SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 LANCING DRIVE, HAMILTON, ONTARIO L8W 3A1
PHONE (905) 318-7440 TOLL FREE (800) 243-1922 FAX (905) 318-7455
E-MAIL: info@soil-mat.on.ca WEB SITE: www.soil-mat.on.ca

PROJECT NO.: SM 124433-G March 19, 2012

CONSEIL SCOLAIRE DE DISTRICT CATHOLIQUE CENTRE-SUD
110 Drewry Avenue
North York, Ontario
M2M 1C8

Attention: Mr. Richard Lehoux, Project Officer

GEOTECHNICAL INVESTIGATION
PROPOSED ADDITION – ECOLE SAINT MARGUERITE BOURGEOYS
60 CLENCH AVENUE
BRANTFORD, ONTARIO

Dear Mr. Lehoux,

Soil-Mat Engineers was retained to undertake a geotechnical investigation for the above noted project. We have completed the fieldwork and laboratory testing, and report preparation and provide our comments and recommendations in general accordance with our Proposal P-4699A dated January 25, 2012. Our comments and recommendations based on our findings at the five borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will consist of the construction of a one to two storey, basementless addition to the southeast of the existing school. In addition, construction will also include the expansion of the parking lot to the west of the school. The purpose of this geotechnical investigation was to determine the subsurface conditions at the five borehole locations and to interpret the findings of this investigation with respect to the design and construction of the foundations and related earthworks for this project.

This report is based on the above summarised project description, 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, such as the addition of a basement level, may void the recommendations given in this report. If significant changes are made to the proposed design, then 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 five [5] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The borings were put down cased using hollow stem continuous flight auger equipment on February 25, 2012 under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD. The boreholes were advanced using a truck-mounted drill rig to depths of up to approximately 6.5 metres below the surrounding ground surface. On completion of drilling all of the boreholes were backfilled in accordance with Ontario Regulation 903.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of the ASTM test specification D1586, Standard Penetration Resistance Testing. 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 borings.

The boreholes were located in the field by a representative of Soil-Mat Engineers. The ground surface elevations at the borehole locations were referenced to a site-specific temporary benchmark described as the top of the existing floor slab at the southeast entrance to the existing school, at the location shown in Drawing No. 1. For convenience, this temporary benchmark was assigned an elevation of 100.0 metres.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Borehole Log Nos. 1 to 5, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed as the exact planes of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The proposed school addition is to be constructed to the southeast of the existing Sainte Marguerite Bourgeoys School located at 60 Clench Avenue in Brantford, Ontario. The building area is presently occupied with asphalt-paved play surfaces, grass playground and a few portables. The proposed building area is relatively flat with a gentle downward slope to the south, away from the existing school building.

The area of the proposed parking lot expansion is currently landscaped, surfaced by grass and a few trees. The existing pavement, which surfaces the existing parking lot, is in very poor condition, with extensive cracking, and breaking up of the asphalt.

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

Topsoil

A surficial veneer of topsoil, about 300 to 350 millimetres in thickness was encountered in Borehole Nos. 2 and 3, respectively. It should be noted that the depth of topsoil might vary across the site and from the depths encountered at the borehole locations. It should also be noted that the term 'topsoil' has been interpreted in this report from a geotechnical-engineering point of view. If it is to be used for landscaping purposes, its suitability should be confirmed by tests on representative samples for organic and nutrient content and therefore its ability to support plant growth.

Pavement Structure

A pavement structure consisting of approximately 50 millimetres of asphaltic concrete overlying a relatively compact Sand and Gravel granular base was encountered at the location of Borehole Nos. 1, 4, and 5.

Sand and Gravel

A native Sand and Gravel deposit was found to underlie the pavement structure and/or topsoil in all of the borehole locations. The granular deposit is generally brown in colour, medium to coarse in gradation, with some cobbles, and traces of Silt, and is compact to very dense in consistency. The granular deposit was noted to transition to Silty Sand and Gravel at a depth of 2.5 metres in Borehole No. 1. It is also noted that occasional boulders may be present within the Sand and Gravel deposit.

The native Sand and Gravel deposit was proven to termination in Borehole Nos. 4 and 5 at a depth of approximately 3.5 metres below the existing grade, and was found to overlie a native Clayey Silt/Silt in Borehole Nos. 1 to 3, inclusive, at depths of roughly 4.25 to 4.75 metres below the existing grade.

Clayey Silt/Silt

Native Clayey Silt/Silt was encountered beneath the Sand and Gravel deposit in Borehole Nos. 1, 2, and 3, at depths of approximately 4.75, 4.25, and 4.25 metres below the existing grade, respectively. The slightly cohesive fine-grained soil is generally brown in colour, with some Gravel in the upper level, and with traces of fine Sand throughout, and is in a compact to dense condition. The Clay content within the native soil was noted to decrease with increasing depth. In addition, the native Clayey Silt/Silt was found to transition to brownish grey in colour in Borehole No. 2 at a depth of roughly 5.5 metres. The fine-grained soil was proven to the termination of Borehole Nos. 1 to 3, inclusive, at a depth of approximately 6.5 metres below the existing grade.

Groundwater Observations

All of the boreholes were recorded as having 'caved in' to depths of approximately 4.5 to 5.2 metres, and were 'dry' at the completion of drilling. Standpipes were not installed as a part of this geotechnical investigation, however the static groundwater level may be estimated to be at a depth of approximately 4 to 5 metres. Regardless, an exact determination of the static groundwater level is considered to be academic for this project as the static groundwater level is expected to be below the anticipated depths of construction. Nevertheless, some minor infiltration of groundwater through more permeable seams and from surface runoff should be anticipated. All of the boreholes were backfilled on completion in accordance with Ontario Regulation 903.

4. FOUNDATION CONSIDERATIONS

The site conditions are suitable for support of the proposed school addition on conventional spread footings founded in the native Sand and Gravel deposit, at a depth of approximately 1.2 to 1.5 metres below the existing grade. Spread footings founded at this level may be designed using a factored Ultimate Limit State [ULS] bearing capacity of 300 kPa [~6,000 psf]. The allowable bearing stress at Serviceability Limit State [SLS] should be limited to 200kPa [~4,000 psf], based on the total and differential settlements not exceeding 25 and 20 millimetres, respectively. Where the founding level extends to a depth of 2.0 metres below the existing grade the design bearing values may be increased to ULS of 400 kPa [~8,000 psf] and SLS of 250 kPa [~5,000 psf]. The footings should have a minimum width of 0.9 metres with the bearing value reducing linearly as a function of width, such that a theoretical footing of zero width would have a design bearing value of zero.

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.

Foot traffic in and around the footing beds will tend to result in disturbance to the founding soils and should therefore be kept to a minimum. Following excavation, the footing bases should be nominally compacted with a plate tamper to seat any surficially disturbed soils. It would be prudent to place a thin concrete 'mud-slab' immediately following foundation excavation, and evaluation, to minimise the disturbance to the founding soils due to rain or construction traffic. All footing beds should be hand-cleaned of any loose or disturbed material immediately prior to the placement of the 'mud-slab' or foundation concrete.

The support conditions afforded by the founding soils are usually not uniform across the site, neither are the loads on the various foundation elements. It is therefore recommended that the footings and foundation walls be reinforced to account for potential variable support and loading conditions.

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 is constructed, if possible, and 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. This practice will limit stress transfer from the higher footings to lower footings.

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 well within normally tolerated limits of 25 and 20 millimetres, respectively. Expansion/movement joints should be provided where connections are made to the existing building to allow for differential movements to occur, both vertically due to compression of the soil under the weight of the addition, and horizontally as the walls expand and contract with fluctuations in humidity and temperature.

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.

5. 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 Site Class D – Stiff Soil, based on the average soil characteristics for the site. If required, site specific shear wave velocity testing may support an increase to Site Class C – Dense Soil.

The seismic data, from Supplementary Standard SB-1 of the Ontario Building Code, for the Brantford area are as follows.

$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
0.24	0.120	0.052	0.014	0.160

6. EXCAVATIONS

It is anticipated that excavations for the construction of foundations and underground services will extend to depths of up to about 1.5 metres below the existing grade into the granular deposit of Sand and Gravel. Excavations through the predominately granular overburden soils should be relatively straightforward, with excavation walls remaining stable at 45 degrees to the horizontal, or steeper, for the short construction period. Where wet seams are encountered the sides of excavations in the granular soils should be expected to slump in to slopes as flat as 3 horizontal to 1 vertical, or flatter. The presence of large cobbles, and/or boulders within the Sand and Gravel, as noted above, may slow the excavation rate. Notwithstanding the foregoing, 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 monitor the work.

As noted above, the static groundwater level is anticipated to be below the required depth of construction. Nevertheless some minor infiltration of groundwater into open excavations should be anticipated. It should be possible to control any water that may seep into the excavations from surface runoff and more permeable seams in the native soils using conventional construction 'dewatering' techniques, such as pumping from sumps and ditches. Surface water should be directed away from the excavations.

It is noted that any nearby above or below ground structures within the zone of influence of open excavations must be examined and evaluated for necessary supplementary support and/or excavation shoring requirements. Any utility poles, light poles, etc. located within 3 metres (horizontally) of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and belowground structures.

7. FLOOR SLAB AND PERMANENT DRAINAGE

Floor slabs may be constructed using conventional slab-on-grade techniques on a prepared subgrade. The exposed subgrade should be proof rolled in the presence of a representative of Soil-Mat Engineers. Any 'soft' spots delineated by this, or other means, should be sub-excavated and replaced with quality granular material compacted to 100 percent of standard Proctor maximum dry density.

As with all concrete floor slabs, there is a tendency for the floor slabs to crack. The slab thickness, concrete mix design, the 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, such as the placement of at least 200 millimetres of well-compacted 20 millimetre clear crushed stone, will be required under the floor slabs where the interior slab surface elevation is less than 300mm above the exterior grade. At a minimum the moisture barrier material 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, etc. Where heavy 'poly' sheeting is used care should be taken in its placement, or a sufficiently heavy thickness provided, to prevent damage (puncturing and/or tearing).

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.

The exterior grade around the structure should be sloped away from the structure to prevent the ponding of water against the foundation walls. Where the level of the interior finished floor is less than 300 millimetres above the exterior grade it is recommended that a permanent perimeter weeping tile system be provided to prevent the building of water against the foundation walls. The enclosed Drawing No. 2 shows schematics of the typical requirements for slab-on-grade construction. Given the free-draining granular soils encountered at the founding level, and the prevailing groundwater conditions, a perimeter weeping tile system could be reasonably omitted.

8. BACKFILL CONSIDERATIONS

The majority of the excavated soils will consist of the granular Sand and Gravel, which is suitable for use as backfill against foundation walls and in service trenches provided that large cobbles and/or boulders are not included in the fill matrix. The on-site granular soils are generally considered to be slightly 'dry' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending upon the weather conditions at the time of construction. Dust could become an issue should construction be undertaken in the 'dry' summer months.

The use of free draining, well-graded granular material, such as an Ontario Provincial Standard Specification [OPSS] Granular B, is often preferred for use against foundation walls and beneath concrete slabs on grade. These materials are generally more readily compacted in restricted access areas, are more tolerant of wet conditions, and generally provide more positive support conditions for concrete slabs.

It is 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 to achieve an efficient compaction operation and to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be on-site during the backfilling and compaction operations to monitor uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. All backfill should be compacted to 100 per cent standard Proctor maximum dry density. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

9. PAVEMENT CONSIDERATIONS

As noted above the existing pavement structure is in relatively poor condition, exhibiting significant cracking and ‘break-up’ of the asphalt layers. As such it would be prudent to consider rehabilitation/reconstruction of the existing pavement in conjunction with the work to expand the parking lot on the west side of the school. It is noted that the existing pavement structure appears to consist of 50 millimetres of asphalt, with a compacted granular base evidently consisting of the on site Sand and Gravel soils. While the on site Sand and Gravel would be considered to provide good subgrade conditions, and could potential be of value as the sub-base course, the provision of at least an OPSS Granular A base course layer would be beneficial in achieving a longer life span of the pavement.

All areas to be paved must be cleared of all topsoil and unsuitable material and the exposed subgrade proofrolled with 3 to 4 passes of a loaded tandem truck in the presence of a representative of Soil-Mat Engineers & Consultants Ltd., 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 sub-excavations of softened subgrade materials will be reduced if construction is undertaken during dry periods of the year and careful attention is paid to the compaction operations. Should pavement construction be undertaken during 'wet' periods of the year it should be anticipated that additional depth of Granular B sub-base course material may be required.

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. Soil-Mat should be given the opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

TABLE A
RECOMMENDED PAVEMENT STRUCTURES

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.

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, then site specific traffic information would be needed, together with detailed laboratory testing of the subgrade soils.

As noted above the existing pavement structure appears to have made use of the existing Sand and Gravel soil as the granular base material. It is reiterated that while consideration could be given to making use of the on site soils as the sub-base course the provision of a full Granular A base course is highly recommended.

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. He 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.

It is anticipated that the existing asphaltic concrete pavement will be saw cut at the limits of construction and reinstated, where required, to match the existing pavement structure. It is noted that the saw cuts should be located sufficiently back from any excavations to avoid undermining of the asphalt. Should the saw cuts become undermined, or the asphalt at the edge of the saw cut become damaged during construction it will be necessary to re-cut the asphalt to provide a stable edge between the existing and new pavement.

Alternatively, in contrast to the traditional approach of asphalt pavements, a permeable pavement system could be considered as the subsurface soils encountered in our investigation are well suited for this application. This office should be consulted for advice on additional testing and design parameters for permeable pavements.

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 only. It is the contractors' responsibility to determine how these conditions will effect the scheduling and methods of construction for the project.

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, then please do not hesitate to contact the undersigned.

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

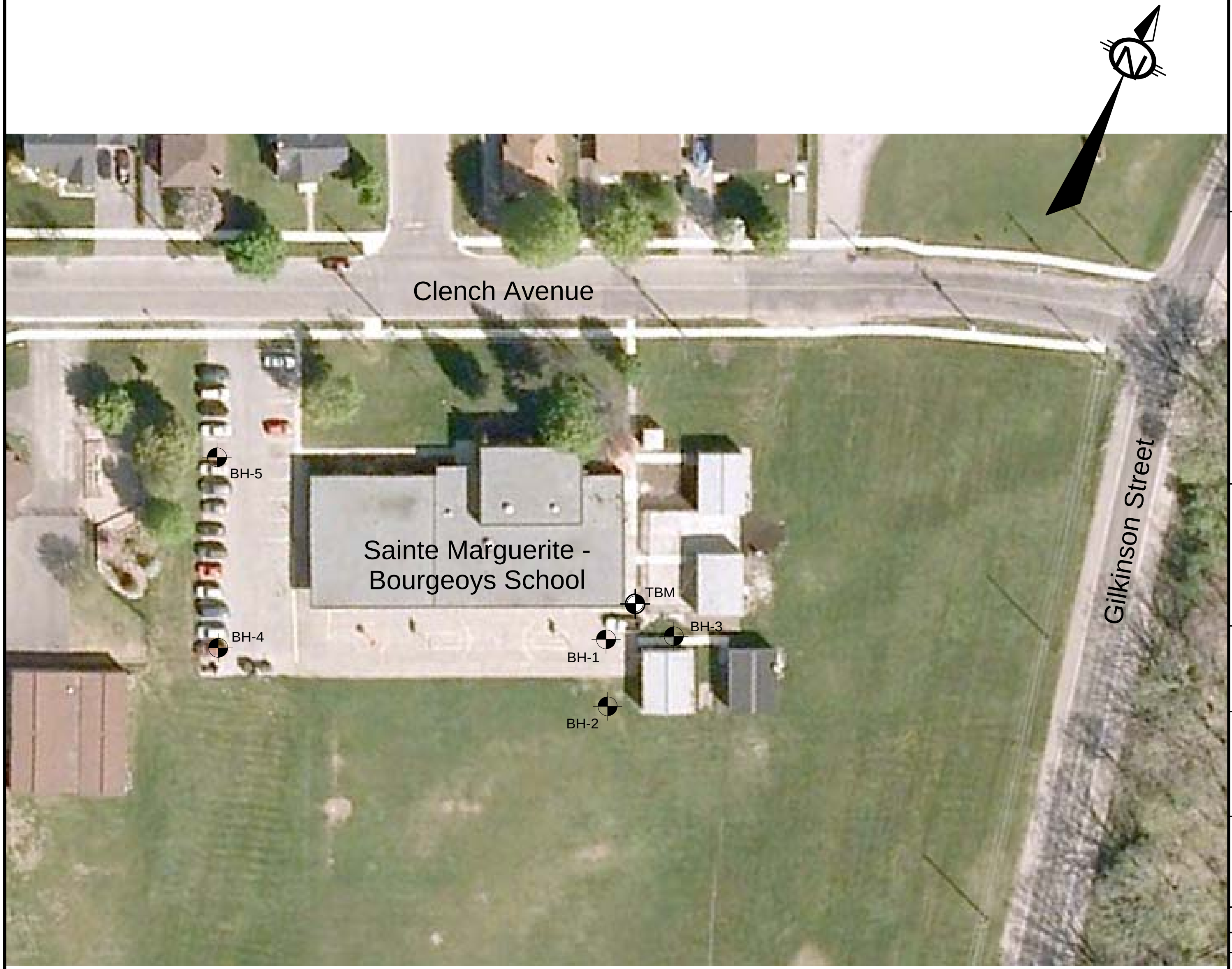
David Horvat, B.Eng., EIT

LICENSED PROFESSIONAL ENGINEER
MAR 20/12
I.D. SHAW
100042315
PROVINCE OF ONTARIO

Ian Shaw, P.Eng.
Project Engineer

Stephen R. Sears, B. Eng. Mgmt., P. Eng.
Review Engineer

Enclosures:	Drawing No.1, Borehole Location Plan Borehole Logs 1 to 5, inclusive Drawing No. 2, Recommended Design Requirements for Slab on Grade
Distribution:	CONSEIL SCOLAIRE DE DISTRICT CATHOLIQUE CENTRE-SUD [3]



LEGEND

⊕ BH-# Borehole

⊕ TBM Temporary Benchmark
Top of existing floor slab, assummed elevation of 100.00 metres.

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 124433-G
2. Borehole locations are approximate.
3. Soil samples will be discarded after 3 months unless directed otherwise by client.
4. Base Image obtained from Google Imagery 2012.

Soil-Mat
Engineers & Consultants Ltd.

CLIENT
Conseil scolaire de district du Centre-Sud-Ouest

PROJECT TITLE
Geotechnical Investigation
Sainte Marguerite Bourgeouys School
60 Clench Avenue, Brantford, Ontario

DRAWING TITLE
Borehole Location Plan

PROJECT No.	SM 124433-G
SCALE	N.T.S.
DATE	February 2012
CHECKED	IS
DRAWN	DH

FILENAME
124433 - Borehole Location Plan.kcw

DRAWING No. 1

Project No: SM 124433-G

Log of Borehole No. 1

Project: Sainte Marguerite Bourgeoys School

Project Manager: Ian Shaw, P.Eng.

Location: 60 Clench Avenue, Brantford, ON

Borehole Location: See Drawing No. 1

: ::

Client: Conseil scolaire de district du Centre-Sud-Ouest

Soil-Mat

SUBSURFACE PROFILE

Depth (m)	Elevation [m]	Description
0	99.59	Ground Surface
		Pavement Structure Approximately 50 millimetres of Ashpaltic Concrete over
		Sand and Gravel Brown, medium to coarse grained, trace of silt, some cobbles, more silty at 2.5 metre depth, compact to dense
	94.84	***Clayey Silt/Silt*** Brown, lower clay content in the lower level, trace of fine sand, compact to dense
	93.09	End of Borehole

NOTES:

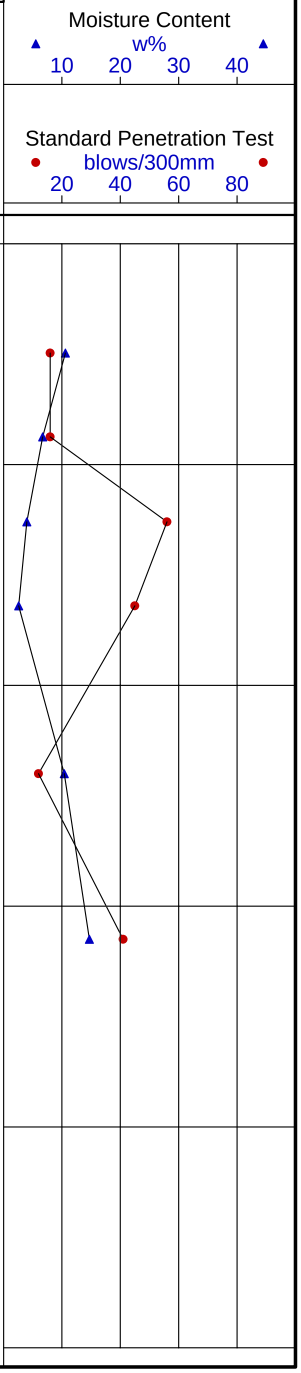
1. Borehole was advanced using solid stem auger equipment on February 25, 2012 to termination at a depth of 6.5 metres.

2. Borehole 'caved-in' to a depth of 5.2 metres on completion and was 'dry' at this level. The borehole was 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	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	3,6,10	16	▨		
SS	2	5,7,9	16	▨		
SS	3	10,32,24	56	▨		
SS	4	14,20,25	45	▨		
SS	5	5,7,5	12	▨		
SS	6	13,17,21	41	▨		



Drill Method: Hollow Stem Augers

Drill Date: February 25, 2012

Hole Size: 200 millimetres

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Existing Floor Slab

Checked by: IS

Sheet: 1 of 1

Project No: SM 124433-G

Log of Borehole No. 2

Project: Sainte Marguerite Bourgeoys School

Project Manager: Ian Shaw, P.Eng.

Location: 60 Clench Avenue, Brantford, ON

Borehole Location: See Drawing No. 1

: ::

Client: Conseil scolaire de district du Centre-Sud-Ouest

Soil-Mat

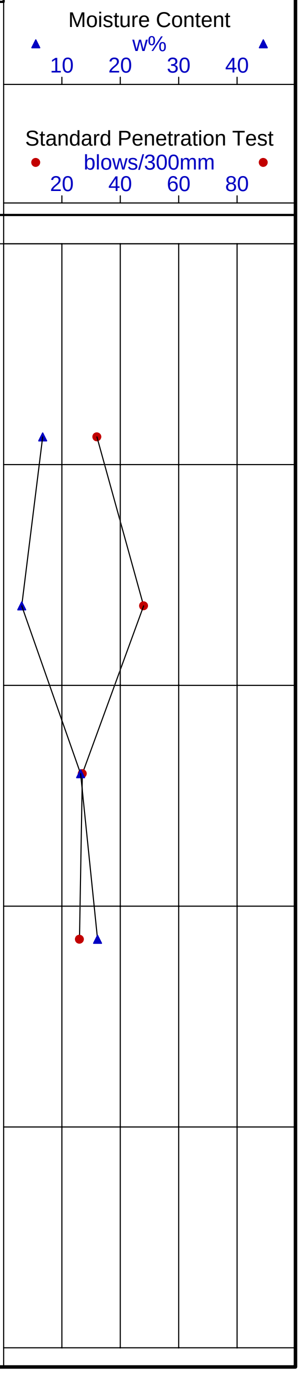
SUBSURFACE PROFILE					SAMPLE						
Depth ft m	Elevation [m]	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0	99.38		Ground Surface								
	99.08		**Topsoil** Approximately 300 millimetres over								
	95.13		**Sand and Gravel** Brown, medium to coarse grained, some cobbles, trace of silt, compact to dense		SS SS	1 2	7,16,16 10,21,27	32 48			
	93.88		**Clayey Silt/Silt** Brown, some gravel in the upper level, lower clay content in the lower level, trace of fine sand, compact		SS	3	12,15,12	27			
	92.88		Transition in colour to brownish grey		SS	4	11,10,16	26			
			End of Borehole								

NOTES:

1. Borehole was advanced using solid stem auger equipment on February 25, 2012 to termination at a depth of 6.5 metres.

2. Borehole 'caved-in' to a depth of 5.0 metres on completion and was 'dry' at this level. The borehole was backfilled as per Ontario Regulation 903.

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



Drill Method: Hollow Stem Augers

Drill Date: February 25, 2012

Hole Size: 200 millimetres

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Existing Floor Slab

Checked by: IS

Sheet: 1 of 1

Project No: SM 124433-G

Log of Borehole No. 3

Project: Sainte Marguerite Bourgeoys School

Project Manager: Ian Shaw, P.Eng.

Location: 60 Clench Avenue, Brantford, ON

Borehole Location: See Drawing No. 1

Client: Conseil scolaire de district du Centre-Sud-Ouest

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Description
0	0	99.59	Ground Surface
0 – 1.15	0 – 0.35	99.24	***Topsoil*** Approximately 350 millimetres over
1.15 – 14	0.35 – 4.25	95.34	***Sand and Gravel*** Brown, medium to coarse grained, some cobbles, trace of silt, compact to dense
14 – 21.3	4.25 – 6.5	93.09	***Clayey Silt/Silt*** Brown, some gravel in the upper level, lower clay content in the lower level, trace of fine sand, compact to dense
			End of Borehole

NOTES:

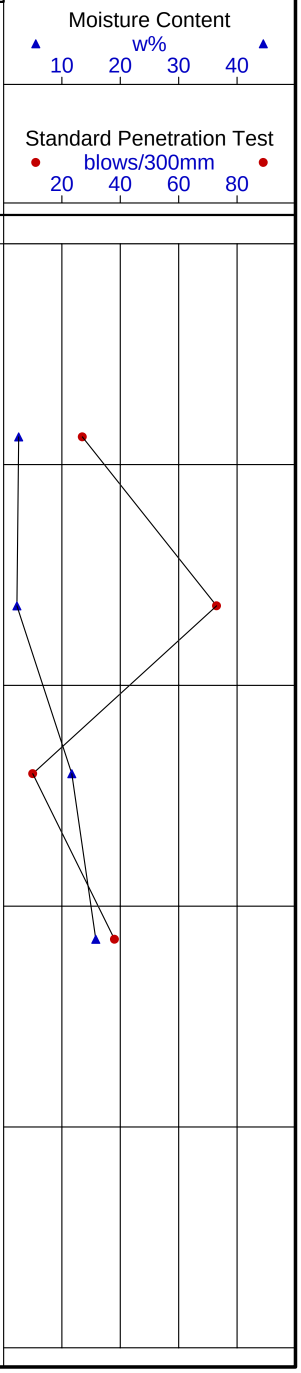
1. Borehole was advanced using solid stem auger equipment on February 25, 2012 to termination at a depth of 6.5 metres.

2. Borehole 'caved-in' to a depth of 4.5 metres on completion and was 'dry' at this level. The borehole was 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	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	15,15,12	27	▨		
SS	2	22,36,37	73	▨		
SS	3	10,5,5 Wet Spoon	10	▨		
SS	4	11,18,20	38	▨		



Drill Method: Hollow Stem Augers

Drill Date: February 25, 2012

Hole Size: 200 millimetres

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 Lancing Drive, Hamilton, ON L8W 3A1
Phone: (905) 318-7440 Fax: (905) 318-7455
e-mail: info@soil-mat.on.ca

Datum: Existing Floor Slab

Checked by: IS

Sheet: 1 of 1

Project No: SM 124433-G

Log of Borehole No. 4

Project: Sainte Marguerite Bourgeoys School

Project Manager: Ian Shaw, P.Eng.

Location: 60 Clench Avenue, Brantford, ON

Borehole Location: See Drawing No. 1
: ::

Client: Conseil scolaire de district du Centre-Sud-Ouest

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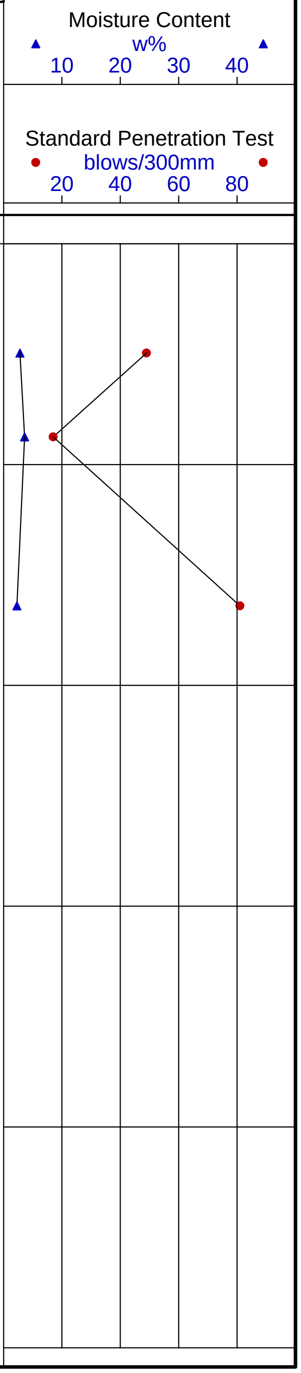
SUBSURFACE PROFILE / SAMPLE

Depth (ft / m)	Elevation [m]	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.67	Ground Surface							
		Pavement Structure Approximately 50 millimetres over							
		Sand and Gravel Brown, medium to coarse grained, some cobbles, trace of silt, compact to dense	SS	1	13,25,24	49	▨		
			SS	2	9,8,9	17	▨		
			SS	3	10,39,42	81	▨		
	96.17	End of Borehole							

Well Data



NOTES:

1. Borehole was advanced using solid stem auger equipment on February 25, 2012 to termination at a depth of 3.5 metres.

2. Borehole 'caved-in' to a depth of 2.8 metres on completion and was 'dry' at this level. The borehole was backfilled as per Ontario Regulation 903.

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

Drill Method: Hollow Stem Augers

Drill Date: February 25, 2012

Hole Size: 200 millimetres

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Sheet: 1 of 1

Project No: SM 124433-G

Log of Borehole No. 5

Project: Sainte Marguerite Bourgeoys School

Project Manager: Ian Shaw, P.Eng.

Location: 60 Clench Avenue, Brantford, ON

Borehole Location: See Drawing No. 1

: ::

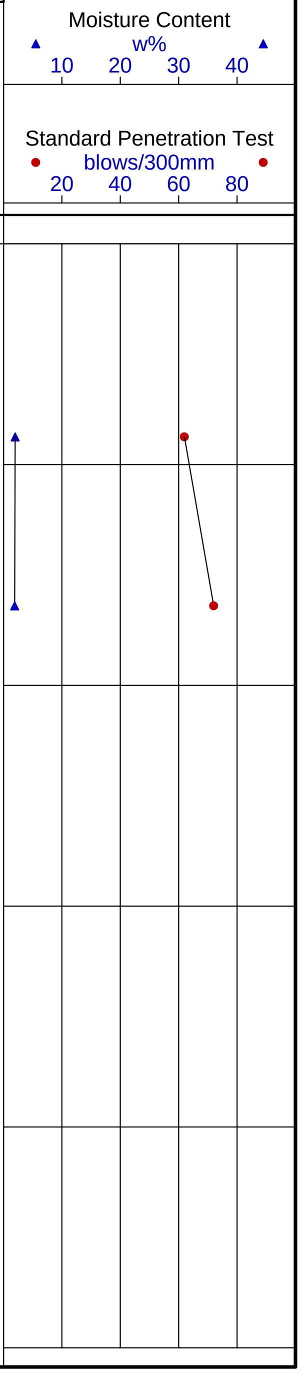
Client: Conseil scolaire de district du Centre-Sud-Ouest

Soil-Mat

SUBSURFACE PROFILE

SAMPLE

Depth	Elevation [m]	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft m 0 0	100.47		Ground Surface								
		▨	**Pavement Structure** Approximately 50 millimetres over **Sand and Gravel** Brown, medium to coarse grained, some cobbles, trace of silt, compact to dense		SS	1	20,24,38	62	▨		
		▨			SS	2	20,30,42	72	▨		
	96.97		End of Borehole								



NOTES:

1. Borehole was advanced using solid stem auger equipment on February 25, 2012 to termination at a depth of 3.5 metres.

2. Borehole 'caved-in' to a depth of 2.7 metres on completion and was 'dry' at this level. The borehole was backfilled as per Ontario Regulation 903.

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

Drill Method: Hollow Stem Augers

Drill Date: February 25, 2012

Hole Size: 200 millimetres

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Checked by: IS

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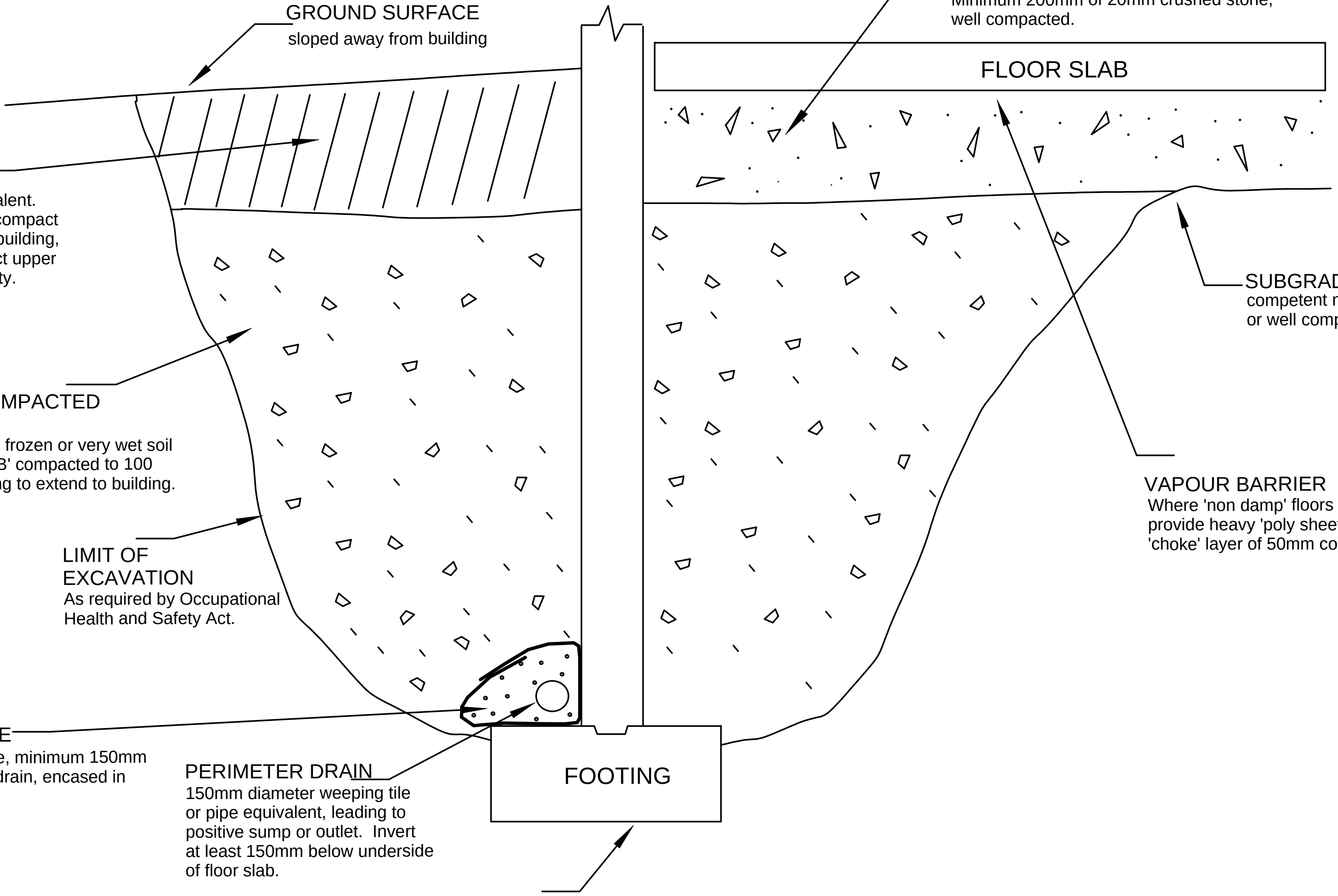

GROUND SURFACE
sloped away from building

MOISTURE BARRIER
Minimum 200mm of 20mm crushed stone, well compacted.

IMPERMEABLE BACKFILL SEAL
Well compacted clay, silty clay, or equivalent. If original soil is granular, omit seal and compact upper 600mm. If pavement adjacent to building, bring Granular 'B' to surface and compact upper 1 metre to 100% Standard Proctor density.

SUBGRADE
competent natural soil or well compacted fill

SELECT COMPACTED BACKFILL
free of organic, frozen or very wet soil
Use Granular 'B' compacted to 100 percent if paving to extend to building.

VAPOUR BARRIER
Where 'non damp' floors are required provide heavy 'poly sheeting over a 'choke' layer of 50mm compact sand.

LIMIT OF EXCAVATION
As required by Occupational Health and Safety Act.

CLEAR STONE
20mm clear stone, minimum 150mm top and sides of drain, encased in heavy geofabric.

PERIMETER DRAIN
150mm diameter weeping tile or pipe equivalent, leading to positive sump or outlet. Invert at least 150mm below underside of floor slab.

pour flush with original undisturbed soil

NOTE:
Drainage system not required if final exterior grade is at least 0.3 metres below finished floor.

NOT TO SCALE

Soil-Mat

Soil-Mat Engineers & Consultants Ltd.

Recommended Design Requirements
Slab-on-Grade with Perimeter Drainage

Project No.:	SM 124433-G
Date:	March 2012

DRAWING No. 2