We recommend that a sample be tested to confirm its conformance prior to its use.

4.3 Elevator Slab

We recommend that the elevator slab be constructed on a 6 inch thick layer of ¾ inch crushed stone placed directly on the proofrolled native sand soil. The intent of the crushed stone is to provide a uniform working surface and to "stiffen" any areas that become loose due to disturbance during construction.

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

We recommend the subgrade be proof-rolled as described in Section 4.1 of this report.

4.4 Seismic Design

Based on the soil conditions encountered and the blow counts obtained in the test borings, the soil at the site is classified as Seismic Site Class D in accordance with the ASCE 7-10 Code. We recommend the following seismic design coefficients be used:

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS – ASCE 7-10	
Seismic Coefficient	**Site Class D**
Short period spectral response (S_S)	0.244
1 second spectral response (S_1)	0.079
MCE_R short period spectral response (S_{MS})	0.390
MCE_R 1 second spectral response (S_{M1})	0.189
Design short period spectral response (S_{DS})	0.260
Design 1 second spectral response (S_{DS})	0.126

The sandy glacial marine are not susceptible to liquefaction based on their density.

4.5 Groundwater Control

Groundwater was not observed in the explorations performed at the site, drilled to a depth of 21 feet. Based on this, a perimeter foundation drain is not necessary for the elevator addition.

5.0 Earthwork Construction

Excavation for the building addition is expected to be relatively easy. No groundwater will be encountered. Occupied excavations in the native soil at the site should be sloped not steeper than 1.5H to 1V.

Where excavation for the addition extends below the existing building footings, we recommend that temporary shoring or other methods be implemented to prevent undermining of the existing soil from beneath the footing. Voids which occur beneath the existing footing should be backfilled with concrete to ensure that all voids are filled.

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 in consistence with this report.

6.0 Closure

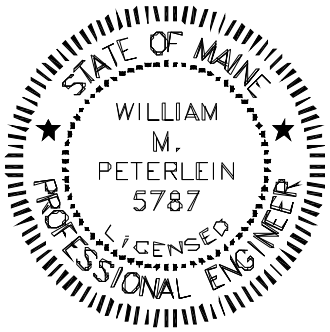
This report has been prepared for the sole use of our client on this project. No other use of this report without the express consent of SGS is permissible.

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

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,

William M. Peterlein, P.E.
President & Principal Engineer



APPENDIX A

EXPLORATION LOCATION PLAN

LEGEND

B-1 SUMMIT TEST BORING (JANUARY 16, 2016)

PLAN REFERENCE

AERIAL IMAGE (2016) WAS OBTAINED FROM GOOGLE EARTH.

SUBSURFACE EXPLORATION LOCATION MAP

UNE ART GALLERY ADDITION

STEVENS AVENUE - PORTLAND, MAINE

PREPARED FOR

UNIVERSITY OF NEW ENGLAND

DATE: 1-18-2017	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 17003	SCALE: 1" = 30'	FILE: 17003 BOR

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APPENDIX B

BORING LOGS

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SOIL BORING LOG

Project:	Art Gallery Addition	Boring #:	**B-1**
Location:	University of New England	Project #:	17003
City, State:	Portland, Maine	Sheet:	1 of 1
		Chkd by:	

Drilling Co:	East Coast Explorations	Boring Elevation:	
Driller:	C. Palmer	Reference:	
Summit Staff:	B. Peterlein, P.E.	Date started: 1/16/2017	Date Completed: 1/16/2017

DRILLING METHOD		SAMPLER	
Vehicle:		Length:	24" SS
Model:	CME 550	Diameter:	2"OD/1.5"ID
Method:	4-1/4" H.A.S.	Hammer:	140 lb
Hammer Style:	Auto	Method:	ASTM D1586

ESTIMATED GROUND WATER DEPTH

Date	Depth	Elevation	Reference
1/16/2017			None Observed

Depth (ft.)	No.	Pen/Rec (in)	Depth (ft)	blows/6"	Elev. (ft.)	SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
1						Dark brown Sandy SILT, trace rootlets, loose dry, ML	Upper 12" frozen	TOPSOIL
2								GLACIAL MARINE
3								
4								
5	S-1	24/15	4			Light brown Silty fine SAND, compact, dry, SM		
			7					
			9					
6			12					
7								
8								
9								
10	S-2	24/18	9			Brown medium to coarse SAND, compact, dry, SP		
			13					
			16					
11			18					
12								
13								
14								
15	S-3	24/20	17			Brown Gravelly SAND, trace Silt, very dense, dry, SP or SW		
			24					
			29					
16			29					
17								
18								
19								
20	S-4	24/16	16			Brown Gravelly SAND, dense, dry, SP or SW		
			15					
			16					
21			14					
22						End of Boring at 21 ft		

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

NOTES: PP = Pocket Penetrometer, MC = Moisture Content
LL = Liquid Limit, PI = Plastic Index, FV = Field Vane Test
Bedrock Joints Su = Undrained Shear Strength, Su(r) = Remolded Shear Strength
Shallow = 0 to 35 degrees
Dipping = 35 to 55 degrees
Steep = 55 to 90 degrees

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

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