SOIL-MAT ENGINEERS & CONSULTANTS LTD.

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PROJECT NO.: SM 135055-G May 16, 2013

4063 Upper Middle Rd. Developments
c/o Ashenhurst Nouwens Ltd.
315 York Boulevard, Suite 2013
Hamilton, Ontario
L8R 3K5

Attention: Mr. Guido Consoli, C.L.S., O.L.S., O.L.I.P., B. Tech.

GEOTECHNICAL INVESTIGATION
PROPOSED EIGHT STOREY BUILDING
4063 UPPER MIDDLE ROAD, BURLINGTON, ONTARIO

Dear Mr. Consoli,

Further to your authorisation we have completed the fieldwork and laboratory testing, and report preparation, in connection with the above noted project. The fieldwork and laboratory testing was done in general accordance with our propose P-5022, dated April 10, 2013. Our comments and recommendations, based on our findings at the four borehole locations, are presented in the following paragraphs.

1. INTRODUCTION

We understand that the proposed project will include the construction of an eight to ten storey condominium building, with a single basement level, as well as the associated municipal services and asphalt paved driveway and parking lot areas. The purpose of this geotechnical investigation was to determine the subsurface conditions at four borehole locations and to interpret the results of this investigation with the respect to the design and construction of the foundations and related earthworks for this project.

This report is based on the above summarised project, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation. The information contained in this report does not reflect upon the environmental aspects of the site and therefore have not been addressed in this document.

2. PROCEDURE

A total of four [4] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The borings were advanced using solid stem continuous flight auger equipment on May 13, 2013 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD. The boreholes were advanced using a track mounted drill rig to termination at depths of between about 3.3 and 6.2 metres below the existing surface, to practical auger and/or sampling spoon refusal on the underlying Queenston Shale. Upon completion of drilling, all of the boreholes were backfilled in general accordance with Ontario Regulation 903.

Representative samples of the subsoils were recovered from the borehole locations at selected depth intervals. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the boreholes.

All boreholes were located in the field by a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD. The ground surface elevations were referenced to a site-specific benchmark described as the top of the top of the manhole grate located on the southern edge of the lot, immediately north of the sidewalk, in front of the existing house. This manhole grate was noted to have Elevation 138.31 metres, as seen on the survey plan provided to our office prepared by Ashenhurst Nouwens Limited dated January 24, 2013 [File No. 13006 TOPO+BLS].

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is located at 4063 Upper Middle Road in Burlington, Ontario. An abandoned single family dwelling currently occupies the south central portion of the lot, with the remainder being relatively forested and vegetated. The site is bounded to the south by Upper Middle Road and to the north and west by residential developments and to the east by a creek and forested lands beyond. The property slopes down from west to east towards the creek.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil of approximately 50 and 75 millimetres in thickness was encountered in Borehole Nos. 3 and 4, respectively. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations. It is noted too that the term "topsoil" has been used from a geotechnical point of view and does not necessarily reflect the suitability of the material to support plant growth.

Sand and Gravel and Limestone Screenings Fill

A loose to compact sand and gravel material approximately 0.7 metres thick was encountered at the surface of Borehole No. 1 and compact limestone screenings approximately 75 millimetres thick in Borehole No. 2, as these borings were advanced through the driveway areas to the existing house.

Clayey Silt

A native brown to brownish grey clayey silt was encountered beneath the granular fill materials and the surficial topsoil at the borehole locations. This cohesive material was mottled and weathered, with organic staining in the upper levels and was found to contain a trace of sand, gravel and shale fragments. The clayey silt encountered in the boreholes was generally found to be very stiff to hard in consistency and described as having a 'till-like' structure. Hand penetrometer tests indicated unconfined compressive strengths consistently in excess of 4.5 kg / cm^2 [>4.5 tons/ft^2].

Queenston Shale Bedrock

Queenston Shale was encountered beneath the clayey silt at the borehole locations. The Queenston Shale bedrock encountered was red in colour with occasional more resistant grey layers, highly weathered in the upper levels, and was found to become sounder with depth. It should also be noted that where shale is encountered at shallower depths it is typically highly weathered and exhibits properties similar to hard soil making the transition from the hard overburden to weathered rock somewhat indistinct. Queenston Shale was encountered at depths ranging from about 2 to 4 metres beneath the existing ground surface. The bedrock was not cored as part of this investigation.

Groundwater Observations

All of the boreholes were noted to have been 'dry' on the completion of drilling. Given the low permeability of the clayey silt soils and the Queenston Shale bedrock, insufficient time would have passed for infiltrating groundwater to stabilise in the open boreholes. Some infiltration of groundwater from more permeable seams in the clayey silt and Queenston Shale must be anticipated by the contractor during the excavation operations. However the rate of infiltration from these seams is expected to be relatively low.

4. EXCAVATIONS

It is anticipated that the excavations for the proposed foundations and for the installation of underground services for the proposed high rise building will extend to the depths of up to 3 to 5 metres below the existing grade, into the very stiff to hard clayey silt and Queenston Shale bedrock. The sides of excavations into the soil and bedrock should remain stable at slopes of up to 60 degrees to the horizontal to near vertical. Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. Excavation slopes steeper than those required in the Safety Act must be supported or a trench box must be provided, and a senior Geotechnical Engineer from this office should supervise the work. The contractor may encounter buried floor slabs, pits, foundations, etc. from the existing building on site which may slow their rate of excavation.

While the typical depths of construction are anticipated to be above the static groundwater level, some infiltration of groundwater through more permeable seams in the native soil and bedrock and from surface runoff should be anticipated. However, the rate of infiltration is anticipated to be relatively low, such that any water that may seem into the excavations could be removed using conventional construction 'dewatering' techniques, such as pumping from sumps and ditches. More water should be expected when connections are made with existing services. Surface water should be directed away from the excavations.

5. FOUNDATION CONSIDERATIONS

The soil conditions encountered in the boreholes are such that the proposed building may be supported on conventional spread footings founded in the native very stiff to hard clayey silt or Queenston Shale bedrock. Spread footings founded in the very stiff to hard clayey silt may be designed using a factored Ultimate Limit State [ULS] bearing capacity of 450 kPa [~9,000 psf]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 300 kPa [~6,000 psf]. Where footings founded on the weathered Queenston Shale, within the upper one metre they may be designed on the basis of a factored ULS and SLS of 750 kPa [15,000 psf]. Where the footings extend into the more sound Queenston Shale, a minimum of one metre into the Queenston Shale bedrock, they may be designed using a factored Ultimate Limit State [ULS] bearing capacity 1,500 kPa [~30,000 psf]. The allowable bearing stress at Serviceability Limit State [SLS] will be controlled by the structure, as the bedrock would have to fail before the Service Limit deformations, typical for the type of building envisioned, would be realised. It is noted that higher bearing values may be available in the less weathered Queenston Shale at increased depth, however such increased values would require review and approval by this office, and possibly additional field investigations and coring of the bedrock.

It is noted that the SLS value represents the Serviceability Limit State, which is governed by the tolerable deflection [settlement] based on the proposed building type, using unfactored load combinations. The ULS value represents the Ultimate Limit State and is intended to reflect an upper limit of the available bearing capacity of the founding soils in terms of geotechnical design, using factored load combinations. There is no direct relationship between ULS and SLS; rather they are a function of the soil type and the tolerable deflections for serviceability, respectively. The above dissertation assumes a typical building. Evidently, the bearing capacity values would be lower for very settlement sensitive structures and larger for more flexible buildings.

In areas where it will be necessary to provide adjacent footings at different founding elevations, the lower footing should be constructed before the higher footing, if possible. To limit stress transfer from higher footings to lower footings, the higher footing should be set below an imaginary line drawn up from the edge of the lower footing at 10 horizontal to 7 vertical.

All footings exposed to the environment must be provided with a minimum of 1.2 metres of earth cover or equivalent insulation to protect against frost damage. This frost protection would also be required if construction were undertaken during the winter months. All footings and foundations should be designed and constructed in accordance with the current Ontario Building Code.

With foundations designed as outlined above and as required by the Building Code, and with careful attention paid to construction detail, total and differential settlements should be small, and within normally tolerated limits of 25 and 20 millimetres respectively, for the type of building and occupancy expected.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations of this report and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

6. SEISMIC DESIGN CONSIDERATIONS

The structure shall be designed according to Section 4.1.8 of the Ontario Building Code, Ontario Regulation 350/06. Based on the subsurface soil conditions encountered in this investigation, the applicable Site Classification for the seismic design is recommended as Site Class B – Rock.

The seismic data, from Supplementary Standard SB-1 of the Ontario Building Code, for Burlington are as follows:

$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
0.36	0.180	0.063	0.020	0.270

7. BACKFILL CONSIDERATIONS

The majority of excavated materials will consist of the native brown clay silt and Queenston Shale bedrock encountered in the boreholes as described above. It is anticipated that a majority of the excavated material will be removed from the subject site to accommodate the basement level. We would recommend that any excavated Queenston Shale bedrock be excluded from re-use as service trench backfill on the project site. The clayey silt is considered suitable for use as backfill in the service trenches. Depending on the weather conditions at the time of construction, some moisture conditioning may be necessary of the on-site soils. It is noted that the on-site clayey silt soils are generally considered to be 'dry' of their optimum moisture content. The cohesive soils encountered are sensitive to moisture absorption and will become practically impossible to compact using conventional compaction equipment if they become wet/saturated during extended periods of precipitation. After a period of heavy precipitation, any near-surface wet or softened material should be allowed to air dry, or be removed and discarded. The clayey silt is not considered to be "free-draining" and should not be used where this characteristic is required.

The use of free draining, well-graded granular material, such as an Ontario Provincial Standard Specification [OPSS] Granular B, Type II, is recommended for use as backfill against foundation walls or to raise the interior grade to the design subgrade level. This material is more readily compacted in restricted access areas, and generally presents a more positive support condition for interior floor slabs and exterior concrete sidewalks, etc.

Any fill materials encountered during the excavation process at the existing building should be assessed for suitability for re-use on site or disposal, and dealt with accordingly.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear strength of any 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increased to equilibrium condition. The clayey silt soils may require high compaction energy to achieve acceptable densities if the moisture content is not close to their standard Proctor optimum value. It is therefore very important that the placement moisture content of the backfill soils be within 3 percent of its standard Proctor optimum moisture content during placement and compaction.

All fill material should be conditioned to within 3 percent of its optimum moisture content, to achieve an efficient compaction operation and to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches of to raise the subgrade elevation should have its moisture content within 3 percent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be retained to monitor the backfilling and compaction operations to confirm uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, such as near the end of compaction 'runs'. In service trenches, the backfill material should be compacted to 95 percent of its standard Proctor maximum dry density to within about one metre below final grade, and to 100 percent of its standard Proctor value above this level in exterior parking areas and to 100 percent within the building area.

7. LATERAL EARTH PRESSURES

The lateral earth pressure on the partial basement walls can be estimated on the basis of backfill [free draining granular material] unit weight, (γ), of 20 kN/m^3. The coefficient of lateral earth pressure may be taken as K_a = 0.35 if small lateral deformations are acceptable [active condition], or K_o = 0.5 in fill against rigid walls [at rest condition]. Any additional pressured due to surcharge loading, such as parked vehicles, floor slab loading, etc., must be included in the design.

8. FLOOR SLAB AND PERMANENT DRAINING

The basement floor slab may be constructed using conventional slab-on-grade techniques on a prepared subgrade. The exposed subgrade surface should be well compacted in the presence of a representative of SOIL-MAT. Any 'soft spots' delineated during this process must be sub-excavated and replaced with quality backfill material compacted to 100 percent of its standard Proctor maximum dry density. The subgrade level can then be raised to the design level with granular soils compacted to 100 percent standard Proctor density. As noted above granular fill is preferred due to its relative insensitivity to weather conditions, its relative easy in achieving the required degree of compaction and its quick response to applied stresses.

As with all concrete floor slabs, there is a tendency for the floor slabs to crack. The slab thickness, concrete mix design, amount of steel and/or fibre reinforcement and/or wire mesh placed into the concrete slab, if any, will therefore be a function of the owner's tolerance for cracks in, and movements of, the slabs-on-grade, etc. The 'saw-cuts' in the concrete floors, for crack control, should extend to a minimum depth of 1/3 of the thickness of the slab.

A moisture barrier will be required under the floor slabs such as the placement of at least 200 millimetres of well-compacted 20 millimetre clear crushed stone. At a minimum, the moisture barrier should contain no more than 10 percent passing the No. 4 sieve.

Where 'non-damp' floor slabs are required, as for instance under sheet vinyl floor coverings, etc., extra efforts will be required to damp proof the floor slab, as with the additional provisions of a heavy 'poly' sheet, damp proofing sprays/membranes, drainage board products, etc. Where 'poly' sheets are used, care should be taken to prevent puncturing and tearing and/or sufficiently heavy gauge sheeting specified. Alternatively, a proprietary product such as Delta-MS Underslab or WR Meadows membrane may be considered in lieu of the 'poly' sheets.

Basement walls should be suitably damp-proofed and a permanent perimeter drainage system should be provided around the structure to prevent the build up of water under the slab-on-grade and against the foundation walls. The perimeter drainage system should consist of 150 mm diameter perforated pipe, surrounded with 200 mm of 20 mm clear stone, and the stone in turn surrounded by a heavy filter fabric. The suppliers of the filter fabric should be consulted as to the type best suited for this project. This office should examine the installation of the drains, as even a small break in the filtering materials could result in loss of fines into the drains with attendant performance difficulties, including settlements of the ground surface. The exterior grade around the structure should be sloped away from the structure to prevent the ponding of water against the foundation walls. The enclosed Drawing No. 2 shows schematics of the typical requirements for drainage and backfill of basement walls.

Curing of the slab-on-grade must be carefully specified to ensure that slab curl is minimised. This is especially critical during the hot summer months of the year when the surface of the slab tends to dry out quickly while high moisture conditions in the moisture barrier or water trapped on top of any 'poly' sheet at the saw cut joints and cracks, and at the edges of the slabs maintains the underside of the slab in a moist condition.

It is also important that the concrete mix design provide a limiting water/cement ratio and total cement content, which will mitigate moisture related problems with low permeance floor coverings, such as debonding of vinyl and ceramic tile. It is equally important that excess free water not be added to the concrete during its placement as this could increase the potential for shrinkage cracking and curling of the slab.

9. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved should be cleared and stripped and the exposed subgrade proofrolled with 3 to 4 passes of a loaded tandem truck (over the same wheel path) in the presence of a representative of SOIL-MAT IMMEDIATELY prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Alternatively, the soft areas may be repaired by punching coarse aggregate, such as a 50 millimetre clear crushed stone, into the soft areas. The need for subexcavations of softened subgrade materials will be reduced if construction is undertaken during the dry summer months of the year and careful attention is paid to the compaction operations.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction. Therefore, precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic.

The suggested pavement structures outlined in Table A are based on subgrade parameters estimated on the basis of visual and tactile examinations of the on-site soils and past experience. The outlined pavement structure may be expected to have an approximate ten-year life, assuming that regular maintenance is performed. Should a more detailed pavement structure design be required, site specific traffic information would be needed, together with detailed laboratory testing of the subgrade soils. Although lighter pavement structures might suffice for the present, such lighter structures are expected to lead to premature pavement failures, etc.

Table A
Suggested Pavement Structure

Layer Description	Compaction Requirements	Light Duty Sections	Heavy Duty [truck route]
Asphaltic Concrete Wearing course OPSS HL 3 or HL 3A	97 percent Marshall	65 millimetres	40 millimetres
Binder Course OPSS HL 8	97 percent Marshall		65 millimetres
Base Course OPSS Granular A	100% SPMDD	150 millimetres	150 millimetres
Sub-base Course OPSS Granular B Type II	100% SPMDD	200 millimetres	350 millimetres

SPMDD denotes Standard Proctor Maximum Dry Density, ASTM-D698.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

10. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The subsoil descriptions and borehole information are intended to describe conditions at the borehole locations. Contractors tendering or undertaking this project should carry out due diligence in order to verify the results of this investigation and to determine how the subsurface conditions will effect their operations.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

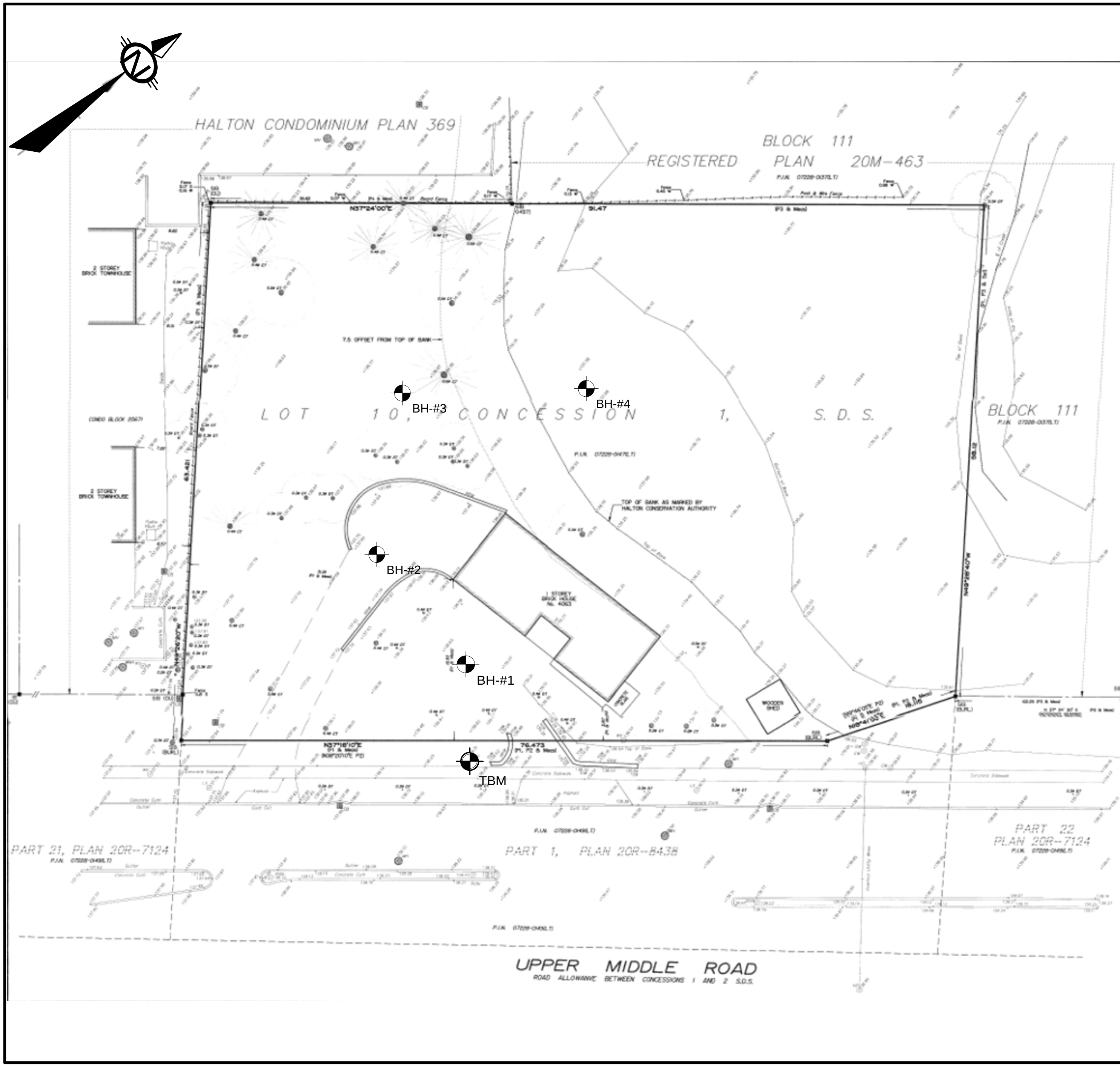
Kyle Richardson, B. Eng., EIT

John Monkman, P. Eng.
Project Engineer

Ian Shaw, P. Eng.
Review Engineer

Attachments: Drawing 1, Borehole Location Plan
Borehole Log Nos. 1 to 4, inclusive
Drawing 2: Typical Design Requirements, Drainage and Backfill of Basement Walls

Distribution: Ashenhurst Nouwens Ltd. [3 plus pdf copy]



LEGEND

BH-# Borehole

TBM Temporary Benchmark [Top of manhole grate immediately south of northern entrance to driveway, Elevation 138.31 metres.]

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 135055-G.
2. Borehole locations are approximate.
3. Soil samples will be discarded after 3 months unless directed otherwise by client.
4. Image obtained from Google 2010 Digital Globe

Soil-Mat
Engineers & Consultants Ltd.

CLIENT
4063 Upper Middle Rd. Developments
C/O Ashenhurst Nouwens Ltd.

PROJECT TITLE
Geotechnical Investigation
Proposed Eight Storey Building
4063 Upper Middle Rd.
Burlington, Ontario

DRAWING TITLE
Borehole Location Plan

PROJECT No.	SM 135055-G
SCALE	N.T.S.
DATE	May 2013
CHECKED	JM
DRAWN	JM
FILENAME	135055-G Borehole Location Plan.kcw

DRAWING No. 1

Project No: SM 135055-G

Project: Proposed Eight Storey Building

Location: Burlington, Ontario

Client: 4063 Upper Middle Rd. Developments C/O Ashenhurst Nouwens Ltd.

Log of Borehole No. 1

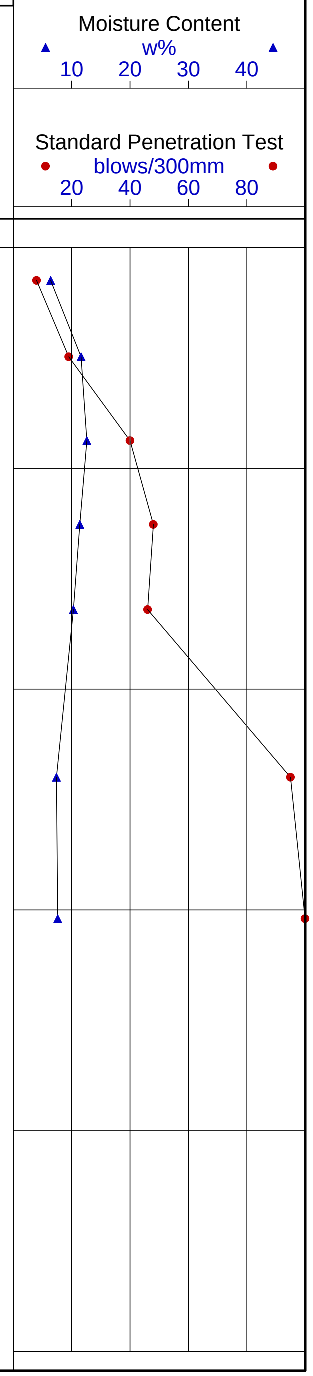
Project Manager: John Monkman, P. Eng.

Borehole Location: See Drawing No. 1

Soil-Mat

SUBSURFACE PROFILE / SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Type	Number	Blow Counts	Blows/300mm	PP (kgf/cm2)
0	0	138.87	Ground Surface					
0–2.3	0–0.7		***Sand and Gravel*** Brown, fine to medium in gradation, loose to compact.	SS	1	4,5,3,4	8	
2.3–13.1	0.7–4.0	138.17	***Clayey Silt*** Brown, mottled and weathered, organic staining in upper level, trace of sand, fine to medium gravel, and shale fragments, 'till-like' structure, very stiff to hard.	AS	2	5,7,12	19	
				SS	3	8,15,25	40	>4.5
				SS	4	8,20,28	48	>4.5
				SS	5	8,20,26	46	>4.5
13.1–20.2	4.0–6.2	134.87	***Queenston Shale*** Red, severely weathered in upper levels, becoming more sound with depth, hard in terms of soil.	SS	6	22,50,45	95	
				SS	7	50/3"	100	
20.2	6.2	132.70	End of Borehole					



NOTES:

1. Borehole was advanced using solid stem auger equipment on May 13, 2013 to termination at a depth of 6.2 metres.

2. Borehole was recorded as 'dry' upon completion of drilling and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers

Drill Date: May 13, 2013

Hole Size: 150mm

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e-mail: info@soil-mat.on.ca

Datum: Geodetic Benchmark

Checked by: JM

Project No: SM 135055-G

Log of Borehole No. 2

Project: Proposed Eight Storey Building

Project Manager: John Monkman, P. Eng.

Location: Burlington, Ontario

Borehole Location: See Drawing No. 1

Client: 4063 Upper Middle Rd. Developments C/O Ashenhurst Nouwens Ltd.

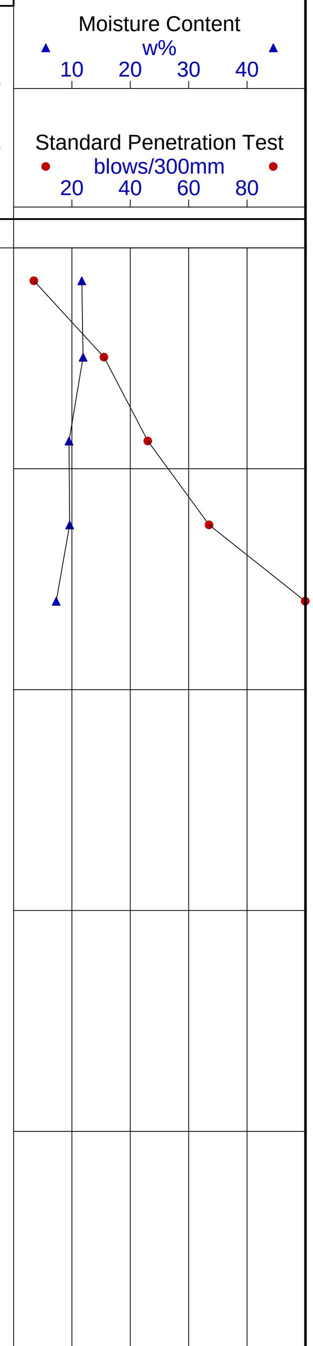
Soil-Mat

SUBSURFACE PROFILE

Depth (m)	Elevation [m]	Description
0	137.59	Ground Surface
		Limestone Screenings Approximately 75 millimeters of over
		Clayey Silt Brown, mottled and weathered, organic staining in upper level, traces of sand, fine to medium gravel, and shale fragments, 'till-like' structure, very stiff to hard.
2	135.46	***Queenston Shale*** Red, severely weathered in upper levels, becoming more sound with depth, hard in terms of soil.
	134.26	End of Borehole

SAMPLE

Type	Number	Blow Counts	Blows/300mm	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	4,4,3,5	7	1.5	
SS	2	8,12,19	31	>4.5	
SS	3	10,24,22	46	>4.5	
SS	4	11,27,40	67	>4.5	
SS	5	21,50/5"	100		



NOTES:

1. Borehole was advanced using solid stem auger equipment on May 13, 2013 to termination at a depth of 3.3 metres.

2. Borehole was recorded as 'dry' upon completion of drilling and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers

Drill Date: May 13, 2013

Hole Size: 150mm

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Datum: Geodetic Benchmark

Checked by: JM

Project No: SM 135055-G

Log of Borehole No. 3

Project: Proposed Eight Storey Building

Project Manager: John Monkman, P. Eng.

Location: Burlington, Ontario

Borehole Location: See Drawing No. 1

Client: 4063 Upper Middle Rd. Developments C/O Ashenhurst Nouwens Ltd.

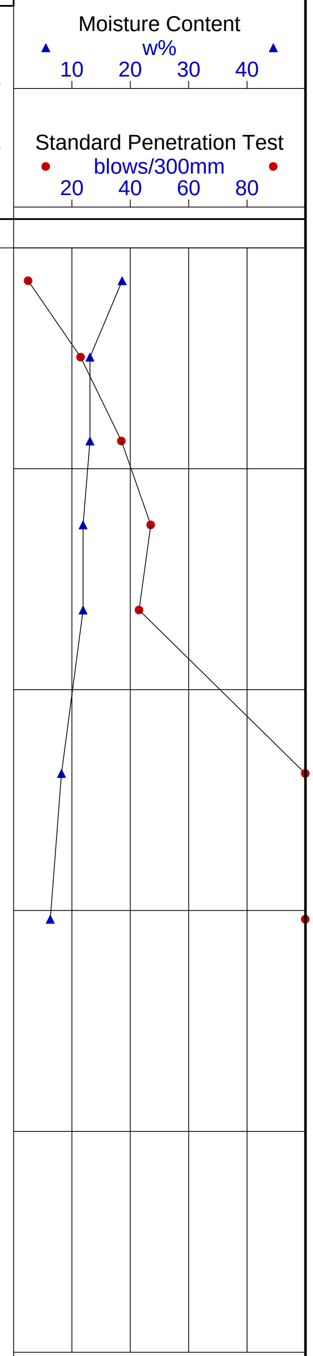
Soil-Mat

SUBSURFACE PROFILE

Depth (m)	Elevation [m]	Description
0	139.12	Ground Surface
0		**Topsoil** Approximately 50 millimeters over
		Clayey Silt Brownish grey, mottled and weathered, organic staining in upper level, traces of sand, fine to medium gravel, and shale fragments, 'till-like' structure, very stiff to hard.
4	135.12	**Queenston Shale** Red, severely weathered in upper levels, becoming more sound with depth, hard in terms of soil.
6	132.97	End of Borehole

SAMPLE

Type	Number	Blow Counts	Blows/300mm	PP (kgf/cm2)
SS	1	2,2,3,5	5	1.5
SS	2	6,10,13	23	>4.5
SS	3	9,15,22	37	>4.5
SS	4	21,25,22	47	>4.5
SS	5	9,18,25	43	>4.5
SS	6	23,39,50/3"	100	
SS	7	50/2"	100	



NOTES:

1. Borehole was advanced using solid stem auger equipment on May 13, 2013 to termination at a depth of 6.2 metres.

2. Borehole was recorded as 'dry' upon completion of drilling and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers

Drill Date: May 13, 2013

Hole Size: 150mm

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Datum: Geodetic Benchmark

Checked by: JM

Sheet: 1 of 1

Project No: SM 135055-G

Log of Borehole No. 4

Project: Proposed Eight Storey Building

Project Manager: John Monkman, P. Eng.

Location: Burlington, Ontario

Borehole Location: See Drawing No. 1

Client: 4063 Upper Middle Rd. Developments C/O Ashenhurst Nouwens Ltd.

Soil-Mat

SUBSURFACE PROFILE

Depth (m)	Elevation [m]	Description
0	136.70	Ground Surface
		Topsoil Approximately 75 millimeters over
0 – 2	134.57	***Clayey Silt*** Brown, mottled and weathered, organic staining in upper level, trace of sand, fine to medium gravel, and shale fragments, firm.
2 – 3.3	133.40	***Queenston Shale*** Red, severely weathered in upper levels, becoming more sound with depth, hard in terms of soil.
		End of Borehole

NOTES:

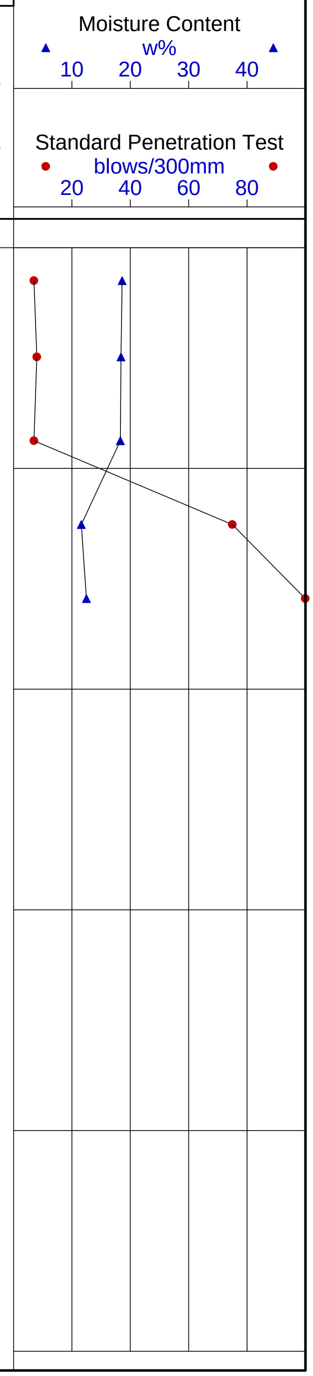
1. Borehole was advanced using solid stem auger equipment on December 13, 2013 to termination at a depth of 3.3 metres.

2. Borehole was recorded as 'dry' upon completion of drilling and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

SAMPLE

Type	Number	Blow Counts	Blows/300mm	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	2,3,4,4	7	1.5	
SS	2	2,3,5	8	>2.5	
SS	3	3,3,4	7	>1.5	
SS	4	18,25,50 Wet Spoon	75	>4.5	
SS	5	43,50/4" Wet Spoon	100	>4.5	



Drill Method: Solid Stem Augers

Drill Date: May 13, 2013

Hole Size: 150mm

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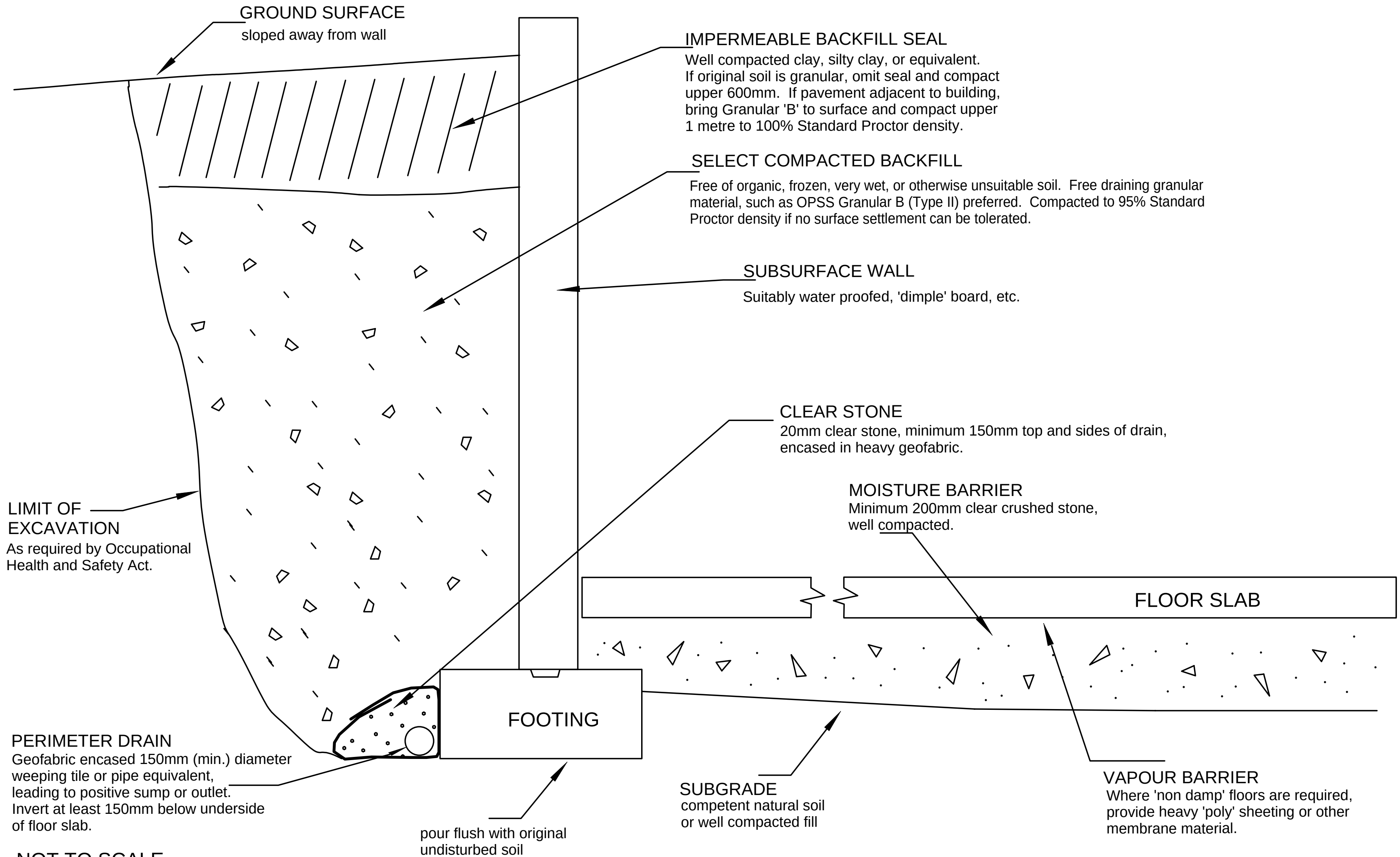
e-mail: info@soil-mat.on.ca

Datum: Geodetic Benchmark

Checked by: JM

Sheet: 1 of 1



NOT TO SCALE

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Soil-Mat Engineers & Consultants Ltd.

Typical Design Requirements
Drainage and Backfill for Basement Walls

Project No.:	SM 135055-G
Date:	May 2013

DRAWING No. 2