PROJECT NO: SM 135134-G

NOVEMBER 22, 2013

GEOTECHNICAL INVESTIGATION
PROPOSED BUSINESS/COMMERCIAL AND MIXED-USE DEVELOPMENT
1200 KING ROAD
BURLINGTON, ONTARIO

PREPARED FOR:

PENTA PROPERTIES INC.

Soil-Mat

BY

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
130 LANCING DRIVE
HAMILTON, ONTARIO
L8W 3A1

Soil-Mat

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PROJECT NO.: SM 135134-G

November 22, 2013

Penta Properties Inc.
4480 Paletta Court
Burlington, Ontario
L7L 5R2

Attention: Mr. Dave Pitblado

GEOTECHNICAL INVESTIGATION
PROPOSED BUSINESS/COMMERCIAL AND MIXED-USE DEVELOPMENT
1200 KING ROAD
BURLINGTON, ONTARIO

Dear Mr. Pitblado,

We have completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The investigation and reporting were undertaken in general accordance with our proposal P4850, dated September 14, 2012, and revised June 7, 2013. Our comments and recommendations, based on our findings at the eighteen borehole locations [eight of which were advanced under the direction of Soil-Mat and reported in our report number SM 114018-G entitled "**PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED STADIUM/COMMERCIAL DEVELOPMENT, KING ROAD AND HIGHWAY 403, BURLINGTON [ALDERSHOT], ONTARIO**" dated January 24, 2011] are presented herein.

1. INTRODUCTION

We understand that it is proposed to construct a business/commercial and mixed-use development on the subject property on the west side of King Road. The proposed development is understood to include site grading and engineered fill [if necessary], installation of municipal services and the construction of an asphaltic concrete paved roadway. The purpose of this geotechnical investigation work was to determine subsurface soils information at the eighteen borehole locations and to interpret the findings with respect to the construction for the proposed business/commercial and mixed-use buildings, outlining such topics as foundation schemes, including bearing pressure and expected long term, short term and differential settlements, floor slab comments and with respect to roadway construction including the excavatability of the soils encountered and suitability for structural fill and service trench backfill purposes, pipe bedding materials, excavation dewatering considerations, compaction requirements, subgrade preparation, pavement structure design and other relevant topics, from a geotechnical point of view.

2. PROCEDURE

A total of ten [10] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The Borehole Nos. 1 through 5, inclusive, were put down uncased using solid stem continuous flight auger equipment to depths of approximately 6.7 metres below the existing grade on July 4, 2013, under the direction and supervision of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD. Furthermore, Borehole Nos. 6 through 10, inclusive, were advanced on September 20, 2013 using Pionjar-driven percussion drill equipment to refusal at depths of 1.5 to 2.0 metres below the existing grade. 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. Samples recovered from Borehole Nos. 1 through 5, inclusive, were 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. Hand penetrometer testing was conducted on all cohesive soil samples.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS & CONSULTANTS LTD. in the proposed roadway allowance according to the plan drawing supplied to our office. The ground surface elevation at the borehole locations was surveyed to a temporary benchmark, described at the top of the Bell manhole near the entrance to the site. The geodetic elevation of this temporary benchmark was provided to our office by Metropolitan Consulting Inc. as 105.58 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 10, inclusive, following the text of this report. Also appended to the end of this report are the logs of eight boreholes advanced on the site in 2011. 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 therefor should not be construed as the exact planes of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The project site is located on the west side of King Road, south of Highway 403 and north of the CN Rail line, in Burlington, Ontario. At the time of the fieldwork, the eastern half of the project site was open land, covered in tall grass and occasional scrub vegetation. The western half of the project site is densely wooded. The lands to the south and west of the subject site are generally densely covered with mature trees. The site topography slopes downwards from the northwest to southeast with a total relief of approximately 8 to 10 metres. The site surface drainage is generally towards the three creeks, Grindstone, Falcon and Indian, which traverse the site from the north.

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

Topsoil

A surficial veneer of topsoil approximately 50 to 300 millimetres in thickness was encountered at all borehole locations with the exception of Borehole No. 7 [2011]. It is noted that the depth of topsoil may vary across the site and from the borehole locations. It is also noted that the term 'topsoil' has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life.

Silty Clay Fill

Silty Clay Fill was found in beneath the topsoil veneer in Borehole No. 6 [2011] and at ground surface in Borehole No. 7 [2011]. The Fill material is generally brown and reddish brown, has occasional medium to coarse grained sand, and contains Gravel. The Fill material was found to be stiff in consistency. The Fill material was found to extend to depths of up to approximately 1.4 and 1.3 metres below the existing grade in Borehole Nos. 6 [2011] and No. 7 [2011], respectively. Neither the source of the Fill, nor the time or condition of its placement are known and so no comments can be made in this regard. Additional investigation of the Fill condition and quality may be warranted, particularly should off-site disposal be required as part of the future site grading operations.

Sand Fill

Sand Fill was encountered beneath the topsoil layer in Borehole Nos. 7, 10 and 5 [2011]. The brown granular fill was fine to coarse in gradation and contained some fine to coarse Gravel. The Sand fill observed in Borehole No. 7 also contained traces of, to some, Silt as well as traces of rootlets. The Sand Fill was proven to refusal in Borehole No. 10 at a depth of 1.8 metres below the surrounding ground surface level.

Clayey Sand Fill

Clayey Sand fill was encountered underlying the topsoil in Borehole No. 9. The brown granular fill was fine to medium in gradation and contained traces of Silt and fine to coarse Gravel as well as traces of rootlets in the upper level. The Clayey Sand Fill was proven to refusal in Borehole No. 9 at a depth of 2 metres below the surrounding ground surface level.

Sand

Sand was encountered beneath the topsoil veneer in Borehole Nos. 3, 4, 5, and 6. This granular soil is reddish brown, with traces of, to some, Silt, traces of Clay, and traces of fine to medium Gravel, and is fine to coarse in gradation. The Sand is generally in a very loose to compact condition. The material has a disturbed appearance in the upper levels of Borehole Nos. 3, 4, and 5 indicating that a portion of the deposit may be possible fill material.

Silty Clay

Silty Clay was encountered directly beneath the topsoil veneer in Borehole Nos. 1, 2, 1 [2011], 2 [2011], 3 [2011], 4 [2011], and 8 [2011], below the Sand layer in Borehole Nos. 3, 4, 5, and 6, as well as below the Sand Fill in Borehole Nos. 7 and 5 [2011] and the Silty Clay Fill in Borehole No. 6 [2011]. The cohesive soil is generally brown or reddish brown in the upper levels, becoming brown to grey with increasing depth, with traces of fine to medium Gravel, occasional shale fragments, and has a mottled and weathered appearance in the upper levels, and was described as a "Till" deposit in the lower levels of Borehole Nos. 1 [2011], 2 [2011], 4 [2011], 7 [2011] and 8 [2011]. The Silty Clay is generally stiff to hard in consistency, with the exception of a soft to firm layer encountered from approximately 3 to 6 metres below grade in each of Borehole Nos. 2, 4, 5, 1 [2011], 2 [2011], 4 [2011], 5 [2011], 6 [2011], and 7[2011]. In Borehole Nos. 1 [2011], 3 [2011], 5 [2011], and 6 [2011], thin 'wet' seams were noted in the Silty Clay deposit. The Silty Clay was proven to termination in Borehole Nos. 3 [2011], 4 [2011], 6 [2011], 7 [2011] and 8 [2011] at depths of between 6.5 and 9.6 metres below the surrounding ground surface level, and to depths of approximately 7.8 to 8.8 metres below the surrounding ground surface level in Borehole Nos. 1 [2011], 2 [2011], and 5 [2011].

Clayey Silt

Clayey Silt was encountered underlying the topsoil layer in Borehole No. 8 and contained within the Silty Clay deposit in Borehole No. 4 [2011] at a depth of approximately 4 metres below the surrounding ground surface level. The red cohesive soil was found to contain traces of rootlets and organics in Borehole No. 8.

Clayey Sand

Native Clayey Sand was encountered underlying the Clayey Silt layer in Borehole No. 8 at a depth of approximately 0.3 metres. The reddish brown granular soil was medium to coarse in gradation and contained traces of fine to coarse Gravel. The Clayey Sand was proven to refusal in Borehole No. 8 at a depth of approximately 2 metres below the surrounding ground surface level.

Organic Clayey Silt

In Borehole No. 4 [2011] the upper Silty Clay was found to transition to a deposit of Clayey Silt at a depth of approximately 4.3 metres. The Clayey Silt is grey, with some Sand and fine Gravel, a trace to some organic material and black organic staining, in a 'wet' condition, and soft in consistency. The Clayey Silt layer was encountered to a depth of 5.2 metres.

Silty Sand/Sandy Silt

In Borehole No. 1 [2011] deposits of Silty Sand and Sandy Silt were found interbedded in the Silty Clay deposit. Notably, these Sandy layers were encountered from approximately 1.4 to 2.1 and 5.9 to 6.4 metres below the existing grade. The Silty Sand and Sandy Silt deposits are brown, with some Gravel, and are generally compact to dense in terms of relative density.

Queenston Shale

Queenston Shale Bedrock was encountered beneath the Silty Clay at depths of about 7.5 to 8.8 metres below grade in Borehole Nos. 1 [2011], 2 [2011] and 5 [2011]. The shale bedrock is red, highly weathered and hard in terms of the consistency of soil. Typically the upper levels of Queenston Shale are weathered such that they exhibit the properties of hard soil, becoming sounder with depth, with occasional more resistant grey layers. The Queenston Shale was present to the termination of Borehole Nos. 1 [2011], 2 [2011] and 5 [2011] at depths of approximately 7.9 and 9.2 metres below the surrounding ground surface level.

Groundwater Observations

All boreholes were recorded as 'dry' upon completion of drilling, with the exception of the following:

Borehole No.	Free Water Depth [m]
1 [2011]	1.5
4 [2011]	3.0
5 [2011]	1.0
8 [2011]	5.5
1	1.8
2	4.3

It should be noted that the measurements listed above are not considered to be indicative of the static groundwater conditions, as insufficient time would have passed for the groundwater level to stabilise in the open boreholes in the low permeability Silty Clay soil. However, the static groundwater level often roughly coincides with the transition in soil colour from brown to grey. Thus, the static groundwater level is anticipated to be at approximately 3 to 6 metres below the existing ground surface.

4. EXCAVATIONS

It is anticipated that the excavations for the proposed foundations of the business/commercial and mixed-use buildings, sewers, and other underground services will extend to depths of up to about 3 to 5 metres below the present grade, into the cohesive Silty Clay. The sides of excavations into the upper level granular/fill soils will remain stable at slopes up to 45 degrees, although would be expected to 'slough-in' to inclinations of 3 horizontal to 1 vertical, or flatter, where wet seams are encountered. Excavation slopes in the cohesive overburden soils should remain stable for the short period of construction at slopes of up to 60 degrees to the horizontal, or steeper. 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.

As noted above the static groundwater level is estimated to be in the range of approximately 3 to 6 metres below the existing ground surface. Excavations to the depths anticipated would not be expected to encounter significant groundwater infiltration in the low permeability Silty Clay. Some infiltration of perched water through more permeable Silty Sand/Sandy Silt seams in the Silty Clay and from surface runoff should be anticipated. However the rate of infiltration is anticipated to be relatively low, such that any water that may seep 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.

The base of excavations in the native Silty Clay encountered in the boreholes should remain firm and stable. Therefore, standard pipe bedding, as typically specified by the City of Burlington should suffice. Deeper excavations, such as for the installation of sanitary sewers, may extend into the firm Silty Clay below the desiccated crust or into granular soils which may become "spongy" or "liverish" depending on the presence of perched groundwater, requiring additional bedding or ballast stone. The bedding material should be uniformly compacted to 95 per cent of the material's standard Proctor maximum dry density. Special attention should be paid to compaction under the pipe haunches.

5. BACKFILLING OPERATIONS

The majority of excavated soils will consist of the native Silty Clay, with some fill and granular soils. Select portions of the overburden materials may be considered to be suitable for use as engineered fill, trench backfill, etc., provided that they are free of organic material and/or staining, or otherwise deleterious material, and the compaction machinery is appropriately sized for the area being backfilled. Proper handling of the cohesive soils based on the material's moisture content and prevailing weather conditions during construction will be important to achieving a successful compaction operation. The onsite soils are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending upon weather conditions at the time of construction.

We note that where backfill material is placed near or slightly above its optimum 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 '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 increases to equilibrium condition. The cohesive soils and fine grained granular soils 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 per cent of its standard Proctor optimum moisture content during placement and compaction.

Fine grained granular and cohesive soils, encountered in the borings are sensitive to moisture absorption and will become practically impossible to compact using conventional compaction equipment if it becomes 'wet' during extended periods of precipitation. After a period of heavy precipitation, any near-surface softened material should be allowed to dry or be removed from the fill surface and discarded.

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.

The backfilling and compaction operations should be monitored by a representative of SOIL-MAT 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, for instance near the end of compaction 'runs', and around the foundation walls. Any engineered fill should be compacted to 100 per cent of its 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.

6. MANHOLES, CATCHBASINS AND VALVE CHAMBERS

Structures properly founded in the native soils will experience relatively small settlements under the anticipated loads. This might result in the protrusion of such structures above the pavement surface if the compaction of the fill around the structure is poor. There is also a potential that pavement surfaces may rise above the chambers due to frost action. To alleviate the potential for these types of differential movements, free draining, non-frost susceptible material should be provided as backfill around the structures located within any paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density. A geofabric separator should be provided between the free draining material and the on-site fine-grained granular soils to prevent the intrusion of fines.

Where thrust blocks are to be founded in the stiff to hard native soils and engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification using an allowable bearing pressure of 150 kPa [~3000 psf]. If thrust blocks are to be founded within the soft to firm Clay layer, larger thrust blocks and/or additional ballast material may be required. Any backfill required behind the blocks should be a crushed limestone product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT CONSIDERATIONS

The roadway areas should be cleared and stripped of all topsoil, together with any other organic and unsuitable materials. The exposed subgrade should be proofrolled with 3 to 4 passes of a loaded tandem truck or large smooth drum roller 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 must be sub excavated and replaced with suitable backfill material. Alternatively, the soft areas may be stabilised by placing coarse crushed stone and 'punching' it into the soft areas.

The need for the treatment of softened subgrade will be reduced if construction is undertaken during the dry summer months and careful attention is paid to the compaction operations. The fill over shallow utilities cut into or across the subdivision streets, such as telephone, hydro, gas, etc. must also be compacted to 100 per cent of its standard Proctor maximum dry density.

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 mitigate 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. These measures would include minimising the amount of heavy traffic travelling over the subgrade, such as during the placement of granular base layers.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as typically experienced during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Granular B sub-base coarse material. It is also important that the subdrains, and sub-base and base coarse layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level as practical.

The proposed pavement structure would be required to adequately support cars, trucks and intermittent delivery and service vehicles. For this project, a recommended pavement structure would consist of the following:

Asphalt Surface Course [HL3]	40mm
Asphalt Binder Course [HL8]	90mm
OPSS Granular 'A' Base Course	150mm
OPSS Granular 'B' Type II Sub-base Course	300mm

It is our opinion that this design is suitable for use on a commercial roadway section, provided that the subgrade has been prepared as specified and is good and firm before the sub-base course material is placed. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. The granular sub-base and base courses and asphaltic concrete layers should conform and be compacted to OPSS or City of Burlington requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

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 present 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 course particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

8. BUSINESS/COMMERCIAL AND MIXED-USE BUILDING FOUNDATIONS

A number of the boreholes were advanced in the proposed building lot areas to provide preliminary and general comments pertaining to foundation design. At the time of this report the building locations, configurations, grades, etc. had not been finalized, therefore, additional investigation and reporting will be required to provide a site specific geotechnical investigation for each proposed building. The foundations for the proposed business/commercial and mixed-use buildings may be designed to bear on the native stiff to very stiff Silty Clay and very stiff to hard Silty Clay Till using the design bearing values provided below.

Silty Clay [stiff to very stiff]:	SLS = 175 kPa [~3,500 psf]
	ULS = 250 kPa [~5,000 psf]
Silty Clay Till [very stiff to hard]:	SLS = 400 kPa [~8,000 psf]
	ULS = 600 kPa [~12,000 psf]

It is not recommended that foundations be designed to bear in the firm to soft Silty Clay. Likewise the depth of foundations in the upper stiff Silty Clay, above the firm layer, should be reviewed and the design values reduced depending on the proximity of the firm layer to the founding level.

Where foundations are required to support heavier loads the use of short concrete caissons extending into the competent Queenston Shale is recommended. For preliminary design purposes caisson foundations should extend a minimum of 1.0 metre into the Queenston Shale and may be designed for a bearing pressure of up to 1,000 kPa [~20,000 psf]. As the deflection required to achieve the ULS condition will be less than the tolerances for SLS, the SLS and ULS bearing values should be taken as the same.

Higher bearing values may be available in the overburden soils and Shale bedrock [including utilizing 'skin' friction]. However additional investigation and laboratory testing would be required to assess these values once the specific locations and configurations of the proposed structures have been finalized. It is recommended that this office be contacted to undertake detailed investigations once more details of the proposed development are known.

In the above discussion 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 typical buildings. Evidently, the bearing capacity values would be lower for very settlement sensitive structures and larger for more flexible buildings.

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.

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.

9. SEISMIC DESIGN CONSIDERATIONS

The structures 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. A higher seismic site class value, perhaps Site Class C – Very Dense Soil and Soft Rock, may be available however it would be necessary to confirm this be site specific shear wave velocity testing.

The seismic data, from Supplementary Standard SB-1 of the Ontario Building Code, for the Burlington area 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

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 only intended to describe conditions at the borehole locations. Contractors placing bids of 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 affect 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.

for Matt LiVecchi, B.Eng., EIT

Michael Brown, B.Eng., EIT

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

LICENSED PROFESSIONAL ENGINEER
Nov 30/13
S. R. SEARS
PROVINCE OF ONTARIO

John Monkman, P. Eng.
Review Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Drawing No. 1 [2011], Borehole Location Plan
Log of Borehole Nos. 1 to 10, inclusive
Log of Borehole Nos. 1 [2011] to 8 [2011], inclusive

Distribution: Penta Properties Inc. [2, plus pdf]



LEGEND

BH-# Borehole

TBM Temporary Benchmark [Top of Bell Manhole, geodetic elevation of 105.58 metres as provided by Metropolitan Consulting]

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 135134-G
2. Soil samples will be discarded after 3 months unless directed otherwise by client.
3. Borehole locations are approximate.

Soil-Mat

Engineers & Consultants Ltd.

CLIENT

Penta Properties Inc.

PROJECT TITLE

Proposed Development
1200 King Road
Burlington, Ontario

DRAWING TITLE

Borehole Location Plan

PROJECT No.	SM 135134-G
SCALE	N.T.S.
DATE	November 2013
CHECKED	SRS
DRAWN	ML

FILENAME
135134 Borehole Location Plan.kcw

DRAWING No. 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 1

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: ::

Soil-Mat

SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		104.49	Ground Surface								
0	0		***Topsoil*** Approximately 50 millimetres over		SS	1	1,2,3,4	5			
2											
4					SS	2	4,6,7,7	13			
6	2				SS	3	5,8,11,13	19		>4.5	
8					SS	4	3,4,8,8	12		>4.5	
10			***Silty Clay*** Reddish brown to greyish brown below 1.5m depth level, mottled and weathered in some layers,with traces of to some, fine to medium Gravel and shale fragments, firm to hard		SS	5	4,6,9,14	15		>4.5	
12	4										
14											
16					SS	6	8,12,19,25	31		>4.5	
18											
20	6				SS	7	13,50/2"	100		>4.5	
22		97.78	End of Borehole								
24			NOTES: 1. Borehole was advanced using solid stem auger equipment on July 4, 2013 to termination at a depth of 6.7 metres. 2. Borehole was recorded as 'wet' at a depth of 1.8 metres 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.								
26	8										
28											
30											
32											

Moisture Content w% 10 20 30 40

Standard Penetration Test blows/300mm 20 40 60 80

Drill Method: Solid Stem Augers

Drill Date: July 4, 2013

Hole Size: 150 mm

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: Geodetic

Checked by: SRS

Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 2

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

Soil-Mat

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Description	Well Data
0	0	104.38	Ground Surface	
			Topsoil Approximately 75 millimetres over	
			Silty Clay Reddish brown to greyish brown below 2 metre depth level, mottled and weathered in upper levels, with occasional red sand seams in the lower levels, traces of fine to medium Gravel and shale fragments, firm to very stiff	
22	6.7	97.67	End of Borehole	

NOTES:

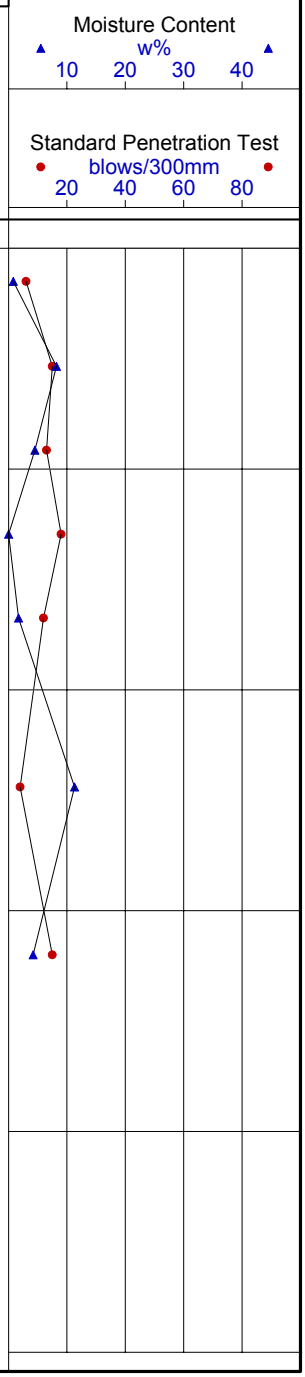
1. Borehole was advanced using solid stem auger equipment on July 4, 2013 to termination at a depth of 6.7 metres.

2. Borehole was recorded as 'wet' at a depth of 4.3 metres 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	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	2,2,4,6	6			
SS	2	6,7,8,10	15		>4.5	
SS	3	2,3,10,17	13		>4.5	
SS	4	7,8,10,12	18		>4.5	
SS	5	3,5,7,8	12		3.0	
SS	6	1,2,2,3	4			
SS	7	3,6,9,14	15		3.5	



Drill Method: Solid Stem Augers

Drill Date: July 4, 2013

Hole Size: 150 mm

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Datum: Geodetic

Checked by: SRS

Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 3

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

Soil-Mat

SUBSURFACE PROFILE

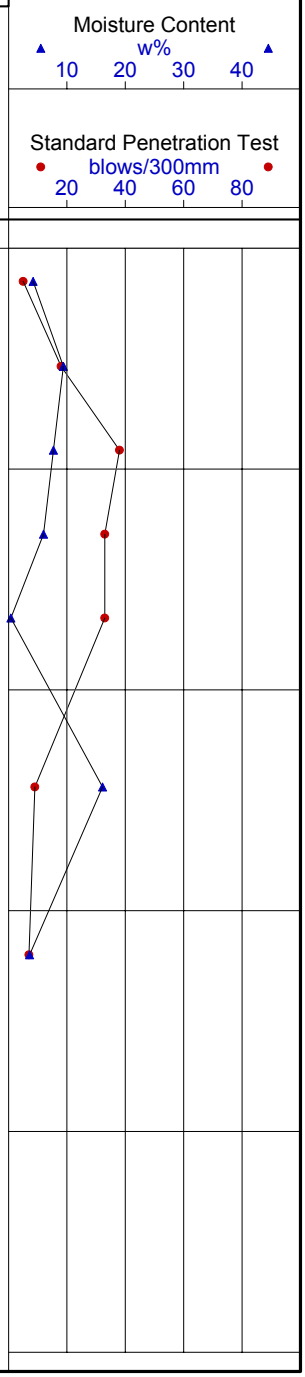
Depth (ft)	Depth (m)	Elevation [m]	Description
0	0	107.36	Ground Surface
0–2	0–0.6	107.36–106.45	**Topsoil** Approximately 75 millimetres over
2–22	0.6–6.7	106.45–100.65	**Sand** Reddish brown, medium to coarse in gradation, with traces of to some Silt and traces of fine to medium Gravel, loose to compact
12–22	3.7–6.7	100.65	**Silty Clay** Brown to grey below 5.5 metre depth level, with traces of fine to coarse Gravel and shale fragments, hard to firm
22	6.7		End of Borehole

NOTES:

1. Borehole was advanced using solid stem auger equipment on July 4, 2013 to termination at a depth of 6.7 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	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	2,2,2,3	5			
SS	2	8,8,10,13	18		>4.5	
SS	3	11,17,21,28	38		>4.5	
SS	4	9,14,19,25	33		>4.5	
SS	5	7,14,19,25	33		>4.5	
SS	6	3,3,6,7	9		3.75	
SS	7	2,3,4,4	7			



Drill Method: Solid Stem Augers

Drill Date: July 4, 2013

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 4

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

Soil-Mat

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Description
0	0	104.37	Ground Surface
			Topsoil Approximately 75 millimetres over
2		103.40	**Sand** Reddish brown, medium to coarse in gradation, with traces of to some Silt and traces of fine to medium Gravel, loose to very loose
6	2		
10			
12	4		**Silty Clay** Brown to grey below 4 metre depth level, mottled and weathered in upper levels, with traces of fine to medium Gravel and shale fragments, hard to firm
16			
20	6		
22		97.66	End of Borehole
26	8		
32			

NOTES:
1. Borehole was advanced using solid stem auger equipment on July 4, 2013 to termination at a depth of 6.7 metres.

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

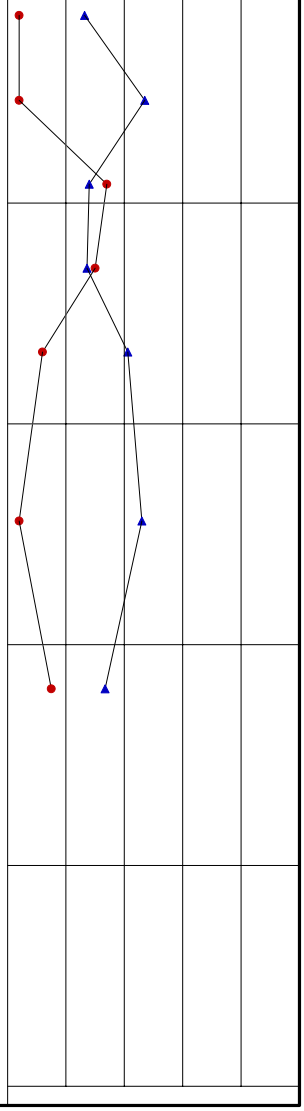
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	1,2,2,2	4			
SS	2	1,2,2,8	4		>4.5	
SS	3	11,15,19,24	34		>4.5	
SS	4	9,13,17,19	30		>4.5	
SS	5	3,5,7,9	12		4.0	
AS	6	2,2,2,3	4			
SS	7	3,6,9,12	15		2.5	

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)



Drill Method: Solid Stem Augers

Drill Date: July 4, 2013

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 5

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: ::

Soil-Mat

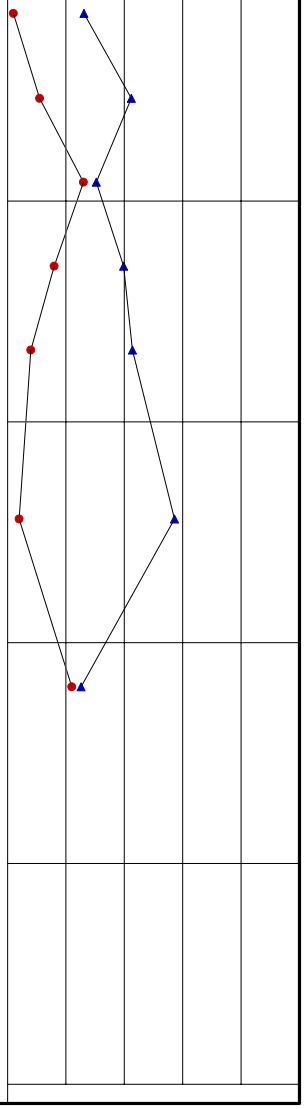
SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		104.01	Ground Surface								
0	0		**Topsoil** Approximately 75 millimetres over								
2		103.04	**Sand** Reddish brown, medium to coarse in gradation, with traces of to some Silt, very loose to loose		SS	1	1,1,1,1	2			
4					SS	2	3,4,7,7	11		>4.5	
6	2				SS	3	8,12,14,17	26		>4.5	
8					SS	4	4,7,9,11	16		>4.5	
10					SS	5	2,3,5,7	8		3.0	
12	4		**Silty Clay** Brown to grey below 3 metre depth level, with mottling and weathering in upper levels, with traces of fine to medium Gravel and shale fragments, very stiff to firm								
14											
16					SS	6	1,2,2,3	4			
18											
20	6				SS	7	8,8,14,16	22		>4.5	
22		97.30	End of Borehole								
24			NOTES: 1. Borehole was advanced using solid stem auger equipment on July 4, 2013 to termination at a depth of 6.7 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.								
26	8										
28											
30											
32											

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)



Drill Method: Solid Stem Augers

Drill Date: July 4, 2013

Hole Size: 150 mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 6

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: 593484.00m E **::** 4797000.00m N

Soil-Mat

SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		111.19		Ground Surface								
0	0			**Topsoil** Approximately 175 millimetres over		SS	1		-			
2		110.22		**Sand** Brown, fine to medium in gradation, with traces of, to some, Silt, traces of fine to medium Gravel.		SS	2		-			
4		109.67				SS	3		-			
6	2			**Silty Clay** Reddish brown, with traces of, to some, fine to coarse Gravel, trace of organic.								
8				End of Borehole								
10												
12	4											
14												
16												
18												
20	6											
22												
24												
26	8											
28												
30												
32												

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80

NOTES:
1. Borehole was advanced using Pionjar-driven percussion drill equipment on September 20, 2013 to refusal at a depth of 1.5 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: Pionjar

Drill Date: Sept. 20, 2013

Hole Size: 25mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 7

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: 593331.00m E **::** 4796811.00m N

Soil-Mat

SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		111.84	Ground Surface								
0	0		***Topsoil*** Approximately 200 millimetres over		SS	1		-			
2			***Sand Fill*** Brown, 'reworked' in appearance, fine to medium in gradation, with traces of, to some, Silt and fine to coarse Gravel, occasional rootlets.		SS	2		-			
4		110.64			SS	3		-			
6	2	110.16	***Silty Clay*** Reddish brown, traces of, to some, fine to coarse Gravel, traces of Shale fragments.								
8			End of Borehole								
10											
12	4										
14											
16											
18											
20	6										
22											
24											
26	8										
28											
30											
32											

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80

NOTES:
1. Borehole was advanced using Pionjar-driven percussion drill equipment on September 20, 2013 to refusal at a depth of 1.7 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: Pionjar

Drill Date: Sept. 20, 2013

Hole Size: 25mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 8

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: 593170.00m E **::** 4796716.00m N

Soil-Mat

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Description	Well Data
0	0	109.36	Ground Surface	
		109.06	**Topsoil** Approximately 125 millimetres over	
2			**Clayey Silt** Red, with occasional rootlets and organic staining.	
4				
6	2	107.36	**Clayey Sand** Reddish brown, medium to coarse in gradation, with traces of fine to coarse Gravel.	
8			End of Borehole	
10				
12	4			
14				
16				
18				
20	6			
22				
24				
26	8			
28				
30				
32				

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1		-			
SS	2		-			
SS	3		-			
SS	4		-			

Moisture Content w% 10 20 30 40

Standard Penetration Test blows/300mm 20 40 60 80

NOTES:
1. Borehole was advanced using Pionjar-driven percussion drill equipment on September 20, 2013 to refusal at a depth of 2.0 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: Pionjar

Drill Date: Sept. 20, 2013

Hole Size: 25mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 9

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: 593089.00m E **::** 4796530.00m N

Soil-Mat

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Symbol	Description	Well Data
0	0	107.63		Ground Surface	
0	0			**Topsoil** Approximately 125 millimetres over	
2				**Clayey Sand Fill** Brown, fine to medium in gradation, with traces of Silt and fine to coarse Gravel, rootlets in the upper level.	
6	2	105.63		End of Borehole	
8					
10					
12	4				
14					
16					
18					
20	6				
22					
24					
26	8				
28					
30					
32					

NOTES:
1. Borehole was advanced using Pionjar-driven percussion drill equipment on September 20, 2013 to refusal at a depth of 2.0 metres.

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

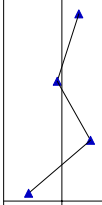
3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1		-			
SS	2		-			
SS	3		-			
SS	4		-			

Moisture Content
w%
10 20 30 40

Standard Penetration Test
blows/300mm
20 40 60 80



Drill Method: Pionjar

Drill Date: Sept. 20, 2013

Hole Size: 25mm

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Sheet: 1 of 1

Project No: SM 135134-G

Project: 1200 King Road

Location: Burlington, Ontario

Client: Penta Properties Inc.

Log of Borehole No. 10

Project Manager: SR Sears, P. Eng.

Borehole Location: See Drawing No. 1

: 592989.00m E **::** 4796500.00m N

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SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		109.56		Ground Surface								
0	0			**Topsoil** Approximately 150 millimetres over **Sand Fill** Brown, fine to coarse in gradation, with traces of fine to medium Gravel.		SS	1		-			
2						SS	2		-			
4						SS	3		-			
		107.76										
6	2			End of Borehole								
8												
10												
12	4											
14												
16												
18												
20	6											
22												
24												
26	8											
28												
30												
32												

Moisture Content w%
10 20 30 40

Standard Penetration Test blows/300mm
20 40 60 80



NOTES:
1. Borehole was advanced using Pionjar-driven percussion drill equipment on September 20, 2013 to refusal at a depth of 1.8 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: Pionjar

Drill Date: Sept. 20, 2013

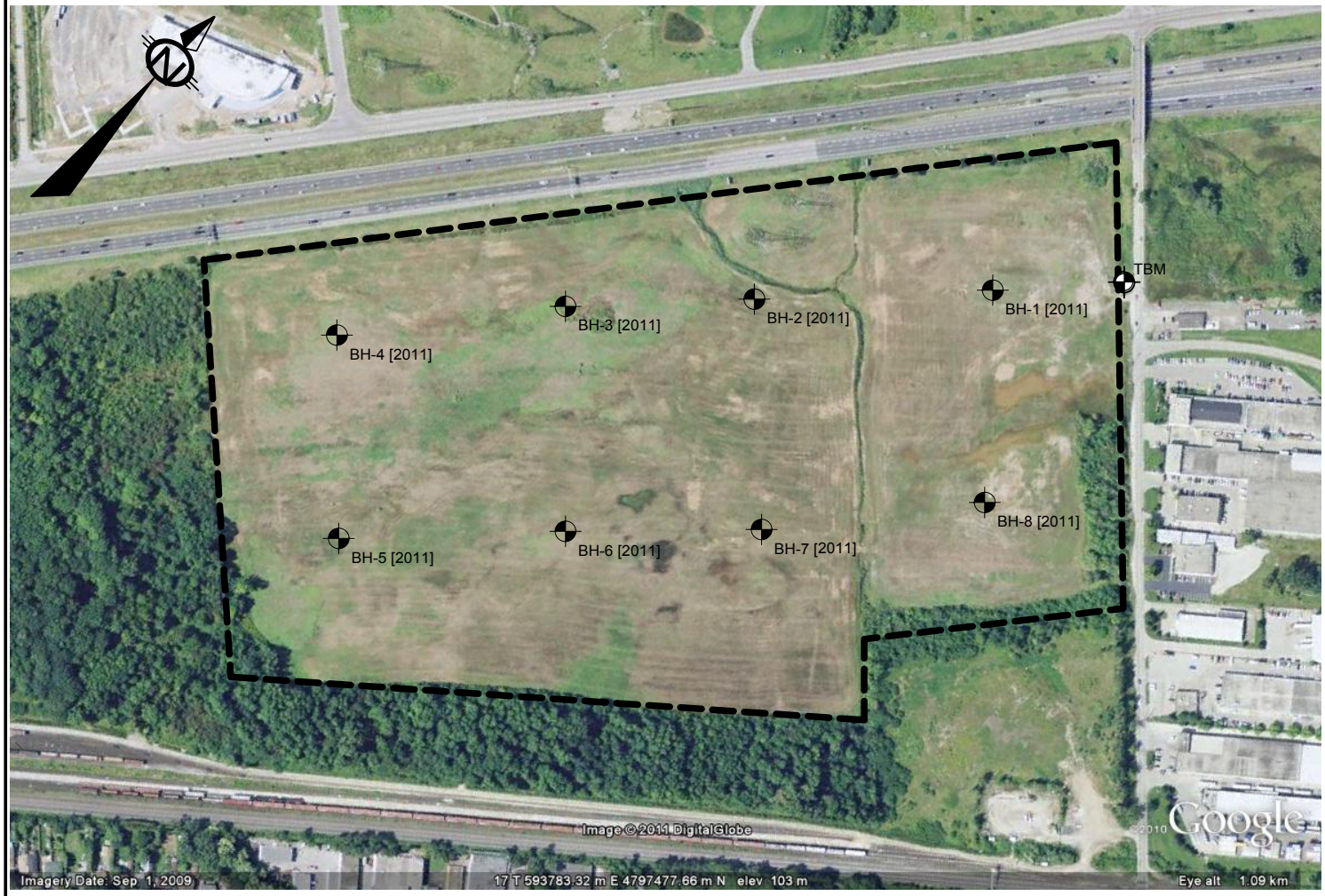
Hole Size: 25mm

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Sheet: 1 of 1



LEGEND

BH-# Borehole

TBM Temporary Benchmark
[Top nut of hydrant on west side of King Road, approximately 140m south of Highway 403, geodetic elevation of 105.7 metres as provided by Metropolitan Consulting]

Subject Site Boundary

NOTES:

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. report number SM 114018-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 2011 Digital Globe

Soil-Mat
Engineers & Consultants Ltd.

CLIENT
Paletta International Corporation

PROJECT TITLE
Geotechnical Investigation
King Road & Highway 403
Burlington, Ontario

DRAWING TITLE
Borehole Location Plan

PROJECT No.	SM 114018-G
SCALE	N.T.S.
DATE	January 2011
CHECKED	IS
DRAWN	PM

FILENAME
114018 Borehole Location Plan.kcw

DRAWING No. 1 [2011]

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 1 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

SUBSURFACE PROFILE

Depth (ft / m)	Elevation [m]	Description
0 / 0	104.66	Ground Surface
	104.36	**Topsoil** — Approximately 300 millimetres
	103.26	**Silty Clay** — Brownish red,trace sand and fine gravel, hard
6 / 2	102.56	**Silty Sand** — Brown, medium to fine grained, with some gravel, occasional thin silty clay seams, saturated, compact
		Silty Clay — Brown to grey, trace fine gravel, wet to saturated, firm to soft
12 / 4	100.86	**Silty Clay** — Grey, trace gravel and shale fragments, very stiff
	98.76	
20 / 6	98.26	**Sandy Silt** — Brownish red, some gravel, dense
		Silty Clay Till — Grey, occasional gravel, occasional shale fragments, hard
26 / 8	96.76	**Queenston Shale** — Red, severely weathered, hard
		End of Borehole

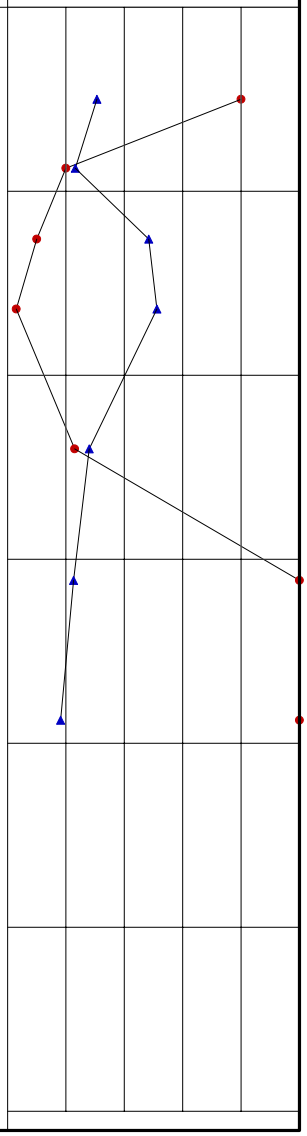
SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery
SS	1	4,45,35	80	
SS	2	11,9,11 Wet Spoon	20	
SS	3	3,4,6 Wet Spoon	10	
SS	4	1,1,2 Wet Spoon	3	
SS	5	4,8,15 Wet Spoon	23	
SS	6	26, 50/75mm Wet Spoon	100+	
SS	7	36, 50/150mm Wet Spoon	100+	

PP (kgf/cm2) | U.Wt.(kN/m3) | Well Data

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 7.9 metres.
2. Free groundwater at a depth of 1.5 metre on completion and borehole backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 2 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

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	106.35	Ground Surface							
0 – 2		**Topsoil** Approximately 150 millimetres							
2 – 12		**Silty Clay** Brown, with some grey in the lower level, trace gravel and shale fragments, hard to stiff	SS	1	5,11,15	26			
			SS	2	11,25,15	40			
			SS	3	4,5,7	12			
12 / 4	102.55								
12 – 18		**Silty Clay** Grey, trace gravel, and shale fragments, stiff to firm	SS	4	4,5,6	11			
18 / 6	100.85								
18 – 24		**Silty Clay Till** Grey to reddish grey, trace to some gravel and shale fragments, very stiff to hard	SS	5	6,9,14	23			
24	98.85								
24 – 26 / 8	98.45	**Queenston Shale** Red, severely weathered, occasional more resistant grey layers, hard	SS	6	40, 50/150mm	100+			
26 – 38 / 10		End of Borehole							

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)

NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 7.9 metres.
2. Borehole dry on completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 3 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

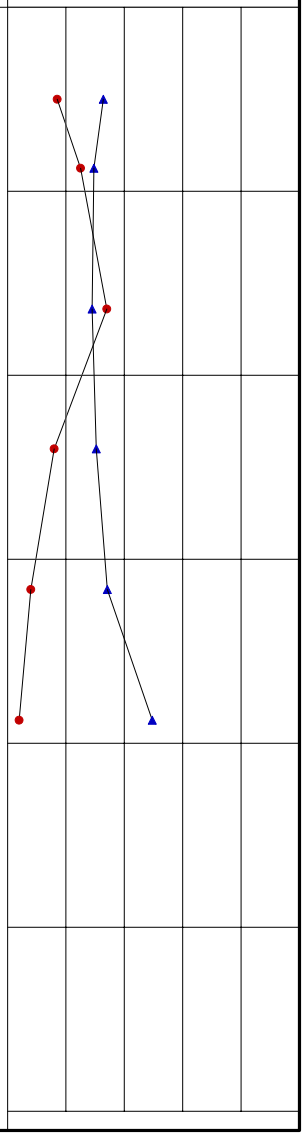
SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
		110.83	Ground Surface							
0	0		**Topsoil** Approximately 150 millimetres							
2			**Silty Clay** Reddish brown to brown, trace gravel and shale fragments, weathered, very stiff							
4				SS	1	5,7,10	17			
6	2			SS	2	8,11,14	25			
8		108.03								
10			Grey, trace gravel and shale fragments, hard to very stiff	SS	3	7,14,20	34			
12	4									
14										
16				SS	4	5,7,9	16			
		105.43								
18			**Silty Clay** Grey, trace fine gravel, 'wet', firm to soft							
20	6			SS	5	3,3,5	8			
22										
24										
26	8	102.73		SS	6	1,2,2	4			
			End of Borehole							
28										
30										
32	10									
34										
36										
38										

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)



NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 8.1 metres.
2. Borehole dry on completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

SOIL-MAT ENGINEERS & CONSULTANTS LTD.
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Datum: Geodetic

Checked by: IS

Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 4 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

SUBSURFACE PROFILE

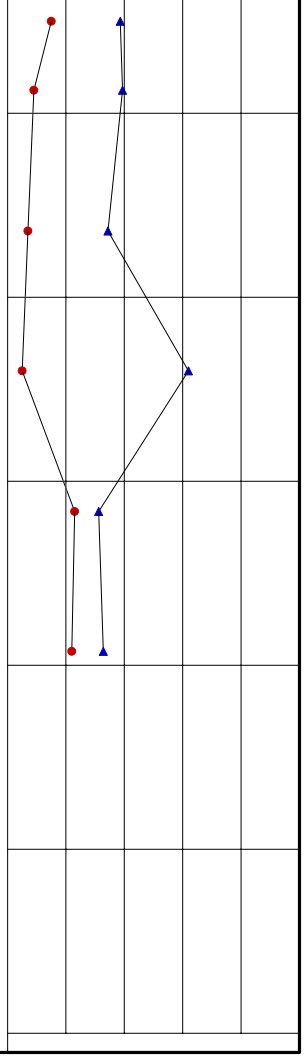
Depth (ft)	Depth (m)	Elevation [m]	Description
0	0	112.71	Ground Surface
			Topsoil Approximately 100 millimetres
			Silty Clay Reddish brown to brown, trace gravel, thin coarse sand seams in the lower level, weathered, very stiff to stiff
	2	108.41	
			Clayey Silt Grey, some sand and fine gravel, trace to some organic material and black organic staining, 'wet', firm to soft
		107.51	
			Silty Clay Till Grey, trace to some gravel and shale fragments, very stiff
	8	104.61	
			End of Borehole

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	5,7,8	15			
SS	2	3,4,5	9			
SS	3	2,3,4 Wet Spoon	7			
SS	4	3,3,2 Wet Spoon	5			
SS	5	5,9,14 Wet Spoon	23			
SS	6	6,10,12 Wet Spoon	22			

Moisture Content w% 10 20 30 40

Standard Penetration Test blows/300mm 20 40 60 80



NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 8.1 metres.
2. Free groundwater at a depth of 3 metres on completion and borehole backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 5 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

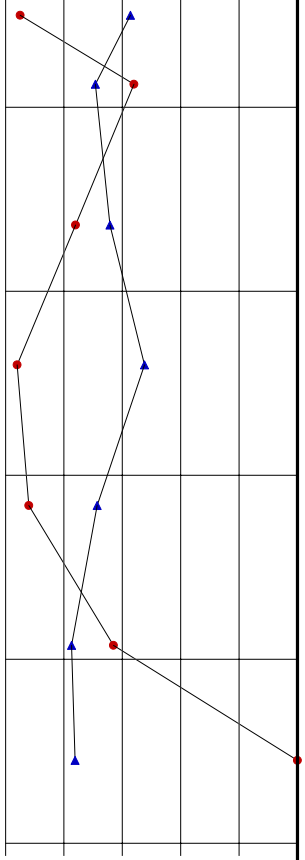
SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Description	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0	0	104.83	Ground Surface							
0	0		**Topsoil** Approximately 200 millimetres							
4		103.53	**Silty Sand** Brown, with some gravel, trace clay, possibe fill, saturated, loose	SS	1	4,1,4 Wet Spoon	5			
6	2		**Silty Clay** Brown to grey, trace gravel and shale fragments, weathered, hard to very stiff	SS	2	14,20,24 Wet Spoon	44			
10				SS	3	5,10,14 Wet Spoon	24			
12	4	100.83	**Silty Clay** Grey, trace fine gravel, 'wet', soft to firm	SS	4	2,2,2 Wet Spoon	4			
20	6			SS	5	2,3,5 Wet Spoon	8			
22		97.83	**Silty Clay Till** Grey, trace to some fine gravel and shale fragments, hard							
26	8			SS	6	7,15,22 Wet Spoon	37			
28		96.03								
30		95.63	**Queenston Shale** Red, severely weathered, occasional more resistant grey layers, hard	SS	7	50/75mm Wet Spoon	100+			
32	10		End of Borehole							

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)



NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 9.2 metres.
2. Free groundwater at a depth of 1 metre on completion and borehole backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 6 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

SUBSURFACE PROFILE

Depth (ft / m)	Elevation [m]	Description
0 / 0	103.25	Ground Surface
		Topsoil Approximately 100 millimetres
	101.85	**Silty Clay Fill** Brown, with gravel, occasional medium to coarse grained sand, stiff
6 / 2		**Silty Clay** Brown to grey, trace to some fine gravel and shale fragments, weathered, very stiff
	99.25	
14 / 4		**Silty Clay** Grey, trace fine gravel and shale fragments, 'wet', firm
20 / 6	96.75	
		End of Borehole

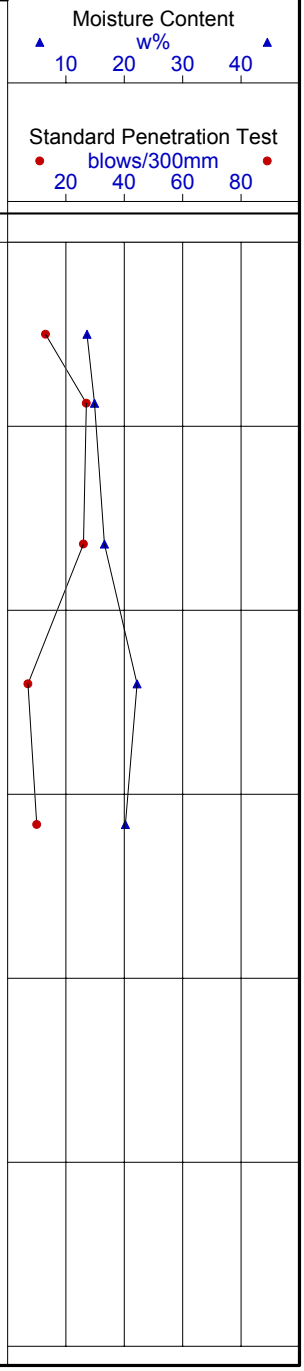
NOTES:
1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 6.5 metres.

2. Borehole dry on completion backfilled as per Ontario Regulation 903.

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

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	6,6,7	13			
SS	2	7,12,15	27			
SS	3	7,11,15	26			
SS	4	3,3,4	7			
SS	5	3,4,6	10			



Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 7 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

SUBSURFACE PROFILE

SAMPLE

Depth (ft)	Depth (m)	Elevation [m]	Symbol	Description	Well Data	Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0	0	102.88		Ground Surface								
0	0			***Silty Clay*** Brownish red, some fine gravel, possible fill, stiff								
4		101.58				SS	1	2,4,6	10			
6	2			***Silty Clay*** Brown to grey, trace to some fine gravel, weathered, very stiff		SS	2	11,14,15	29			
10						SS	3	7,8,9	17			
12	4	98.88										
14				***Silty Clay*** Grey, trace fine gravel, 'wet', soft to stiff		SS	4	2,2,3	5			
18	6											
20		96.18				SS	5	5,5,7	12			
22				***Silty Clay Till*** Grey, trace to some fine gravel and shale fragments, hard								
26	8					SS	6	8,16,28	44			
28												
30		93.33				SS	7	17,32, 50/100mm	100+			
32	10			End of Borehole								
34												
36												
38												

Moisture Content w% (10, 20, 30, 40)

Standard Penetration Test blows/300mm (20, 40, 60, 80)

NOTES:

1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 9.55 metres.
2. Borehole dry on completion and backfilled as per Ontario Regulation 903.
3. Soil samples will be discarded after three months unless otherwise directed by our client.

Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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Sheet: 1 of 1

Project No: SM 114018-G

Project: 403 & King Road

Location: Burlington, Ontario

Client: Paletta International Corporation

Log of Borehole No. 8 [2011]

Borehole Location: See Drawing No. 1

Project Manager: Ian Shaw, P. Eng.

Soil-Mat

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Elevation [m]	Description
0	0	103.42	Ground Surface
0	0		**Topsoil** Approximately 150 millimetres
2			**Silty Clay** Reddish brown to brown to grey, trace to some fine gravel, weathered, very stiff
12	4	99.42	**Silty Clay Till** Grey, trace to some fine gravel and shale fragments, very stiff to hard
20	6	96.92	End of Borehole

NOTES:
1. Borehole advanced using solid stem continuous flight auger equipment on January 21, 2011 to termination at a depth of 6.5 metres.

2. Free groundwater at a depth of 5.5 metres on completion and borehole backfilled as per Ontario Regulation 903.

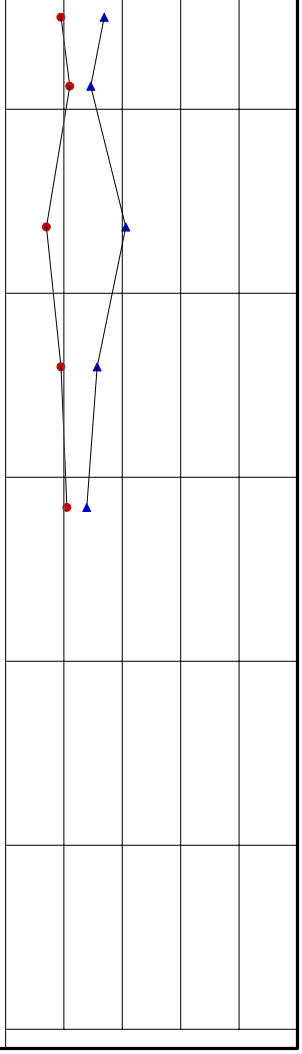
3. Soil samples will be discarded after three months unless otherwise directed by our client.

SAMPLE

Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
SS	1	7,9,10	19			
SS	2	4,8,14	22			
SS	3	4,6,8 Wet Spoon	14			
SS	4	6,7,12 Wet Spoon	19			
SS	5	5,8,13 Wet Spoon	21			

Moisture Content w% 10 20 30 40

Standard Penetration Test blows/300mm 20 40 60 80



Drill Method: Solid Stem Auger

Drill Date: January 21, 2011

Hole Size: 150mm

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