GeoPro Consulting Limited

Geotechnical-Hydrogeology-Environmental-Materials-Inspection

Geotechnical Investigation

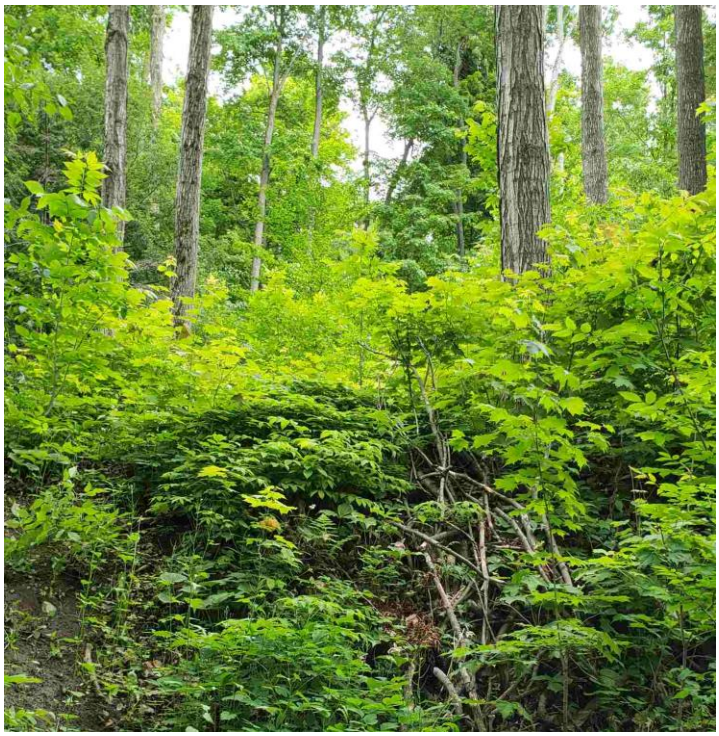
Slope Stability Assessment and Geotechnical Setback Study

Proposed Residential Developments

County Road 27, Barrie, Ontario

Prepared For:

Di Poce Management Inc. c/o Oksana Vialykh, BBA, AACI



GeoPro Project No.: 17-2099GE Revised

Report Date: October 31, 2019

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GeoPro CONSULTING LIMITED

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Appendix A

Photos of the slope

Limitations to the Report

1. INTRODUCTION

GeoPro Consulting Limited (GeoPro) was retained by Di Poce Management Inc. c/o Oksana Vialykh, BBA, AACI (the Client) to conduct a geotechnical investigation for the Slope Stability Assessment and Setback Study for the existing slope located at the northeast corner of the subject land which is located on the east side of County Road 27, west of Essa Road and north of Salem Road, City of Barrie, Ontario.

The purpose of this geotechnical investigation was to obtain information on the existing subsurface conditions by means of a limited number of boreholes, in-situ tests and laboratory tests of soil samples to provide required geotechnical design information. Based on GeoPro's interpretation of the data obtained, geotechnical comments and recommendations related to the project designs are provided.

The report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the recommendations and opinions in this report are applicable only to the proposed project as described above. On-going liaison and communication with GeoPro during the design stage and construction phase of the project is strongly recommended to confirm that the recommendations in this report are applicable and/or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project shall be directed to GeoPro for further elaboration and/or clarification.

This report is provided on the basis of the terms of reference presented in our approved proposal prepared based on our understanding of the project. 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 report can be relied upon.

This report deals with geotechnical issues only. The geo-environmental (chemical) aspects of the subsurface conditions, including the consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources, were not investigated and were beyond the scope of this assignment.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. Laboratory testing follows ASTM or CSA Standards or modifications of these standards that have become standard practice in Ontario.

This report has been prepared for the Client only. Third party use of this report without GeoPro's consent is prohibited. The limitations to the report presented in this report form an integral part of the report and they must be considered in conjunction with this report.

2. FIELD AND LABORATORY WORK

The field work for the geotechnical investigation was carried out on April 25, 2018, during which time one (1) borehole (Borehole BH7) was advanced at the locations shown on the Borehole Location Plan, Drawing 1. The borehole was drilled to depth of about 15.3 m below the existing ground surface.

The requested borehole location was provided by the Client. The borehole was located and staked in the field by GeoPro according to the requested borehole location plan provided by the Client; the borehole locations in the field were adjusted according to the drill rig accessibility and the underground utility conditions. The field work for this investigation was monitored by a member of our engineering staff who logged the boreholes and cared for the recovered samples.

The borehole was advanced using continuous flight auger drilling equipment supplied by a drilling specialist subcontracted to GeoPro. Samples were retrieved with a 51 mm (2 inches) O.D. split-barrel (split spoon) sampler driven with a hammer weighing 624 N and dropping 760 mm (30 inches) in accordance with the Standard Penetration Test (SPT) method.

The groundwater conditions were noted in the borehole during drilling and immediately upon completion of drilling. Monitoring well (51 mm in diameter) was installed in Borehole BH7 to monitor long-term groundwater conditions.

All soil samples obtained during this investigation were brought to our laboratory for further examination. These soil samples will be stored for a period of three (3) months after the day of issuing draft report, after which time they will be discarded unless we are advised otherwise in writing. Geotechnical classification testing (including water content, grain size distribution and Atterberg Limits, when applicable) were carried out on selected soil samples. The results of grain size analyses of the selected soil samples are shown in Figure 1.

The approximate elevations at the as-drilled borehole locations were surveyed using a DGPS unit. The elevations at the as-drilled borehole locations were not provided by a professional surveyor and should be considered to be approximate. Contractors performing the work should confirm the elevations prior to construction. The borehole locations plotted on Borehole Location Plan Drawing 1 were based on the measurements of the site features and should be considered to be approximate.

3. SUBSURFACE CONDITIONS

Notes on sample descriptions are presented in Enclosure 1A. An explanation of terms used in the borehole logs is presented in Enclosure 1B. Detailed subsurface conditions in the all boreholes are presented on the borehole logs (Enclosure 2 inclusive). The following are the detailed descriptions of the major soil strata encountered in the boreholes.

3.1 Soil Conditions

Topsoil

Topsoil with a thickness of about 360 mm was encountered surficially in Borehole BH7.

Reworked Sandy Silt to Sand and Silt

Reworked sandy silt to sand and silt were encountered below the topsoil in Borehole BH7, and extended to a depth of about 0.6 m below the existing ground surface. An SPT N value of 5 blows per 300 mm penetration indicated a loose compactness. The in-situ moisture content measured in the soil sample was approximately 16%.

Clayey Silt

Clayey Silt deposit was encountered below the reworked sandy silt to sand and silt in borehole BH7, and extended to a depth of about 1.2 m below the existing ground surface. An SPT N value of 11 blows per 300 mm penetration indicated a stiff consistency. The natural moisture content measured in the soil sample was approximately 27%.

(Fine) Sand and Silt, Silty (Fine) Sand and (Fine) Sand

(Fine) sand and silt, silty (fine) sand and (fine) sand deposits were encountered below the clayey silt deposit in Borehole BH7, and extended to a depth of about 15.3 m below the existing ground surface. Borehole BH7 was terminated in these deposits. SPT N values ranging from 6 to greater than 100 blows per 300 mm penetration indicated a loose to very dense compactness. The natural moisture content measured in the soil samples ranged from approximately 4% to 18%.

3.2 Groundwater Conditions

Groundwater condition observations were made in the boreholes during and immediately upon completion of drilling are shown in the borehole logs and are also summarized in the following table.

BH No.	BH Depth (m)	Depth of Water Encountered during Drilling (mBGS)	Water Level upon Completion of Drilling (mBGS)	Cave-in Depth upon Completion of Drilling (mBGS)
BH7	15.3	N/A	N/A	N/A

Note: mBGS = meters below ground surface

Monitoring well construction details and the measured groundwater levels are shown in the borehole logs and also summarized in the following table.

Monitoring Well ID	Screen Interval (mBGS)	Water Level (mBGS)
		May 11, 2018
BH7	13.7 – 15.2	14.83

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

4. DISCUSSION AND RECOMMENDATIONS

This section of the report provides a slope stability assessment for the subject slope based on our interpretation of subsurface data from a limited number of boreholes, slope profiles obtained, our field observations and our understanding of the project requirements. The information in this portion of the report is provided for the guidance of the design engineers and professionals. The results of the slope stability assessment are subject to the review and approval of the relevant agencies.

Based on the borehole information, our visual slope inspection as well as the slope profiles interpreted from the contour lines of the provided topographic drawings, a detailed slope stability study was carried out to evaluate the long-term global stability of the existing slope as well as the setback requirement. The assessment of the stability of the subject slope consisted of two components:

1. Visual field review of the current slope conditions from a slope stability perspective; and
2. Global stability analyses and setback study at the selected typical cross-sections based on the subsurface conditions encountered in the boreholes carried out during the geotechnical investigation.

4.1 Existing Slope Conditions and Profile

The following section provides geotechnical comments related to the slope geometry based on our review of the slope profiles as well as observations made during a visual inspection of the

existing slope carried out by our geotechnical staff on June 5, 2018. One typical slope profiles were provided for the global stability analyses. (See Drawing 1 for the locations of the selected profiles). Selected photographs of the subject slope taken during the site visit are presented in Appendix A.

Based on our site observations, the slope profiles and topographic drawing provided by the Client, the slope conditions at the site are described as follows:

1. The subject slope is situated at the northeast corner of the subject land (east side of County Road 27, west of Essa Road and north of Salem Road, City of Barrie, Ontario.)
2. The inclination of the slope at Cross-Section A-A' ranged from about 1.0 horizontal to 1 vertical (1.0H:1V) to 5.9 horizontal to 1 vertical (5.9H:1V) with the overall slope inclination 4.0 horizontal to 1 vertical (4.0H:1V);
3. The slope surface are generally covered by trees and bushes with decayed leaves/branches;
4. No water seepage was noted at the slope surface within the study area;
5. Erosion was noted at the slope toe around the bear creek bend area; the rest of the slope surface is generally heavily vegetated and no obvious erosion was noted;
6. Indications of shallow slumping/sloughing at or near-surface slope materials were not observed along the slope during our field review;
7. Tension cracks and/or other indicators of deep seated movement of the slope were not observed at or beyond the crest of the slope;
8. Vegetation in the subject site was observed to be uniform and no previous soil disturbance was noted at the time of site visit.

4.2 Erosion Setback Consideration

An erosion setback is required as the wave uprush causes the water to reach the toe of the slope in the storm events. The magnitude of the erosion component is typically the estimated recession of the slope toe due to erosion over a specified design period, and is measured as a horizontal distance from the waterline of the river. The toe erosion component is to be assessed using suggested guidelines for toe erosion allowances contained in "Technical Guide for River & Stream Systems: Erosion Hazard Limit (2002)" prepared by the Ontario Ministry of Natural Resources.

Based on the soil conditions in the boreholes and the site observations, the soils at the slope toe generally consisted of very dense sand and silt to silty sand. Evidence of active erosion of the

slope toe was observed during the site visit. In accordance with "Technical Guide for River & Stream Systems: Erosion Hazard Limit (2002)", a design erosion setback allowance of 8.0 m is considered applicable for the exposed soils present at the toe of the slope. This erosion allowance of e=8.0 m will be used to establish the long-term stable top of slope at Cross-Section A-A'.

In accordance with "NVCA Natural Hazards Technical Guide (2013)", the toe erosion allowance should be pre-consulted with NVCA engineering staff and determine which assessment methods are applicable for determining the toe erosion component of the erosion hazard limit.

4.3 Soil Parameters

Based on the results of the geotechnical investigation, soil strength parameters selected for the soil strata have been estimated based on the borehole drilled near the slope, previously published information and from our experience on similar projects. A global slope stability analysis was carried out for the soil stratigraphy using effective stress/strength parameters as shown in the following Table:

Material Parameters for Slope Stability Analysis

Material Type	Unit Weight (kN/m^3)	Effective Friction Angle Φ'	Cohesion (kPa)
Surficial Vegetation	16	26°	1
Reworked Sandy Silt to Sand and Silt	18	28°	0
Clayey Silt	19	29°	1
(Fine) Sand and Silt to Silty (Fine) Sand	20	30°	0
(Fine) Sand	21	31°	0

4.4 Stability Analysis of Existing Slope

The *"Technical Guide, River & Stream Systems: Erosion Hazard Limit"* document published by the Ontario Ministry of Natural Resources in 2002 ("The Guide"), provides recommendations for minimum Factors of Safety for the design of stable slopes on the basis of land-use above or below the slopes. A Design Minimum Factor of Safety (FOS) of 1.30 to 1.50 is recommended in Table 4.3 of the Guide (Section 4.3.3.1 Design Minimum Factors of Safety) for Active Land Uses, such as those containing residential structures. A Factor of Safety greater than 1.5 should be used in consideration of the subject slope located at northeast corner of the subject land. Based on our previous experience, Factor of Safety of 1.5 is usually required by Conservation Authorities.

Long-term stability analysis of the existing slope at above noted section was carried out with the computer program SLIDE (Version 6.0) using the Simplified Bishop method. The analysis result for the existing slope is presented in Drawing 2 and is summarized in the following table:

Long-term Stability Analysis Result of the Existing Slope

Slope Location/Drawing Number	Overall Existing Slope Inclination	Existing Slope Height (m)	Calculated Factor of Safety	Note
Existing Slope, Cross-Section A-A' / Drawing 2	4.0 H : 1V	12	2.30	Stable (FS>1.5)

The calculated Factor of Safety (FOS) of the existing slope at Cross-Section A-A' is 2.30, as shown on Drawing 2, which are greater than minimum acceptable value of 1.5. The existing slope at Cross-Section A-A' is considered stable in terms of long term stability based on the minimum acceptable value of 1.5.

4.5 Analyses of Geotechnical Long Term Stable Slope Considering Erosion Setback

In order to determine the long-term stable slope, analyses of the long-term stable slope at Cross-Section A-A' has been carried out, and the result is presented on Drawing 3. The calculated FOS of the slope considering erosion setback at Cross-Section A-A' is greater than 1.5, which meets the minimum acceptable value of 1.5.

This erosion allowance of e=8.0 m is used to establish the long-term stable slope crest.

4.6 Long Term Stable Slope Crest (LTSSC)

The long-term stable slope crest does not include an erosion access allowance, a development/access setback component or a rear-yard allowance. The requirement for these additional setbacks, if any, are typically set by the Town/City, District or Provincial regulations and should be determined through consultation with the applicable regulatory bodies/agencies. Similarly, the setback required for safety against flood conditions or preservation of vegetation or wildlife is independent of the geotechnical and/or erosion setback criteria proposed.

Based on the analysis results, the points/line representing the long-term stable slope crest including the erosion setback at Cross-Section A-A' is presented in Drawing 1 and summarized as follows.

- The geotechnical long term stable slope crest at Cross-Section A-A' stays at the existing slope crest.

4.7 Comments and Recommendations

Additional comments related to the slope stability at the site are as follows:

- In order to prevent soil erosion at the slope surface, the vegetation and trees on the existing slopes must be preserved.
- Surface water must be directed away from the slope surface, if any active erosion is noted on the slope surface.
- Fill or the waste (i.e. organics and cutting trees) must not be placed on the existing slope surfaces or near the top of the slopes.

Any foundations near the slope should be founded below an imaginary 3H:1V line drawn up from the toe of the long term stable slope. Should this requirement be not meet, a geotechnical engineer should be consulted for further evaluation.

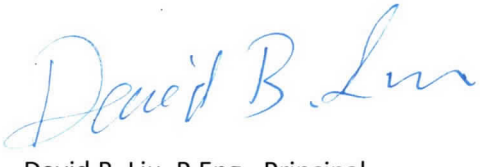
5. CLOSURE

We trust that this report provides sufficient geotechnical engineering information to facilitate the detail design of this project. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office.

Yours very truly

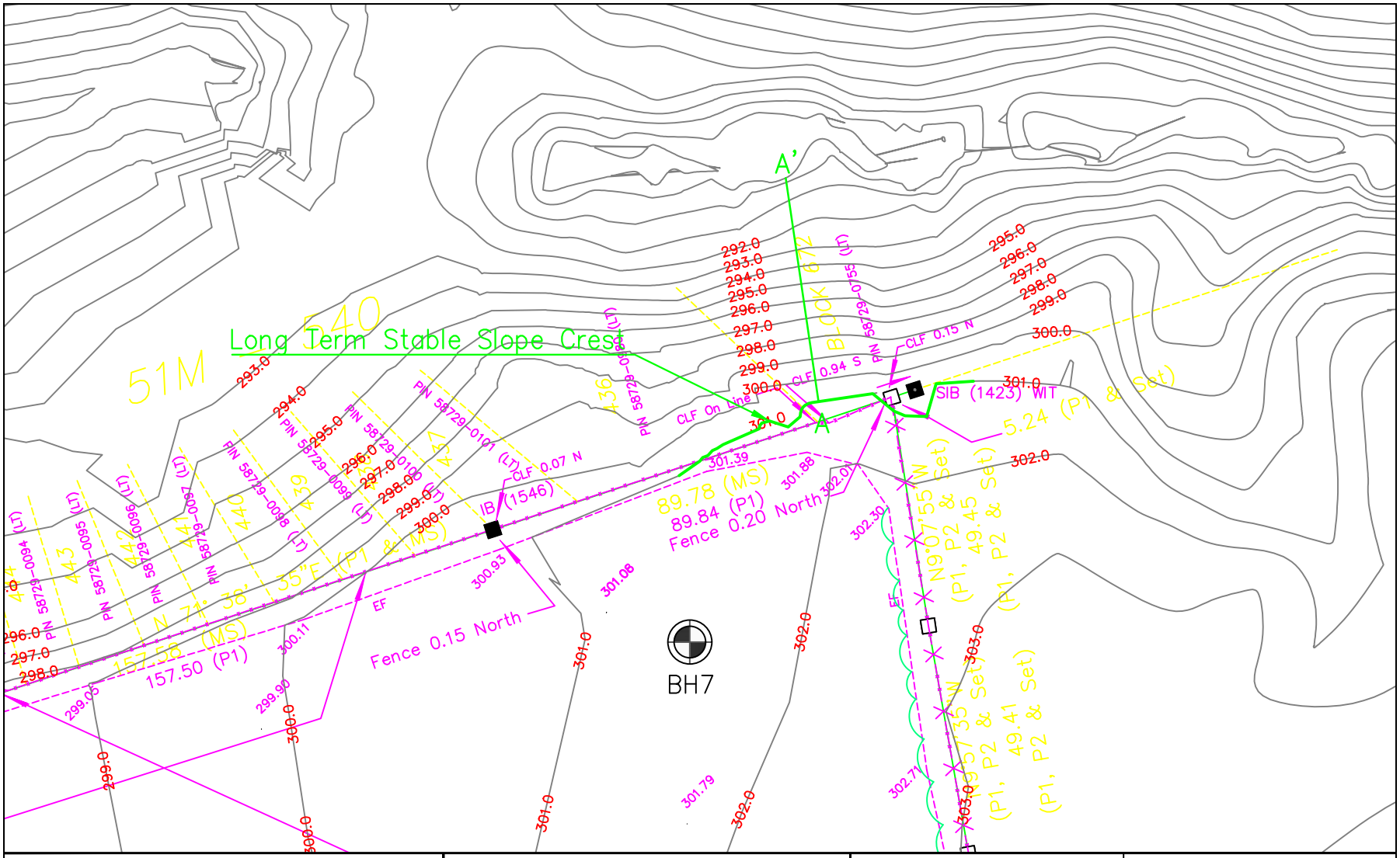
GEOPRO CONSULTING LIMITED

Dylan Q. Xiao, M.A.Sc., P.Eng.
Geotechnical Group



David B. Liu, P.Eng., Principal

DRAWINGS

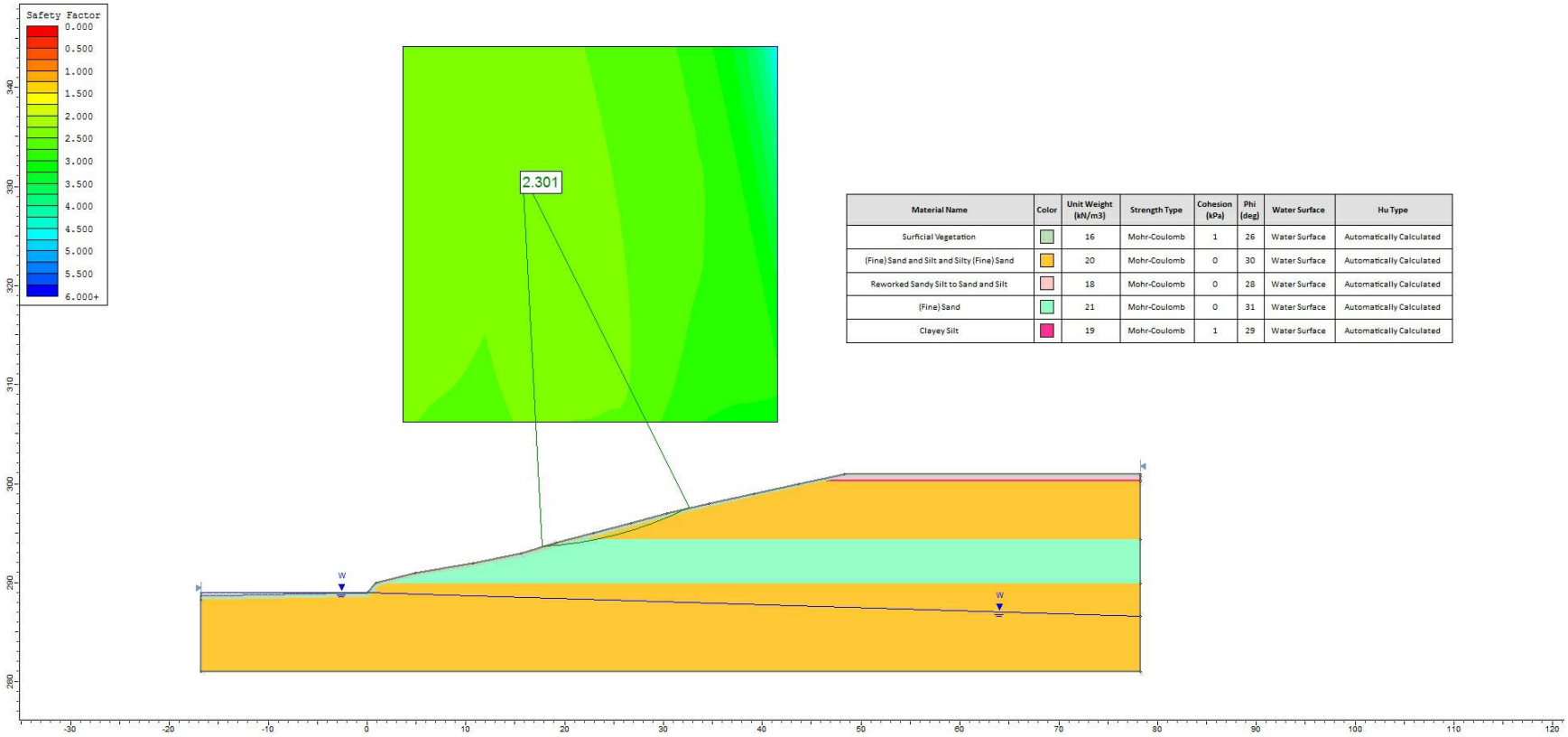


Legend:

Borehole Location

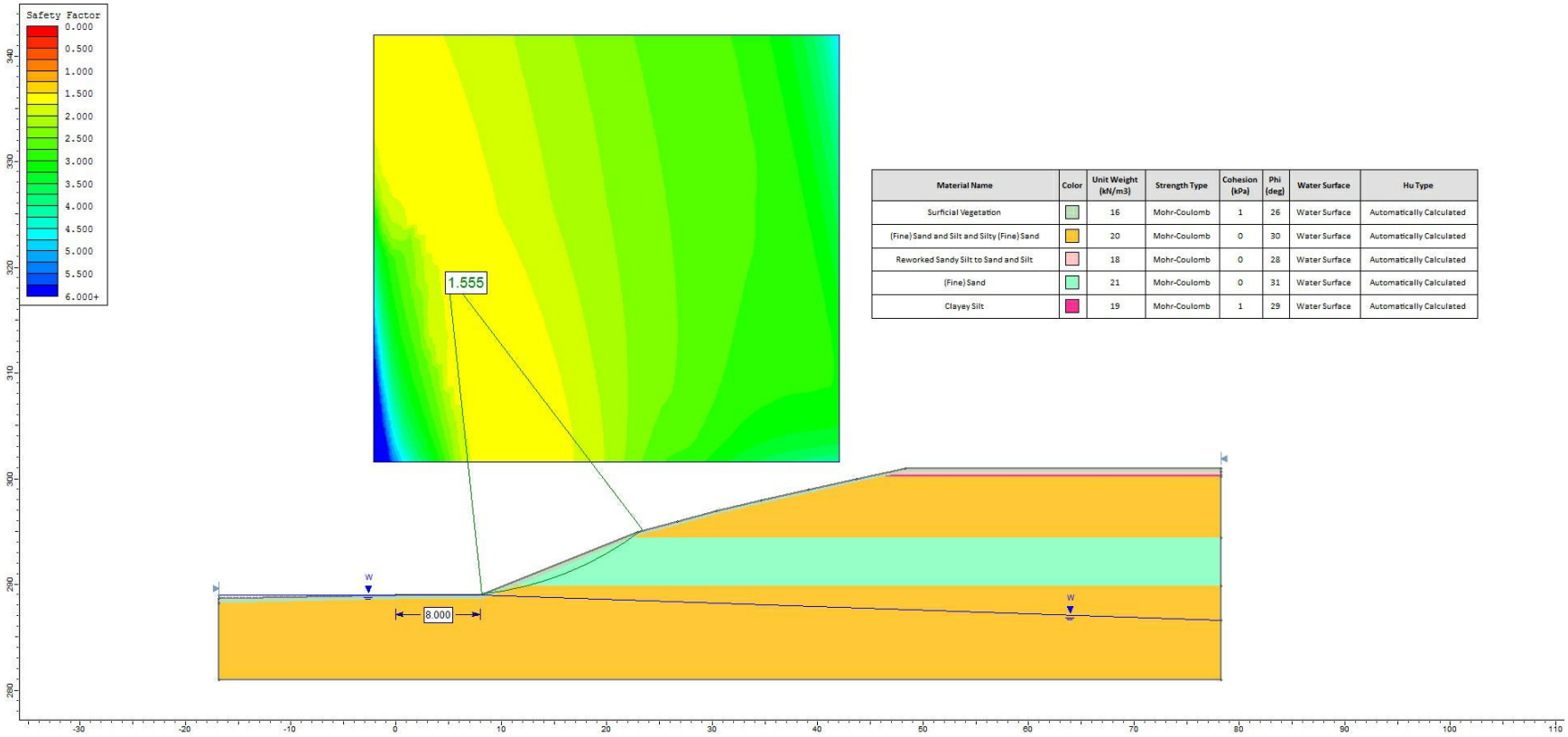
Client:	Di Poce Management Inc. c/o Oksana Vialykh, BBA, AACI	Project No.: 17-2099GE	Drawing No.: 1
Drawn: WF	Approved: DL	Title:	Borehole Location Plan
Date: June, 2018	Scale: N.T.S	Project:	Geotechnical Investigation Slope Stability Assessment and Geotechnical Setback Study Proposed Residential Developments, County Road 27, Barrie, Ontario
Original Size: Letter	Rev: DX		GeoPro Consulting Limited

Slope Stability Analysis of Existing Slope, Cross-Section A-A'



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Surficial Vegetation		16	Mohr-Coulomb	1	26	Water Surface	Automatically Calculated
(Fine) Sand and Silt and Silty (Fine) Sand		20	Mohr-Coulomb	0	30	Water Surface	Automatically Calculated
Reworked Sandy Silt to Sand and Silt		18	Mohr-Coulomb	0	28	Water Surface	Automatically Calculated
(Fine) Sand		21	Mohr-Coulomb	0	31	Water Surface	Automatically Calculated
Clayey Silt		19	Mohr-Coulomb	1	29	Water Surface	Automatically Calculated

Slope Stability Analysis of Long-Term Stable of Slope, Cross-Section A-A'



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Water Surface	Hu Type
Surficial Vegetation		16	Mohr-Coulomb	1	26	Water Surface	Automatically Calculated
(Fine) Sand and Silt and Silty (Fine) Sand		20	Mohr-Coulomb	0	30	Water Surface	Automatically Calculated
Reworked Sandy Silt to Sand and Silt		18	Mohr-Coulomb	0	28	Water Surface	Automatically Calculated
(Fine) Sand		21	Mohr-Coulomb	0	31	Water Surface	Automatically Calculated
Clayey Silt		19	Mohr-Coulomb	1	29	Water Surface	Automatically Calculated

ENCLOSURES

Enclosure 1A: Notes on Sample Descriptions

1. Each soil stratum is described according to the *Modified Unified Soil Classification System*. The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be used by others. Please note that a description of the soil stratums is based on visual and tactile examination of the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

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 preliminary 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.

Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Dimension type sample
FS	Foil sample
NR	No recovery
RC	Rock core
SC	Soil core
SS	Spoon sample
SH	Shelby tube Sample
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure
WR – Samples advanced by weight of sampler and rod
WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size
Boulders	> 300 mm
Cobbles	75 mm - 300 mm
Gravel	4.75 mm - 75 mm
Sand	0.075 mm – 4.75 mm
Silt	0.002 mm-0.075 mm
Clay	<0.002 mm(*)

(*) Canadian Foundation Engineering Manual (4th Edition)

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

1. Lab triaxial test
2. Field vane shear test
3. Lab. vane shear test
4. SPT "N" value
5. Pocket penetrometer

b) Cohesionless Soils

Compactness Condition (Formerly Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Soil Tests

w	Water content
w_p	Plastic limit
w_l	Liquid limit
C	Consolidation (oedometer) test
CID	Consolidated isotropically drained triaxial test
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement
D_R	Relative density (specific gravity, Gs)
DS	Direct shear test
ENV	Environmental/ chemical analysis
M	Sieve analysis for particle size
MH	Combined sieve and hydrometer (H) analysis
MPC	Modified proctor compaction test
SPC	Standard proctor compaction test
OC	Organic content test
U	Unconsolidated Undrained Triaxial Test
V	Field vane (LV-laboratory vane test)
γ	Unit weight

LOG OF BOREHOLE BH07

PROJECT: Geotechnical Investigation for Slope Stability Assessment and Geotechnical Setback Study

CLIENT: Di Poce Management Inc. c/o Oksana Vialykh, BBA, AACI

PROJECT LOCATION: County Road 27, Barrie, Ontario

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

DRILLING DATA

METHOD: Continuous Flight Auger - Auto Hammer

FIELD ENGINEER: RR

SAMPLE REVIEW: DX

CHECKED: DL

DIAMETER: 205 mm

DATE: 2018-04-25

REF. NO.: 17-2099GE

ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	ELEVATION
301.4 / 0.0	**TOPSOIL:** (360 mm)	1	SS	5	301
301.0 / 0.4	**REWORKED SANDY SILT TO SAND AND SILT:** trace to some clay, trace gravel, trace organics, trace rootlets, layers of clayey silt, dark brown to brown, moist, loose	2	SS	11	
300.8 / 0.6	**CLAYEY SILT:** some sand, trace organics, brown, moist, stiff				
300.2 / 1.2	**SAND AND SILT:** trace clay, trace gravel, pockets of organics, brown, moist, loose	3	SS	6	300
299.3 / 2.1	**SILTY SAND:** trace clay, trace gravel, layers of sand, containing cobbles and boulders, brown, moist, dense	4	SS	40	299
298.5 / 2.9	**FINE SAND AND SILT TO SILTY FINE SAND:** trace gravel, layers/zones of silt, brown, moist, dense to very dense	5	SS	34	298
	--- auger grinding ---layers of clayey silt	6	SS	85 / 260 mm	297
295.8 / 5.6	**SILTY SAND:** trace to some gravel, layers of sand and silt, containing cobbles and boulders, brown, moist, very dense	7	SS	50 / 150 mm	296
294.4 / 6.9	--- auger grinding **SAND:** some silt, some gravel, containing cobbles and boulders, brown, moist, very dense	8	SS	50 / 130 mm	295
292.9 / 8.5	**FINE SAND:** trace to some silt, trace gravel, brown, moist, very dense	9	SS	50 / 80 mm	294
					293
					292

Bentonite

DYNAMIC PENETRATION TEST
○ SPT ≳ Cone blows/0.3m
20 40 60 80

SHEAR STRENGTH (kPa)
● Unconfined ✕ Field Vane & Sensitivity
▲ Quick Triaxial ⊠ Penetrometer + Lab Vane
20 40 60 80

Plastic Limit w_P | Natural Moisture Content w | Liquid Limit w_L

WATER CONTENT (%)
10 20 30 40

> >100

UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	1	63	31	5
	15	73	12	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Geotechnical Investigation for Slope Stability Assessment and Geotechnical Setback Study **DRILLING DATA**

CLIENT: Di Poce Management Inc. c/o Oksana Vialykh, BBA, AACI | METHOD: Continuous Flight Auger - Auto Hammer | DIAMETER: 205 mm

PROJECT LOCATION: County Road 27, Barrie, Ontario | FIELD ENGINEER: RR | DATE: 2018-04-25

DATUM: Geodetic | SAMPLE REVIEW: DX | REF. NO.: 17-2099GE

BH LOCATION: See Borehole Location Plan | CHECKED: DL | ENCL. NO.: 2

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	"N" BLOWS/0.3m	GROUND WATER	ELEVATION
	FINE SAND: trace to some silt, trace gravel, brown, moist, very dense(Continued)					291
11		10	SS	50 / 80 mm		
289.9						290
11.5	**SAND AND SILT TO SILTY SAND:** trace gravel, containing cobbles and boulders, brown, moist, very dense					
12		11	SS	50 / 80 mm		289
13	--- auger grinding				Sand	288
14		12	SS	50 / 50 mm		
					Screen	287
15					286.6/May 11	
286.1					Natural Pack	
15.3	**END OF BOREHOLE**	13	SS	50 / 80 mm		

Note:
1) 51 mm dia. monitoring well was installed in borehole upon completion of drilling.

Water Level Reading

Date	W. L Depth (mBGS)
May 11, 2018	14.83

DYNAMIC PENETRATION TEST — ○ SPT ≳ Cone blows/0.3m — 20 40 60 80

SHEAR STRENGTH (kPa) — ● Unconfined ✕ Field Vane & Sensitivity ▲ Quick Triaxial ⊠ Penetrometer + Lab Vane — 20 40 60 80

Plastic Limit (w_P) | Natural Moisture Content (w) | Liquid Limit (w_L)

WATER CONTENT (%) — 10 20 30 40

> >100

UNIT WT (kN/m³)

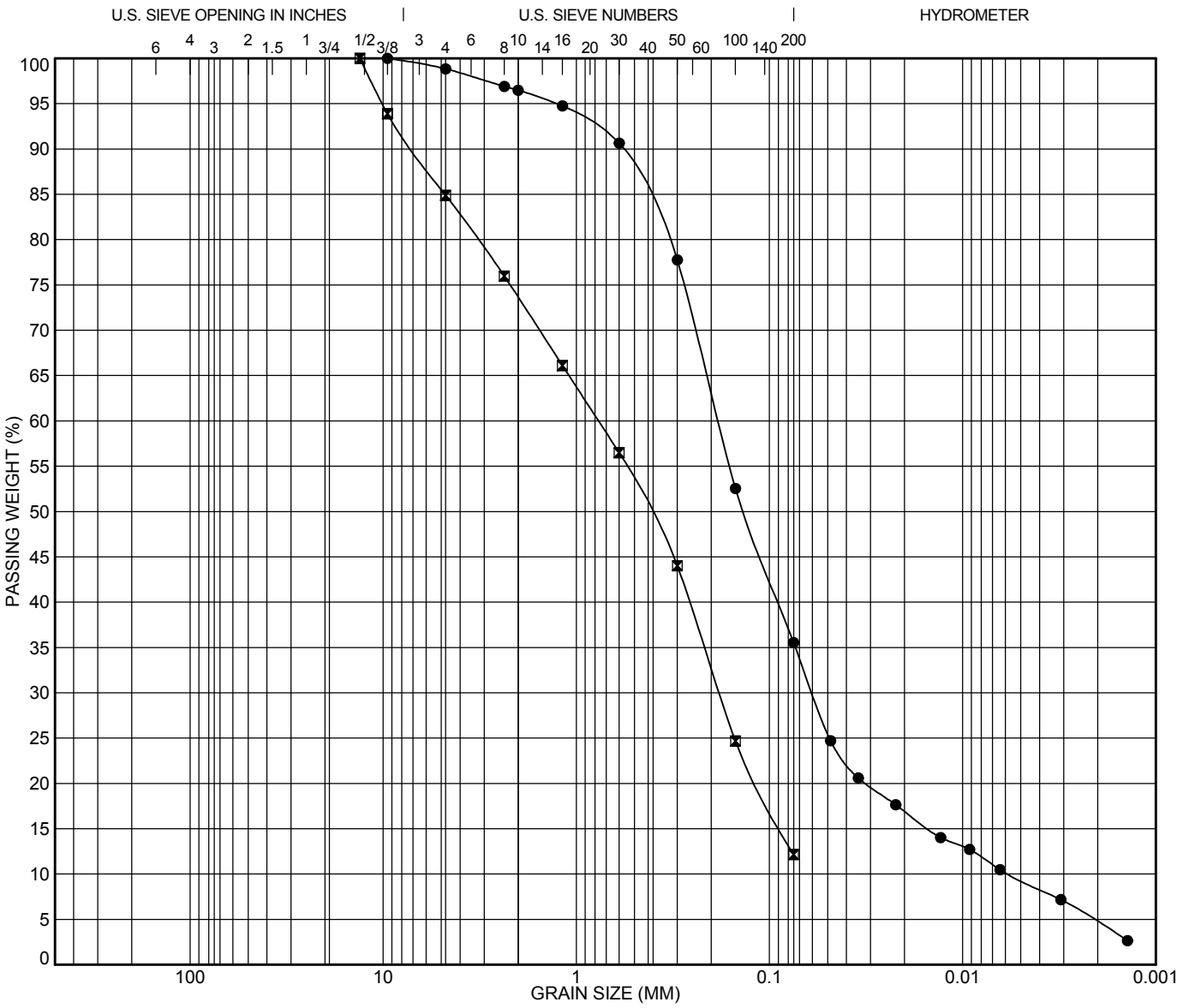
REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

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

FIGURES



COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

	Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	BH07	SS4	2.29					3.38	31.91
⊠	BH07	SS8	7.62					0.64	11.54

	Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH07	SS4	2.29	9.5	0.184	0.06	0.006	1.2	63.3	30.9	4.7
⊠	BH07	SS8	7.62	13.2	0.768	0.181		15.1	72.7	12.2	

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GRAIN SIZE DISTRIBUTION

PROJECT: Geotechnical Investigation for Slope Stability Assessment and Geotechnical Setback Study

LOCATION: County Road 27, Barrie, Ontario

PROJECT NO.: 17-2099GE | SAMPLED ON: 2018-04-25

FIGURE NO.: 1 | TESTED ON: 2018-05-15

Appendix A: Photographs

Photo 1 – Looking downward, standing at the slope crest

Photo 2 – Looking downward, standing at the middle portion of the slope.

Photo 3 – Looking upward, standing at the toe of the slope.

Photo 4 – Looking west, standing at south side of the creek, erosion was noted at the slope toe around the creek bend area

LIMITATIONS TO THE REPORT

This report is intended solely for the Client named. The report is prepared based on the work has been undertaken in accordance with normally accepted geotechnical engineering practices in Ontario.

The comments and recommendations given in this report are based on information determined at the limited number of the test hole and test pit locations. The boundaries between the various strata as shown on the borehole logs are based on non-continuous sampling and represent an inferred transition between the various strata and their lateral continuation rather than a precise plane of geological change. Subsurface and groundwater conditions between and beyond the test holes and test pits may differ significantly from those encountered at the test hole and test pit locations. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole and test pit locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The report reflects our best judgment based on the information available to GeoPro Consulting Limited at the time of preparation. Unless otherwise agreed in writing by GeoPro Consulting Limited, it shall not be used to express or imply warranty as to any other purposes. No portion of this report shall be used as a separate entity, it is written to be read in its entirety. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated.

The design recommendations given in this report are applicable only to the project designed and constructed completely in accordance with the details stated in this report. Otherwise, our responsibility is limited to interpreting the subsurface information at the borehole or test pit locations.

Should any comments and recommendations provided in this report be made on any construction related issues, they are intended only for the guidance of the designers. The number of test holes and test pits may not be sufficient to determine all the factors that may affect construction activities, methods and costs. Such as, the thickness of surficial topsoil or fill layers may vary significantly and unpredictably; the amount of the cobbles and boulders may vary significantly than what described in the report; unexpected water bearing zones/layers with various thickness and extent may be encountered in the fill and native soils. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and make their own conclusions as to how the subsurface conditions may affect their work and determine the proper construction methods.

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. GeoPro Consulting Limited 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.