

Specification For Geotechnical Investigation

PART 1 - GENERAL

Date: December 4, 2012

- 1.1 Project:** Brock University Goodman School of Business
Brock University Student Union
- 1.2 SEL Project Number:** 20120675
- 1.3 Architect** +VG Architects - The Ventin Group

Attention: Chris Hall

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- 1.4 Structural Engineer:** Stephenson Engineering Ltd.
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Attention: Rob Popplewell

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- 1.5 Building Description**
- .1 No. of storeys above grade; - Goodman School of Business (Phase I)- up to 5 storeys
- Student Union (Phase II) - up to 4 storeys
 - .2 No. of basements; - Facility of Business - 1 storey
- Student Union - No basement but may include tunnel for building services.
 - .3 Description of structure; To be determined but likely a combination of:
Concrete Frame and Structural Steel Framing
Parking Structure - Provide frost protection guidelines for footings.
 - .4 Special Considerations; Proximity of property lines.
Buried utility services.
Presence of significant harder dolostone at certain locations
 - .5 Existing Geotechnical Information; Not available.

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PART 2 - SCOPE OF WORK

- 2.1 Obtain permission for access to site.
- 2.2 Locate boreholes and/or test pits;- As shown on accompanying plan.

Relocate to avoid obstructions as necessary, recording actual location on plan.
Ensure that all underground services are located before drilling.
- 2.3 Record geodetic elevation of ground surface at borehole and pit locations and relate to a known benchmark.
- 2.4 Drill until rock is encountered. For 30% of all holes when rock is encountered, bore 3,000 mm into it.
- 2.5 Install piezometers at 20% of boreholes, but not less than three (3) per phase, to establish the stabilized water table(s).
- 2.6 Report verbally, before equipment is removed from the site, the following:
 - .1 If extremely poor or unexpected soil conditions are encountered, necessitating drilling to a greater depth to locate bearing stratum.
 - .2 If conditions are extremely variable, necessitating more boreholes or dynamic cone penetration tests.
 - .3 If special equipment such as piezometers need to be installed to obtain reliable tests.
 - .4 If any additional site work such as load tests is considered necessary.
 - .5 If good and uniform soil conditions are encountered which could result in saving on a number of boreholes and/or pits.
- 2.7 Obtain approval before exceeding the estimated cost of the work, either in field or in the laboratory.
- 2.8 Obtain samples of each soil type encountered, the first sample being at a depth not greater than 750 mm and succeeding samples at not more than 1500 mm increments of depth. Record whether samples are dry, moist or wet.
- 2.9 Record penetration values of Standard Penetration Test at the top of each soil stratum, commencing at 750 mm depth and at increments not greater than 750 mm down to 3000 mm and not greater than 1500 mm thereafter.
- 2.10 Preserve soil samples for a minimum of three months.
- 2.11 Backfill all boreholes with grout in accordance with Regulation 903.
- 2.12 Restore site to its original state upon completion of on site work.

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PART 3 - REPORT

- 3.1 Submit a soil investigation report.
- 3.2 Include (but not be limited to) in the Report the following:
- .1 A detailed description of the soil investigation, including details of the method of soil boring used, a description of the general geology of the area and a drawing showing the actual location and elevation of the boreholes.
 - .2 A description of the physical properties cohesion and friction angles, soil constraints for at rest, active and passive conditions, unit weights for the various soil strata and the modulus of subgrade reaction, found in each borehole and the elevation of the stabilized water table.
 - .3 Summarize the results of all relevant boreholes, in a coordinated series of logs.
 - .4 Any special conditions or irregularities.
 - .5 Water conditions and flow rates for drainage, including effect of weather.
 - .6 Safe bearing capacity and founding elevations for soils encountered including:
 - 1. Bearing capacity under Serviceability Limit State (SLS)
 - 2. Bearing capacity under Ultimate Limit State (ULS)
 - 3. Factored geotechnical resistances based on applicable resistance factors in accordance with Table K1 of NBC 2005 structural commentaries.
 - 4. Modulus of subgrade reaction.
- Note: Should caissons be suggested as an appropriate foundation system provide SLS/ULS for both hand cleaned and non hand cleaned bearing.
- .7 Recommended types of foundation.
 - .8 Recommendations for drainage and dewatering.
 - .9 Recommended foundation factors for seismic design in accordance with Ontario Building Code 2006 and National Building Code 2005.
 - .10 Advice on any special construction difficulties that may be encountered.
 - .11 Recommended parameters for design of shoring system.
 - .12 Parameters for underpinning of existing structures.
 - .13 Recommendations for asphalt paving construction.
 - .14 Recommended parameters for designing foundation walls and isolated cantilevered walls.

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- .15 Recommended parameters for perimeter and under-floor drainage.
- .16 Recommendations for back fill materials, compaction and slab-on-grade construction.
- .17 Give recommended frost protection depth to underside of footings.
- .18 Possible effects of ground water during construction if the water table is close to or above the likely elevation of the bottom of excavations.
- .19 Suitability of excavated material as backfill.
- .20 If methane gas is found in fill material, and/or in underlying shale, comment on its concentration and suggest methods for its control.
- .21 Report to avoid use of ambiguous terms such as, **should and may**. The intention of the report is to establish a baseline for the contractor. Options and alternatives for credits can be investigated or proposed after award of contract.

3.3 Distribute reports as follows:

To Owner: - 2 copies.

To Architect: - 1 copy.

To Consulting Structural Engineer: - 1 copy.

PART 4 - COST AND TIMING

- 4.1 Submit unit rates for all work necessary to complete the sub-soil investigation, as specified herein, including fees for permits which may be required for Phase I only.
- 4.2 Submit unit rates for all work necessary to complete the sub-soil investigation, as specified herein, including fees for permits which may be required for Phase II assuming work performed concurrently with Phase I.
- 4.3 Submit estimated time to carry out the field and laboratory work.
- 4.4 Submit total estimated cost of the work.
- 4.5 Submit starting, completion and report submission dates.

PART 5 - ENVIRONMENTAL TESTING

- 5.1
 - a) Submit proposal for recommended environmental testing required for this site, sufficient to satisfy the Ministry of the Environment for soil disposal requirements.
 - b) Carry out environmental testing to satisfy the requirements of the Ministry of the Environment for soil disposal. Testing to conform to MOEE and CAEAL requirements.
 - c) If required, provide recommendation for sulphate resistant concrete.

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- 5.2 Indicate presence of methane gas.
- 5.3 Submit separate cost for this aspect of the work.

PART 6 - ON SITE REVIEW AND TESTING

Submit proposed program and costs for site review and testing during construction.

END OF SPECIFICATION



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Project No.
20120675

DATE
12.04.2012

BY
RP/RS

SHEET

SK1

PROJECT

BROCK UNIVERSITY

PROPOSED BOREHOLE LOCATIONS

READ THIS DWG. IN CONJUNCTION WITH LATEST STRUCTURAL DWGS. ALL MATERIAL AS LATEST STRUCTURAL DWGS U/N.

