REPORT ON
PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED NEW ALTON SUBDIVISION
QUEEN STREET
CALEDON, ONTARIO

Prepared for:

1029629 ONTARIO INC.

Prepared By:

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Project: SP17-213-10
September 6, 2017

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1. INTRODUCTION

Sirati & Partners Consultants Limited (SPCL) was retained by 1029629 Ontario Inc. to undertake a geotechnical investigation at the property located in the village of Alton, northwest of the Queen Street and Main Street intersection in Caledon, Ontario.

The property under investigation consists of a 14.5 acres vacant land. It is understood that the subject property will be redeveloped into a new residential subdivision with 40 single detached lots.

The design details of the proposed development are not available to us at the time of writing this report, hence this report should be considered preliminary.

This report deals with geotechnical issues only. Environmental and hydrogeological studies for the subject site are reported under separate covers.

The purpose of this preliminary geotechnical investigation was to obtain information about the subsurface conditions at borehole locations and from the findings in the boreholes make preliminary recommendations pertaining to the geotechnical design of underground utilities, subdivision roads and to comment on the foundation conditions for general house construction.

This report is provided based on the terms of reference presented above and on the assumption that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for 1029629 Ontario Inc. and its architect and designers. Third party use of this report without Sirati & Partners Consultants Limited (SPCL) consent is prohibited. The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

2. FIELD AND LABORATORY WORK

A total of eight boreholes (BH1 through BH8; see Drawing 1 for location plan) were drilled to depths ranging from 6.8 m to 12.7 m below the existing grade. The location of BH5 was moved 21 m towards the north from its initially planned location due to limited accessibility caused by trees. Boreholes were drilled with hollow stem continuous flight auger equipment by a drilling sub-contractor under the direction and supervision of SPCL personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a

hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the SPCL laboratory for detailed examination by the project engineer and for laboratory testing.

In addition to visual examination in the laboratory, all soil samples were tested for moisture content. Selected three soil samples were subjected to grain size analyses and gradation curves are presented in Figure 10.

Water level observations were made during drilling and in the open boreholes at the completion of the drilling operations. Monitoring wells were installed in four boreholes (BH1, BH5, BH6, and BH7) for the long-term (stabilized) groundwater level monitoring.

Presence of heavily wooded area and vegetation prohibited SPCL personnel to use the conventional differential GPS system to survey the borehole locations. We therefore require this information to be provided to SPCL for inclusion in the borehole logs.

3. SITE AND SUBSURFACE CONDITIONS

The borehole location plan is shown in Drawing 1. Notes on soil descriptions are presented in Drawing 1A. The subsurface conditions in the boreholes are presented in the individual borehole logs (Encl. 2 to 9 inclusive). The subsurface conditions in the boreholes are summarized in the following paragraphs.

3.1 SOIL CONDITIONS:

Topsoil/Fill Material:

A 220 mm to 330 mm thick surficial layer of topsoil was found at all borehole locations. The thickness of the topsoil in each borehole is shown in the borehole log. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

Below the topsoil, fill material was encountered in all boreholes, except BH6, extending to depths ranging from 0.8 m to 2.3 m. The fill material mainly consisted of sand and silty sand with trace of clay and topsoil. The measured SPT 'N' values in the fill material ranged from 1 to 6 blows for 300 mm penetration, indicating its very loosely- to loosely-compacted state.

Cohesionless Silty and Sandy Deposits

The native soil underlying the fill material in all boreholes consisted of cohesionless soils of sand, sandy silt to silty sand, silt, and sand and gravel. The SPT 'N' values ranged from 2 blows per 300 mm penetration to 50 blows for less than 300 mm penetration, more commonly between 8 and 17, indicating a loose to dense compaction state. The layer was not fully penetrated in BH1 through BH5, and BH8.

Grain size analyses of four (4) samples (BH1/SS4, BH2/SS3, BH3/SS6, BH7/SS3) were conducted and the results are presented in Figure 10, with the following fractions:

Clay: 8 to 13%
Silt: 7 to 30%
Sand: 57 to 81%
Gravel: less than 9%

Sandy Silt to Silty Sand Till

The cohesionless silty and sandy deposits in BH6 was underlain by glacial till deposits comprising sandy silt to silt sand soils. The layer was observed to extend from 6.1 m to the bottom of the borehole. The layer was found to be in a loose to dense state, with measured SPT 'N' values ranging from 8 blows to over 50 blows for 300 mm penetration. This layer was not fully penetrated.

Clayey Silt to Silty Clay Till

A cohesive layer of clayey silt to silty clay till was observed in BH7, underlying the sand to silty sand layer. The layer was observed to extend from 10.7 m to the bottom of the borehole. The layer was found to be in a stiff to hard state, with measured SPT 'N' values ranging from 8 to 36 blows per 300 mm penetration. The layer was not fully penetrated.

3.2 GROUNDWATER CONDITIONS

Upon completion of drilling (short-term), groundwater was found in all boreholes to be at 1.5 m to 3.0 m below the existing grade. The stabilized groundwater level in the monitoring wells was measured in the installed wells on July 13, 2017 and recorded to be at 2.9 m, 2.7 m, 2.9 m and 1.3 m below the existing grade in BH/MW1, BH/MW5, BH/MW6, and BH/MW7, respectively, as listed in Table 1.

Table 1: Groundwater Levels Observed in Monitoring Wells

BH No.	Date of Drilling	Date of Observation	Depth of Groundwater Below Existing Grade (m)
BH1	June 6, 2017	July 13, 2017	2.9
BH5	June 7, 2017	July 13, 2017	2.7
BH6	June 6, 2017	July 13, 2017	2.9
BH7	June 7, 2017	July 13, 2017	1.3

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. DISCUSSION AND RECOMMENDATIONS

4.1 GENERAL

It is proposed to develop the site as a residential subdivision. The lots will therefore be serviced by a network of roads, storm and sanitary sewers and watermains.

The groundwater table at the subject site is generally high, at about 1.3 m to 2.9 m below the existing grade. It is anticipated that groundwater control is required during the construction of underground services. Also, installation of permanent underfloor drainage would be necessary.

A hydrogeological study is recommended for the subject site to evaluate the type and extent of groundwater control required during the construction and permanent groundwater control upon completion of the construction. The seasonally high groundwater table must be established with a long-term groundwater levels monitoring program. Subject to the findings from the hydrogeological study, a permit to take water (PTTW) may also be required.

4.2 ROADS

The investigation has shown that the predominant subgrade soil at the site, after stripping the topsoil, fill material and any other organic and otherwise unsuitable soils (weather/disturbed silty clay/clayey silt) at occasional locations, will generally consist of sandy silt to silty sand, sand, and sand and gravel.

Based on the above and assuming that traffic usage will be residential minor local or local, the following minimum pavement thickness is recommended:

40 mm HL3 Asphaltic Concrete
65 mm HL8 Asphaltic Concrete
150 mm Granular 'A'
300 mm Granular 'B'

These values may need to be adjusted according to the Township of Caledon Standards. The pavement structure recommended above assumes that the subgrade has sufficient bearing capacity to accommodate the applied pavement structure and local traffic. The site subgrade and weather conditions (i.e. if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. Furthermore, heavy construction equipment may have to be kept off the newly constructed roads before the placement of asphalt and/or immediately thereafter, to avoid damaging the weak subgrade by heavy truck traffic.

4.2.1 Stripping, Sub-excavation and Grading

The site should be stripped of all topsoil, weathered/disturbed soils and any organic or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas.

Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer, by at least several passes of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, similar to the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be recompacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Proper cambering and allowing the water to escape towards the sides (where it can be removed by means of subdrains) is considered to be beneficial for this project. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave, etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at ±2% of the optimum moisture content, imported granular material must be used.

Any fill required for regrading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in thin layers and compacted to at least 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade, as per Town Standards. The compaction of the new fill should be checked by frequent field density tests.

4.2.2 Construction

Once the subgrade has been inspected and approved, the granular base and sub-base course materials should be placed in layers not exceeding 200 mm (uncompacted thickness) and should be compacted to at least 100% of their respective SPMDD. The grading of the material should conform to current OPS Specifications.

The placing, spreading and rolling of the asphalt should be in accordance with OPS Specifications or, as required by the local authorities.

Frequent field density tests should be carried out on both the asphalt and granular base and sub-base materials to ensure that the required degree of compaction is achieved.

4.2.3 Drainage

The Township of Caledon requires the installation of full-length subdrains on all roads. The subdrains should be properly filtered to prevent the loss of (and clogging by) soil fines.

All paved surfaces should be sloped to provide satisfactory drainage towards catch basins. As discussed in Section 4.2.1, by means of good planning any water trapped in the granular sub-base materials should be drained rapidly towards subdrains or other interceptors.

4.3 SEWERS

As a part of the site development, a network of new storm and sanitary sewers is to be constructed.

4.3.1 Trenching

It is expected that the trenches will be dug through sandy silt to silty sand, silt, and sand deposits, in some locations below the groundwater. Positive dewatering such as well points will be required prior to any trenching/excavation in cohesionless sandy soils below the groundwater table, otherwise it will result into flowing sides and unstable base. Water table must be lowered to 1m below the lowest excavation level. Further dewatering details should be confirmed by the hydrogeology report.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the overburden can be classified as Type 3 Soil above the groundwater table and Type 4 Soil below the groundwater table.

4.3.2 Bedding

The boreholes show that, in their undisturbed state, native soils may not provide adequate support for the sewer pipes to allow the use of normal Class B type bedding. Any loose material should be replaced with engineered fill. The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, have to be increased depending on the pipe diameter. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. After installing the pipe on the bedding, a granular surround of approved bedding material, which extends at least 300 mm above the obvert of the pipe, or as set out by the local authority, should be placed.

To avoid the loss of soil fines from the subgrade, uniformly graded clear stone should not be used unless, below the granular bedding material, a suitable, approved filter fabric (geotextile) is placed. The geotextile should extend along the sides of the trench and should be wrapped all around the poorly graded bedding material.

4.3.3 Backfilling of Trenches

Based on visual and tactile examination, and the measured moisture contents of the soil samples, the onsite excavated soils will generally need to be brought to ±2% of the optimum moisture content. If the soils are too wet to be re-used as backfill material in the service trenches, proper aeration will be required prior to their use as backfill material. Unless the materials are properly pulverized and compacted in sufficiently thin lifts, post-construction settlements could occur. The backfill should be placed in maximum 200 mm thick layers at or near (±2%) their optimum moisture content, and each layer should be compacted to at last 95% SPMDD. Unsuitable materials such as organic soils, boulders, cobbles, frozen soils, etc. should not be used for backfilling. Otherwise imported selected inorganic fill will be required for backfilling at this site.

The onsite excavated soils should not be used in confined areas (e.g. around catch basins and laterals under roadways) where heavy compaction equipment cannot be operated. The use of imported granular fill together with an appropriate frost taper would be preferable in confined areas and around structures, such as catch basins.

4.4 SITE GRADING AND ENGINEERED FILL

In the areas where earth fill is required for site grading purposes, an engineered fill may be constructed below house/building foundations, roads, boulevards, etc.

Prior to the construction of engineered fill, all topsoil, fill material, weak weathered / disturbed and any other unsuitable materials must be removed in this area. After the removal of all unsuitable materials, the excavation base consisting of native soil deposits must be inspected and approved by a qualified geotechnical engineer prior to any placement of engineered fill. The base of the excavation should be compacted and proof rolled with heavy compactors (minimum 10,000 kg). During proof rolling, any spongy, wet or soft/loose spots should be sub-excavated to stable subgrade and replaced with approved soil, compatible with subgrade conditions, as directed by the geotechnical engineer.

The material for engineered fill should consist of approved inorganic soil, compacted to 100 percent of Standard Proctor Maximum Dry Density (SPMDD). Recommendations regarding engineered fill placement are provided in **Appendix A** of this report.

To reduce the risk of improperly placed engineered compacted fill, full-time supervision of the contractor is essential by SPCL to certify the engineered fill. Despite full time supervision, it has been found that contractors frequently bulldoze loose fill into areas and compact only the surface. The inspector, either busy on other portions of the site or absent during "off hours" will be unaware of this condition. This potential problem must be recognized and discussed at a pre-construction meeting.

Depending upon the amount of grade raise, there will be consolidation settlement of the underlying soils. Additionally, there will be settlement of the engineered fill under its own weight, approximately 0.5% of the fill height. A waiting period of 3 to 6 months may be required prior to the construction of any structures on engineered fill. This should be confirmed during the detail design stage, once the grading plans for the proposed development are available.

4.5 FOUNDATION CONDITIONS

The boreholes show that provided the foundation soil is undisturbed during the construction, in general, allowable soil bearing values of 90 to 150 kPa (SLS) are feasible in the undisturbed inorganic natural soils, at or below the depths provided on Table 2. The bearing value would be suitable for the use of normal spread footing foundations to support normal single-family dwellings.

Table 2: Bearing Values and Founding Levels of Spread Footings

BH No.	Material	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth Below Existing Ground (m)	Founding Level at or Below Elevation (m)
BH1	Sand	90	135	4.6	TBD
BH2	Sand and Gravel	150	225	2.6	TBD
BH3	Sandy Silt	90	135	3.3	TBD
BH4	Silt	150	225	3.3	TBD
BH5	Silty Sand to Sand	120	180	2.6	TBD
BH6	Sand	90	135	1.2	TBD
BH7	Silty Sand	90	135	1.8	TBD
BH8	Clayey Silt/Silty Clay	100	150	2.6	TBD

Where the grade needs to be raised, the proposed structures can be supported by spread and strip footings founded on engineered fill for an allowable bearing pressure of 150 kPa. The engineered fill supporting footings should be constructed in accordance with the guidelines presented in **Appendix A**. Other requirements of engineered fill are given in Section 4.4.

All footings must be founded below a 1.5 m of frost cover.

5. GENERAL COMMENTS ON REPORT

Sirati & Partners Consultants Limited (SPCL) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Sirati & Partners will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

SIRATI & PARTNERS CONSULTANTS LIMITED

Meysam Najari, Ph.D., E.I.T.

Archie Sirati, Ph.D., P.Eng.

Drawings

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

750 Millway Avenue, Unit-8,
Vaughan, ON L4K 0M7
Phone#905-669-4477, Fax#905-669-4488

North:

Legend:

Property Boundary

BH#: Borehole

Project Title:

Geotechnical Investigation

Site Location:

Lot 23, Concession 4, W.H.S.
Town of Caledon, Ontario

Figure Title: Site Location

Scale: 0 25m 50m

Project Number: SP17-213-10

Date: September 2017

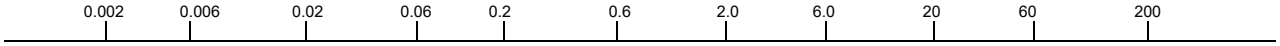
Figure Number: 1

Drawing 1A: Notes on Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Sirati & Partners Consultants Limited also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH1

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/06/2017

REF. NO.: SP17-213-10
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH (kPa)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** 220mm											
0.2	**FILL:** silty sand, trace clay, trace gravel, dark brown, very moist, very loose		1	SS	3							
0.8	**SANDY SILT TO SILY SAND:** trace clay, trace gravel, brown, moist, very loose		2	SS	3							
1.5	**SILT:** trace to some sand, trace clay, brown, wet, very loose		3	SS	2							
2.3	**SANDY SILT TO SILY SAND:** trace clay, trace gravel, brown, wet, very loose to loose		4	SS	4							0 57 30 13
			5	SS	2		W. L. 2.9 mBGL Jul 13, 2017					
4.6	**SAND:** trace silt, grey, wet, loose		6	SS	9							
5.1	**SANDY SILT TO SILY SAND:** trace clay, trace gravel, brown, wet, loose											
6.1	**SAND AND GRAVEL:** trace silt, some cobbles, brown, wet, very dense		7	SS	50/ 120mm							
6.4	**END OF BOREHOLE**											

Notes:
1) Monitoring well installed in the borehole upon completion.
2) Water level in the well was measured to be at 2.9 m depth on July 13, 2017.

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +³, ×³: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH2

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/07/2017

REF. NO.: SP17-213-10
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** 250mm											
0.3	**FILL:** silty sand, trace topsoil, trace gravel, brown, moist, very loose		1	SS	3							
1			2	SS	4							
1.5	**SAND AND GRAVEL:** trace silt, brown to dark brown, wet, very loose		3	SS	4							9 72 7 12
2	dense at 2.3m		4	SS	34							
3												
3.0	**FINE SAND:** trace to some silt, some gravel, occasional cobble/boulder, brown, wet, compact to very dense		5	SS	11							
4												
			6	SS	45							
5												
6			7	SS	51							
7												
7.6	**END OF BOREHOLE** Notes: 1) Auger refusal and terminated. 2) Water level at 1.8 m during drilling.		8	SS	50/ 25mm							

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH3

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/05/2017

REF. NO.: SP17-213-10
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** 250mm											
0.3	**FILL:** sandy silt, trace clay, brown, moist, very loose to loose		1	SS	2				○			
			2	SS	5				○			
1.5	**SANDY SILT:** trace clay, greyish brown, wet, very loose to loose		3	SS	4				○			
			4	SS	2				○			
			5	SS	9				○			
3.7	**SAND:** trace silt, brown, wet, loose to compact											
			6	SS	24				○			0 81 7 12
6.1	**SANDY SILT TO SILTY SAND:** trace clay, trace gravel,brown, wet, compact		7	SS	12				○			
	very dense below 7.6m		8	SS	23							
8.2	**END OF BOREHOLE** Notes: 1) Auger refusal and terminated. 2) Water level at 2.4 m during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH4

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/06/2017

REF. NO.: SP17-213-10
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:** 330mm		1	SS	2							
0.3	**FILL:** silty sand, trace clay, brown, moist, very loose		2	SS	2							
1.5	**FILL:** sand, some silt, trace topsoil, trace gravel, brown, moist, very loose		3	SS	1							
2.3	**SANDY SILT:** trace clay, trace gravel, greyish brown, very moist, very loose		4	SS	4							
3.0	**SILT:** trace to some clay, trace sand, greyish brown, wet, compact		5	SS	14							
4.6	**SAND:** trace to some silt, trace clay, brown, wet, compact		6	SS	16							
			7	SS	14							
7.6	**SILT:** trace to some clay, trace sand, grey, wet, compact		8	SS	23							
	very dense below 9.1m		9	SS	53							
9.7	**END OF BOREHOLE** Notes: 1) Water level at 2.4 m during drilling.											

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH5

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/07/2017

REF. NO.: SP17-213-10
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:**250mm											
0.3	**FILL:** sand, some crusher limestone, brown to grey, moist, very loose		1	SS	2							
			2	SS	4							
1.6	**SANDY SILT TO SILTY SAND:** trace clay, brown, moist, compact		3	SS	10							
2.3	**SILTY SAND TO SAND:** trace gravel, brown, wet, compact		4	SS	14	▽	W. L. 2.7 mBGL Jul 13, 2017					
3.0	**SANDY SILT TO SILTY SAND:** trace clay, brown, wet, compact to dense		5	SS	13							
4.6	**SANDY SILT TILL:** trace to some clay, occasional cobble/boulder, brown, wet, dense		6	SS	40							
6.1	**SAND AND GRAVEL:** some cobble/boulder, greyish brown, wet, dense to very dense		7	SS	30							
7.6	**END OF BOREHOLE** Notes: 1) Auger refusal and terminated. 2) Water level in the well was measured to be at 2.7 m depth on July 13, 2017.		8	SS	50/ 25mm							

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH6

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/06/2017

REF. NO.: SP17-213-10
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:**280mm		1	SS	2							
0.3	**SAND:** trace to some gravel, trace silt, greyish brown, moist, very loose to loose		2	SS	9							
1.5	**GRAVELLY SAND:** trace silt, greyish brown, moist, dense		3	SS	31							
2.3	**SILTY SAND:** trace clay, brown, wet, compact		4	SS	13							
3.0	**SILT TO SANDY SILT:** trace clay, trace gravel, brown, wet, compact		5	SS	26	▽	W. L. 2.9 mBGL Jul 13, 2017					
4.6	**SAND:** trace silt, grey, wet, compact		6	SS	16							
6.1	**SANDY SILT TILL:** trace to some clay, trace gravel, layer of crusher limestone, brown, wet, very dense		7	SS	55							
7.6	**SILTY SAND TILL:** trace clay, trace gravel, brown, wet, loose		8	SS	8							
	dense to very dense below 9.1m		9	SS	40							
10.4	**END OF BOREHOLE** Notes: 1) Monitoring well installed in the borehole upon completion. 2) Water level in the well was measured to be at 2.9 m depth on July 13, 2017.		10	SS	50/ 25mm							

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ε_f=3% ○ Strain at Failure

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH7

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/07/2017

REF. NO.: SP17-213-10
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	**TOPSOIL:**280mm											
0.3	**FILL:** silty sand, trace topsoil, trace rootlets, brown, moist, loose		1	SS	6				○			
0.8	**FILL:** sand mixed with limestone, trace cobble, brown, moist, compact		2	SS	22							
1.5	**SILTY SAND:** trace sand, trace clay, brown, wet, loose to compact		3	SS	8	▽	W. L. 1.3 mBGL Jul 13, 2017		○			0 79 13 8
			4	SS	13				○			
			5	SS	14				○			
			6	SS	19				○			
			7	SS	22				○			
			8	SS	8				○			
9.1	**SILTY CLAY:** trace sand, trace gravel, grey, wet, stiff		9	SS	8				○			
10.7	**CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, hard		10	SS	36				○			
12.2	**INTERBEDDED SILT AND CLAYEY SILT:** trace sand, trace gravel, brown, moist, stiff		11	SS	13				○			
12.7	**END OF BOREHOLE**											

Notes:
1) Monitoring well installed in the borehole upon completion.
2) Water level in the well was measured to be at 1.3 m depth on July 13, 2017.

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon_f}$=3% Strain at Failure

Sirati & Partners Consultants Ltd.
Geotechnical & Environmental Services
Engineering Solutions

LOG OF BOREHOLE BH8

PROJECT: Geotechnical and Hydrogeological Services
CLIENT: Derrick Libawski
PROJECT LOCATION: New Alton Subdivision Queen Street, Caledon, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Hollow Stem Augers
Diameter: 200mm
Date: Jun/07/2017

REF. NO.: SP17-213-10
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
0.0	**TOPSOIL:**280mm						
0.3	**FILL:** silty sand, trace topsoil, brown, moist, very loose		1	SS	3		
0.8	**SILTY SAND:** trace clay, brown, moist, very loose		2	SS	2		
1.5	**SAND:** trace to some silt, brown, moist, very loose		3	SS	4		
2.3	**SILTY SAND:** trace clay, trace gravel, brown, wet, compact		4	SS	10		
			5	SS	11		
4.6	**SANDY SILT:** trace clay, grey, wet, compact		6	SS	10		
			7	SS	12		
6.7	**SAND:** trace silt, grey, wet, compact						
7.6	**SAND AND GRAVEL WITH COBBLES:** some silt, brown, wet, compact to dense		8	SS	18		
			9	SS	38		
9.7	**END OF BOREHOLE** Notes: 1) Water level at 2.6 m during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

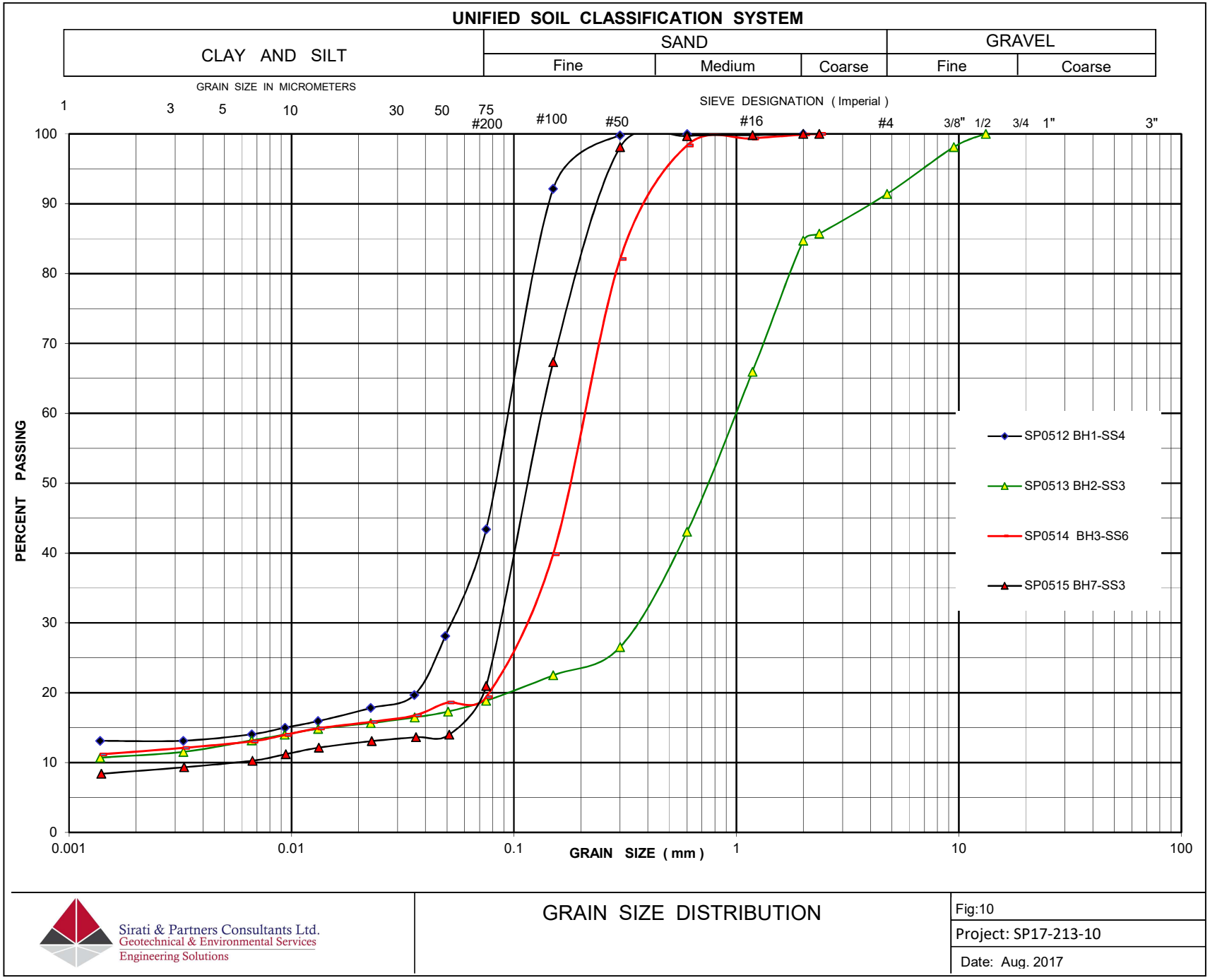
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

SPCL SOIL LOG SP17-213-10 - ALTON SUBDIVISION.GPJ SPCL.GDT 8/29/17

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure



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Engineering Solutions

GRAIN SIZE DISTRIBUTION

Fig:10

Project: SP17-213-10

Date: Aug. 2017

Appendix A:

Guidelines for Engineered Fill

GENERAL REQUIREMENTS FOR ENGINEERED FILL

Compacted imported soil that meets specific engineering requirements and is free of organics and debris and that has been continually monitored on a full-time basis by a qualified geotechnical representative is classified as engineered fill. Engineered fill that meets these requirements and is bearing on suitable native subsoil can be used for the support of foundations.

Imported soil used as engineered fill can be removed from other portions of a site or can be brought in from other sites. In general, most of Ontario soils are too wet to achieve the 100% Standard Proctor Maximum Dry Density (SPMDD) and will require drying and careful site management if they are to be considered for engineered fill. Imported non-cohesive granular soil is preferred for all engineered fill. For engineered fill, we recommend use of OPSS Granular 'B' sand and gravel fill material.

Adverse weather conditions such as rain make the placement of engineered fill to the required degree of density difficult or impossible; engineered fill cannot be placed during freezing conditions, i.e. normally not between December 15 and April 1 of each year.

The location of the foundations on the engineered fill pad is critical and certification by a qualified surveyor that the foundations are within the stipulated boundaries is mandatory. Since layout stakes are often damaged or removed during fill placement, offset stakes must be installed and maintained by the surveyors during the course of fill placement so that the contractor and engineering staff are continually aware of where the engineered fill limits lie. Excavations within the engineered fill pad must be backfilled with the same conditions and quality control as the original pad.

To perform satisfactorily, engineered fill requires the cooperation of the designers, engineers, contractors and all parties must be aware of the requirements. The minimum requirements are as follows, however, the geotechnical report must be reviewed for specific information and requirements.

1. Prior to site work involving engineered fill, a site meeting to discuss all aspects must be convened. The surveyor, contractor, design engineer and geotechnical engineer must attend the meeting. At this meeting, the limits of the engineered fill will be defined. The contractor must make known where all fill material will be obtained from and samples must be provided to the geotechnical engineer for review, and approval before filling begins.

2. Detailed drawings indicating the lower boundaries as well as the upper boundaries of the engineered fill must be available at the site meeting and be approved by the geotechnical engineer.

3. The building footprint and base of the pad, including basements, garages, etc. must be defined by offset stakes that remain in place until the footings and service connections are all constructed. Confirmation that the footings are within the pad, service lines are in place, and that the grade conforms to drawings, must be obtained by the owner in writing from the surveyor and Sirati & Partners Consultants Limited. Without this confirmation no responsibility for the performance of the structure can be accepted by Sirati & Partners Consultants Limited (SPCL). Survey drawing of the pre and post fill location and elevations will also be required.

4. The area must be stripped of all topsoil and fill materials. Subgrade must be proof-rolled. Soft spots must be dug out. The stripped native subgrade must be examined and approved by a SPCL engineer prior to placement of fill.

5. The approved engineered fill material must be compacted to 100% Standard Proctor Maximum Dry Density throughout. Engineered fill should not be placed during the winter months. Engineered fill compacted to 100% SPMDD will settle under its own weight approximately 0.5% of the fill height and the structural engineer must be aware of this settlement. In addition to the settlement of the fill, additional settlement due to consolidation of the underlying soils from the structural and fill loads will occur and should be evaluated prior to placing the fill.

6. Full-time geotechnical inspection by SPCL during placement of engineered fill is required. Work cannot commence or continue without the presence of the SPCL representative.

7. The fill must be placed such that the specified geometry is achieved. Refer to the attached sketches for minimum requirements. Take careful note that the projection of the compacted pad beyond the footing at footing level is a minimum of 2 m. The base of the compacted pad extends 2 m plus the depth of excavation beyond the edge of the footing.

8. A bearing capacity of 150 kPa at SLS (225 kPa at ULS) can be used provided that all conditions outlined above are adhered to. A minimum footing width of 500 mm (20 inches) is suggested and footings must be provided with nominal steel reinforcement.

9. All excavations must be done in accordance with the Occupational Health and Safety Regulations of Ontario.

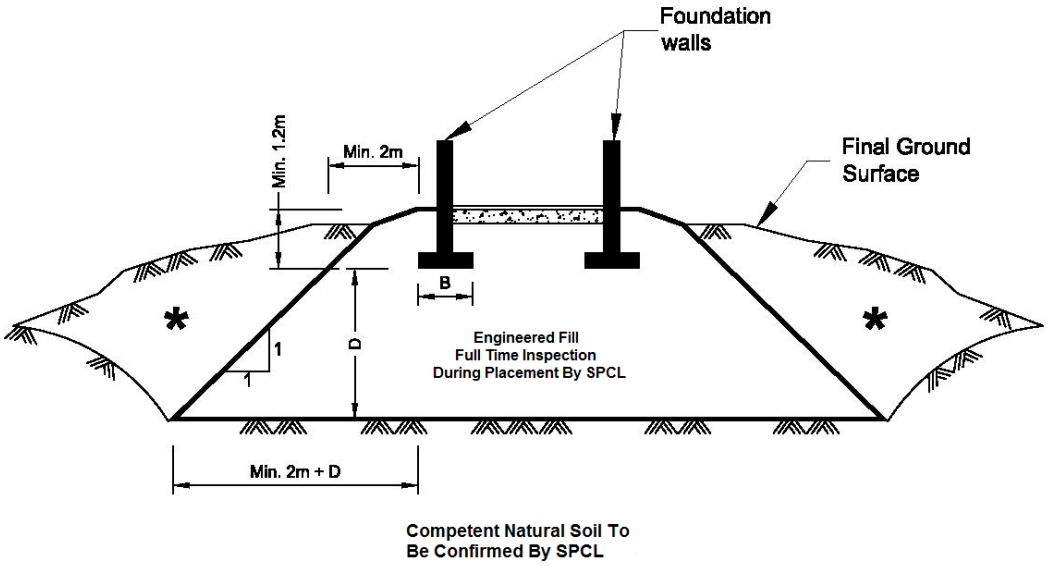
10. After completion of the engineered fill pad a second contractor may be selected to install footings. The prepared footing bases must be evaluated by engineering staff from SPCL prior to footing concrete placements. All excavations must be backfilled under full time supervision by SPCL to the same degree as the engineered fill pad. Surface water cannot be allowed to pond in excavations or to be trapped in clear stone backfill. Clear stone backfill can only be used with the approval of SPCL.

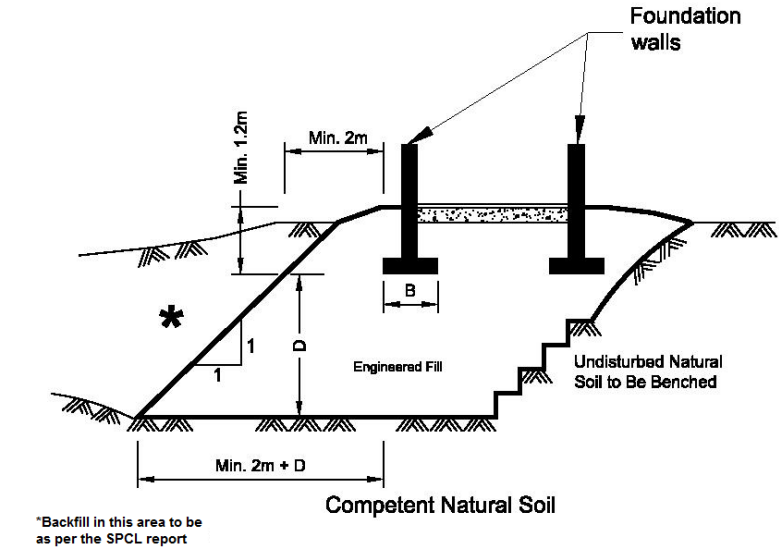
11. After completion of compaction, the surface of the engineered fill pad must be protected from disturbance from traffic, rain and frost. During the course of fill placement, the engineered fill must be smooth-graded, proof-rolled and sloped/crowned at the end of each day, prior to weekends and any stoppage in work in order to promote rapid runoff of rainwater and to avoid any ponding surface water. Any stockpiles of fill intended for use as engineered fill must also be smooth-bladed to promote runoff and/or protected from excessive moisture take up.

12. If there is a delay in construction, the engineered fill pad must be inspected and accepted by the geotechnical engineer. The location of the structure must be reconfirmed that it remains within the pad.

13. The geometry of the engineered fill as illustrated in these General Requirements is general in nature. Each project will have its own unique requirements. For example, if perimeter sidewalks are to be constructed around the building, then the projection of the engineered fill beyond the foundation wall may need to be greater.

14. These guidelines are to be read in conjunction with Sirati & Partners Consultants Limited (SPCL) report attached.


Foundation walls
Final Ground Surface
Min. 1.2m
Min. 2m
B
D
1
1
Engineered Fill
Full Time Inspection
During Placement By SPCL
Min. 2m + D
Competent Natural Soil To
Be Confirmed By SPCL


Foundation walls
Min. 1.2m
Min. 2m
B
D
1
1
Engineered Fill
Undisturbed Natural Soil to Be Benched
Min. 2m + D
Competent Natural Soil
*Backfill in this area to be as per the SPCL report

Appendix B: Limitation and Use of the Report

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to Sirati & Partners Consultants Limited (SPCL) at the time of preparation. Unless otherwise agreed in writing by SPCL, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the borehole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the borehole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc. Professional judgement was exercised in gathering and analyzing data and formulation of recommendations using current industry guidelines and standards. Similar to all professional persons rendering advice, SPCL cannot act as absolute insurer of the conclusion we have reached. No additional warranty or representation, expressed or implied, is included or intended in this report other than stated herein the report.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SPCL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

SPCL engagement hereunder is subject to and condition upon, that SPCL not being required by the Client, or any other third party to provide evidence or testimony in any legal proceedings pertaining to this finding of this report, or providing litigations support services which may arise to be required in respect of the work produced herein by SPCL. It is prohibited to publish, release or disclose to any third party the report produced by SPCL pursuant to this engagement and such report is produced solely for the Client own internal purposes and which shall remain the confidential proprietary property of SPCL for use by the Client, within the context of the work agreement. The Client will and does hereby remise and forever absolutely release SPCL, its directors, officers, agents and shareholders of and from any and all claims, obligations, liabilities, expenses, costs, charges or other demands or requirements of any nature pertaining to the report produced by SPCL hereunder. The Client will not commence any claims against any Person who may make a claim against SPCL in respect of work produced under this engagement.