455 Phillip Street, Unit 100A Waterloo, Ontario N2L 3X2 Canada www.qhd.com



Our ref: 11227231

20 May 2021

Mr. Mario Polla 904 Mississauga Heights Drive Mississauga, Ontario L5C 1A6

Slope Stability Evaluation 904 Mississauga Heights Drive, Mississauga, Ontario

Dear Mr. Polla

GHD Limited (GHD) has been retained by Mr. Mario Polla (Owner) to carry out a geotechnical evaluation to assess the development setback at 904 Mississauga Heights Drive (Site or Property), in Mississauga, Ontario, ON. The Site location is shown on Figure 1.

It is understood the geotechnical evaluation is required as part of the Zoning By-law Amendment application to allow for five lots, Lot A, Lot B, Lot C, Lot D and Lot E, accessed via a Common Element Condominium (CEC) Road (R16 Zone – Detached Dwellings on a CEC Road). The existing residential structure will remain on Lot D. The proposed subdivision plan provided by Sajecki Planning is included as **Attachment 1**. The stable valley slope from the geotechnical work will also be included in the Environmental Impact Study prepared by the ecological consultants

The Property is located on the north bank of the Credit River on top of an approximately 23 m high bluff and is currently occupied by a two-storey single family residential structure constructed at an offset distance as little as 9.44 m from the existing top of the slope. An approximately 30 m wide Mississauga Gold & Country Club fairway separates the toe of the slope from the Credit River. This evaluation is being carried out to determine the safe development setback of the proposed development from the Long-Term Stable Slope Line (LTSSL) in accordance with the Credit Valley Conservation (CVC) Guidelines¹.

GHD previously conducted a geotechnical investigation at the Site in March 2007 for the proposed construction of the existing residential structure and comprised of three boreholes. The findings and recommendations are provided in the GHD (heritage Inspec-Sol Inc.) geotechnical investigation report dated April 11, 2007 titled 'Subsurface Investigation and Slope Stability Analyses, Proposed Residential Dwelling and Guesthouse, 904 Mississauga Heights Drive, Mississauga, Ontario'. The GHD 2007 report is included as **Attachment 2.**

GHD has conducted this evaluation to meet the requirements of the CVC Guidelines to determine the LTSSL and erosion setbacks.

→ The Power of Commitment

¹ Credit Valley Conservation (February 2014): Slope Stability Definition & Determination Guideline, p8

1. **Site Geology**

The Property is located in the Physiographic Region of the Iroquois Plain², a lowland bordering the 300 km long shoreline of Lake Ontario extending from the Niagara River in the west to the Trent River in the east. In the area of the Site, from Aldershot (Hamilton/Burlington) to Mississauga, the Lake Iroquois shoreline is comprised of a shale bedrock bluff. In the general Site area the Shale bedrock is comprised of grey shale of the Georgian Bay Formation as shown on Figure 2 and Figure 3.

2. Setback Evaluation

The Lake Iroquois shoreline bluff is approximately 23 m high and has a gradient of 1.4 horizontal to 1 Vertical (1.4H:1V). The setback evaluation comprised of an initial Site visit, a review of subsurface conditions, and a Slope Stability Rating assessment as discussed in the following sections.

2.1 **Visual Inspection**

A GHD geotechnical engineer visited the valley slope running along the northern property boundary on May 5, 2021. The photo log prepared during the inspection is attached to this letter as Attachment 3.

The existing residential structure is set approximately 15 m from the existing physical top of the approximately 23 m high slope with the southeast corner of the structure only about 10 m from the top of the bluff (Photo 1). The bluff top has a concave edge (Photo 1 and Photo 2) indicative of a relatively hard underlying stratum. The slope face at the time of inspection was covered with fallen leaves (Photo 3 to Photo 8) and was generally free of grass and shrubs.

Trees that were described as relatively young to mature and in a low to medium density, was observed on the slope face that were generally straight with no signs of tilting, which would be indicative of no past slope movements. There was no evidence of active erosion due to surface runoff over the slope face. Also, there were no signs of groundwater seepage observed anywhere on the slope face or signs of slope instability noted during the Site visit. The location of the existing residential structure and its approximately 40 m length parallel to the approximately 80 m long existing top of the bluff likely impedes overland drainage over the slope.

The Credit River at its closest was measured to be more than 20 m away from the toe of the bluff.

2.2 Subsurface Soil and Groundwater Conditions

GHD conducted a geotechnical investigation at the Site in 2007 consisting of the advancement of three boreholes. The subsurface conditions at all three borehole locations were found to be generally consistent with the published geology. Due to the method of augering and Standard Penetration sampling used, the samples of weathered and highly weathered grey shale, and interbedded limestone layers, were extracted as grey fragments of silt, sand and gravel size particles and identified as such. The sound shale bedrock was identified in the borehole logs upon auger refusal. It is noted that the top of the Georgian Bay formation is highly weathered and can be easily penetrated a few metres during drilling activities before sounder bedrock is encountered. The presence of the Georgian Bay shale from the ground surface is also supported by the fact that the slope gradient is uniform from top of slope to the toe i.e., rather steep at 1.4H:1V, and there is no change in profile at the presumed overburden/bedrock interface, which is typically the case due to the large

² Chapman, L. J., and Putnam, D. F., (1984): The Physiography of Southern Ontario; Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600,000

difference in shear strength of the two strata. Based on our interpretation of the logs, the subsurface stratigraphy at the Site is comprised of the following:

- Georgian Bay Shale Highly weathered Shale 0 to 1 m below ground surface (BGS)
- Georgian Bay Shale Weathered Shale 1 to 4 m BGS
- Georgian Bay Shale Sound / Intact ≥ 4 m BGS

2.3 Slope Stability Rating

Based on the results of Site inspection and a review of the geological and the topography survey provided by Sajecki Planning, GHD completed a Slope Stability Rating Chart of the approximately 80 m long slope at cross-Sections A-A and B-B in accordance with the requirements of the Ontario Ministry of Natural Resources (MNR) Guidelines3. The locations of the cross-sections are shown on Figure 4. The cross-sections at these locations based on the topographic survey are shown on Figure 5. The ratings are an indication of the potential of slope instability according to the following criteria issued by MNRF:

Table 1 Slope Instability Rating

Stage	Slope Instability Rating	Score	Investigation Requirements
1	Low Potential	≤24	Site inspection only, confirmation, report letter
II	Slight Potential	25 to 35	Site inspection and surveying, preliminary study, detailed report
III	Moderate Potential	>35	Boreholes, piezometers, lab tests, surveying detailed report

The ratings are provided in the attached Table 1 to Table 7 and are summarized in the table below.

Table 2 Slope Inclination and Heights

Task	Slope Inclination (H:V)	Slope Material	Seepage from slope face	Slope Height (m)	Vegetation Cover	Table Land Drainage	Proximity of Creek	Previous Landslide activity	Slope Rating
Cross-Section	n A-A								
Observation	1.4:1 (35.5°)	Shale	No	23	Well vegetated	None	>15m	No	24
Rating	16	0	0	8	0	0	0	0	
Cross-Section	n B-B								
Observation	1.4:1 (35.5°)	Shale	No	23	Well vegetated	None	>15m	No	24
Rating	16	0	0	8	0	0	0	0	

The slope at cross-section A-A and B-B based on a rating value of 24 are considered to have a low instability potential. As such the existing top of the slope is considered the Long-Term-Stable-Top-of-the-Slope (LTSTOS).

³ MNRF (2002) River & Stream Systems: Erosion Hazard Limit - Technical Guide issued by the Ontario Ministry of Natural Resources

3. **Global Stability Evaluation**

It is understood that CVC requires global slope stability analyses regardless of the MNRF slope rating values. Global stability refers to the potential of a slope to undergo a relatively deep-seated circular failure. The subsurface stratigraphy was selected using the GHD borehole logs and the published geology.

3.1 Analyses Methodology and Software

The static slope stability analyses were performed for cross-sections A-A and B-B using the Morgenstern & Price Method using the module Slope/W of the computer software Geo-Studio 2021 developed and distributed by Geo Slope International Ltd.

3.2 **Material Properties**

The properties required for the stability analyses of the slope is the bulk densities and shear strength parameters of the materials involved. The subsurface stratigraphy of the slope profile is discussed in Section 2.2.

The Georgian Bay Shale has a uniaxial compression strength⁴ of 8 to 19 MPa, whereas the uniaxial compression strength interbedded limestone layers ranges from 100 to 190 MPa. The uniaxial compressive strength⁵ of limey shale can range from 20 to 35 MPa. The Georgian Bay Shale can also be typically classified as 'Very Poor Rock' according to the Rock Mass Rating (RMR) system. The strength of such a rock mass is limited by the upper limits of angle of internal friction of 15 degrees and cohesion of 100 kPa of the joint system. The material parameters assumed in our analyses are provided in the following table and are shown on the slope stability analyses provided on Figure 6 and Figure 7.

Table 3 **Material Properties**

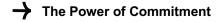
Material	Unit Weight (kN/m3)	Effective Shear Strength Parameters		
		Cohesion (kPa)	Φ' (Degrees)	
Highly weathered Shale (soil like)	22	20	10	
Weathered Shale	24	30	15	
Intact Shale		Impenetrable		

The selected parameters are considered conservative based on the published technical literature and our experience with similar materials.

3.3 **Piezometric Conditions**

Piezometric surfaces can affect the results of the slope stability analyses if they pass through the soil mass above the critical slip circle/plane. The conditions for a free groundwater table (aquifer) are not present at the Site. Groundwater seepage was not observed on the slope face therefore a phreatic line was not included in the analyses.

GHD (2010) Geotechnical Investigation, Outfall Tunnel and Stormwater Quality Facility, 480 Lakeshore Boulevard, Toronto, Ontario



Lo. K.Y. and Hori, M. (1979): "Deformation and Strength Properties of Some Rocks in Southern Ontario". Canadian Geotechnical Journal, Vol. 16, p 108 - 120

3.4 **Minimum Factors of Safety**

A factor of safety (FS) in slope stability analysis can be defined as the ratio of the available shear strength to that of the applied stresses along a potential failure plane. A factor of safety of 1.0 or greater indicates stable conditions and a value of less than 1.0 represents unstable conditions. Typically, a target factor of safety between 1.3 and 1.5 is considered reasonable for natural slopes, under static conditions. For the purposes of this study a minimum factor of safety of 1.5 was targeted.

3.5 Slope Stability Evaluation Results

The graphical outputs of the slope stability analyses are provided on Figure 6 and Figure 7 and are summarized in the following table.

Table 4 Slope Stability Analysis Results

Cross-Section	Factor of Safety	Figure	Remarks
Cross-Section A-A	2.29	Figure 6	
Cross-Section B-B	2.77	Figure 7	

A review of Figure 6 and Figure 7 and Table 4 shows that the factors of safety for both cross-sections A-A and B-B exceeded the targeted factor of safety of 1.5.

Erosion Allowance 4.

The erosion allowance was determined in accordance with the CVC Guidelines, applicable if the channel is within 15 m of a slope toe, which are reproduced below.

Table 5 **Erosion Allowance**

Material at Channel Bank or Bank Full/Bank Condition	Active Erosion of Bank	Erosion Currently not Evident	Existing Erosion Protection in Place and Maintained Along Bank
Limestone or Dolostone	2 m	1 m	0 m
Shale	5 m	2 m	0 m
Cohesive soils; silty clays, clayey silts	8 m	4 m	0 m
Cohesionless soils; silts, sands	15 m	7 m	0 m

The slope is comprised of the Shale bedrock and the Credit River flows at a distance of more than 15 m from the toe of the slope. As a result, there is no erosion allowance is required.

5. Long Term Stable Top of Slope

Based on the analyses discussed above and using Figure 3, Figure 4a and Figure 5 of the CVC Guidelines, the existing top of slope line staked by CVC shown on Figure 5, can be considered the LTSSL.

6. **Recommendations and Conclusions**

Based on the results of our Site visit, a review of subsurface conditions, the Slope Stability Rating assessment, and the slope stability analysis, the following is a summary of our recommendations and conclusions:

- No stability issues were identified in this study for the existing slope along the Lake Iroquois shoreline bluff.
- 2. The existing top of the slope is considered the Long-Term-Stable-Slope Line (LTSSL).
- The existing vegetative cover including trees on the slope must not be disturbed for any future development for continuation of the existing conditions.

We trust the above meets your present requirements. Please contact us if you require further information or clarification.

Regards

Hassan Gilani, M.Sc., P.Eng.

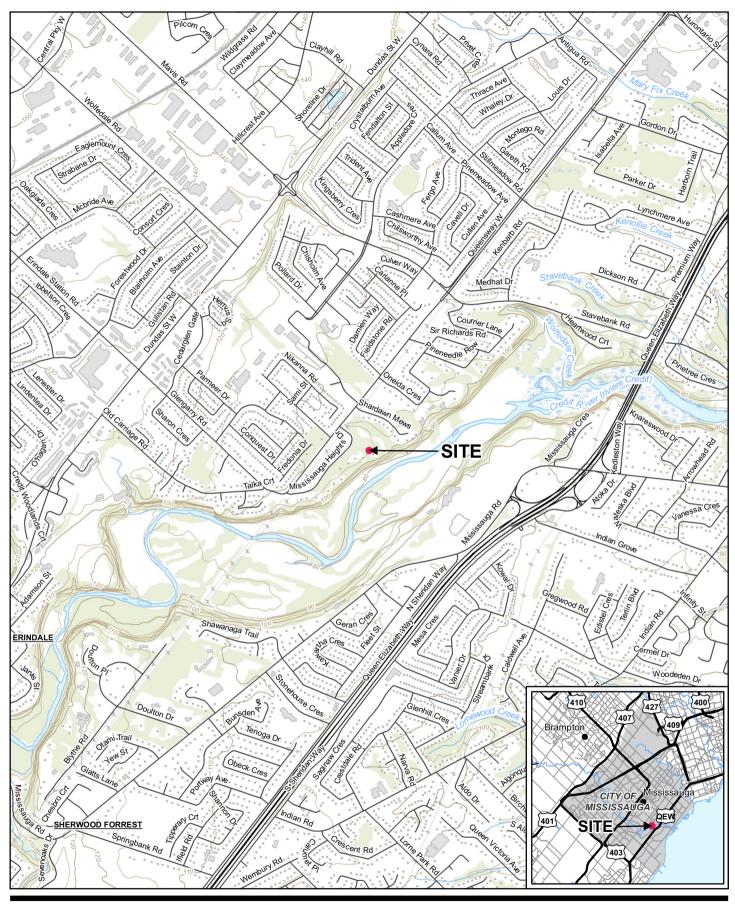
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HG/cd/1

Encl.

Karl Roechner, M.A.Sc. P.Eng.

+1 905 374 3821 karl.roechner@ghd.com





Map Projection: Transverse Mercator Horizontal Datum: North American 1983 Grid: NAD 1983 UTM Zone 17N



GHD

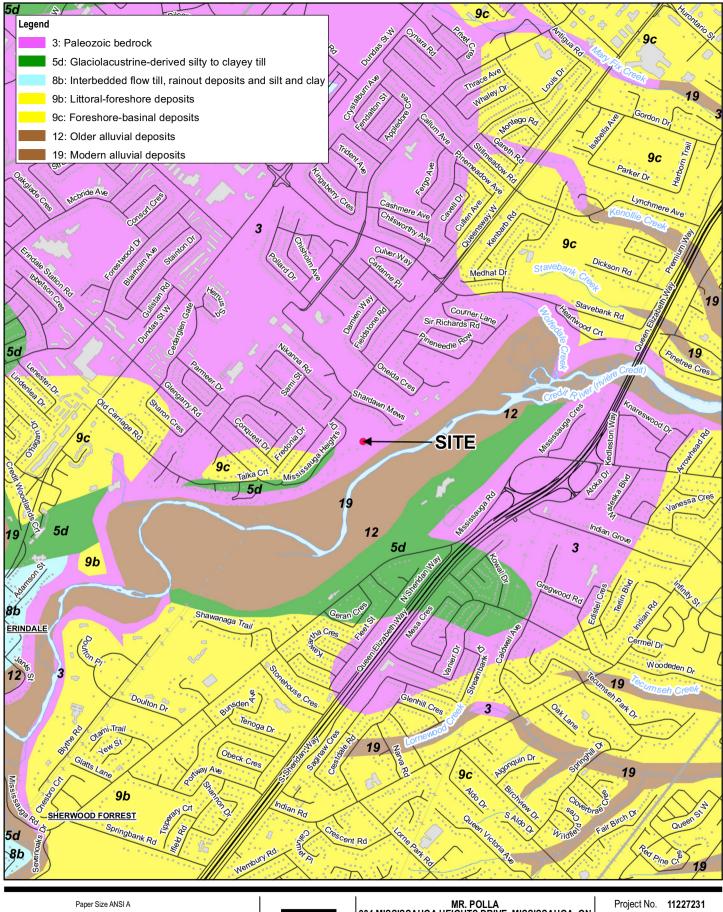
MR. POLLA 904 MISSISSAUGA HEIGHTS DRIVE, MISSISSAUGA, ON SLOPE STABILITY ANALYSES

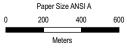
Project No. 11227231 Revision No. -

Date May 17, 2021

SITE LOCATION MAP

FIGURE 1





Map Projection: Transverse Mercator Horizontal Datum: North American 1983 Grid: NAD 1983 UTM Zone 17N



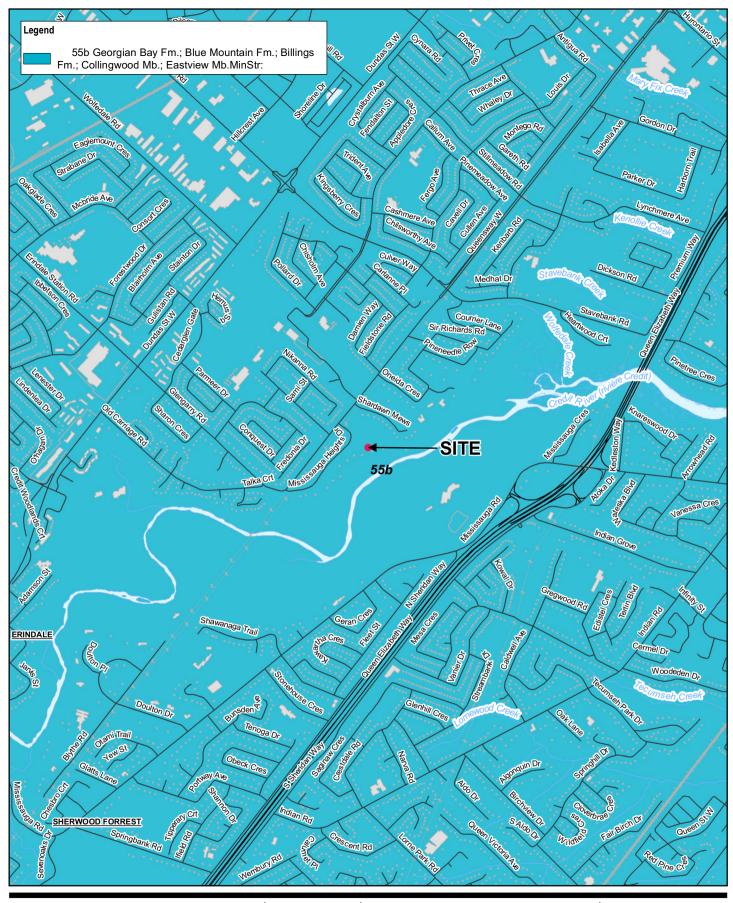
MR. POLLA 904 MISSISSAUGA HEIGHTS DRIVE, MISSISSAUGA, ON SLOPE STABILITY ANALYSES

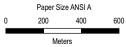
Project No. 11227231
Revision No. -

Date May 17, 2021

SURFICIAL GEOLOGY

FIGURE 2





Map Projection: Transverse Mercator Horizontal Datum: North American 1983 Grid: NAD 1983 UTM Zone 17N



GHD

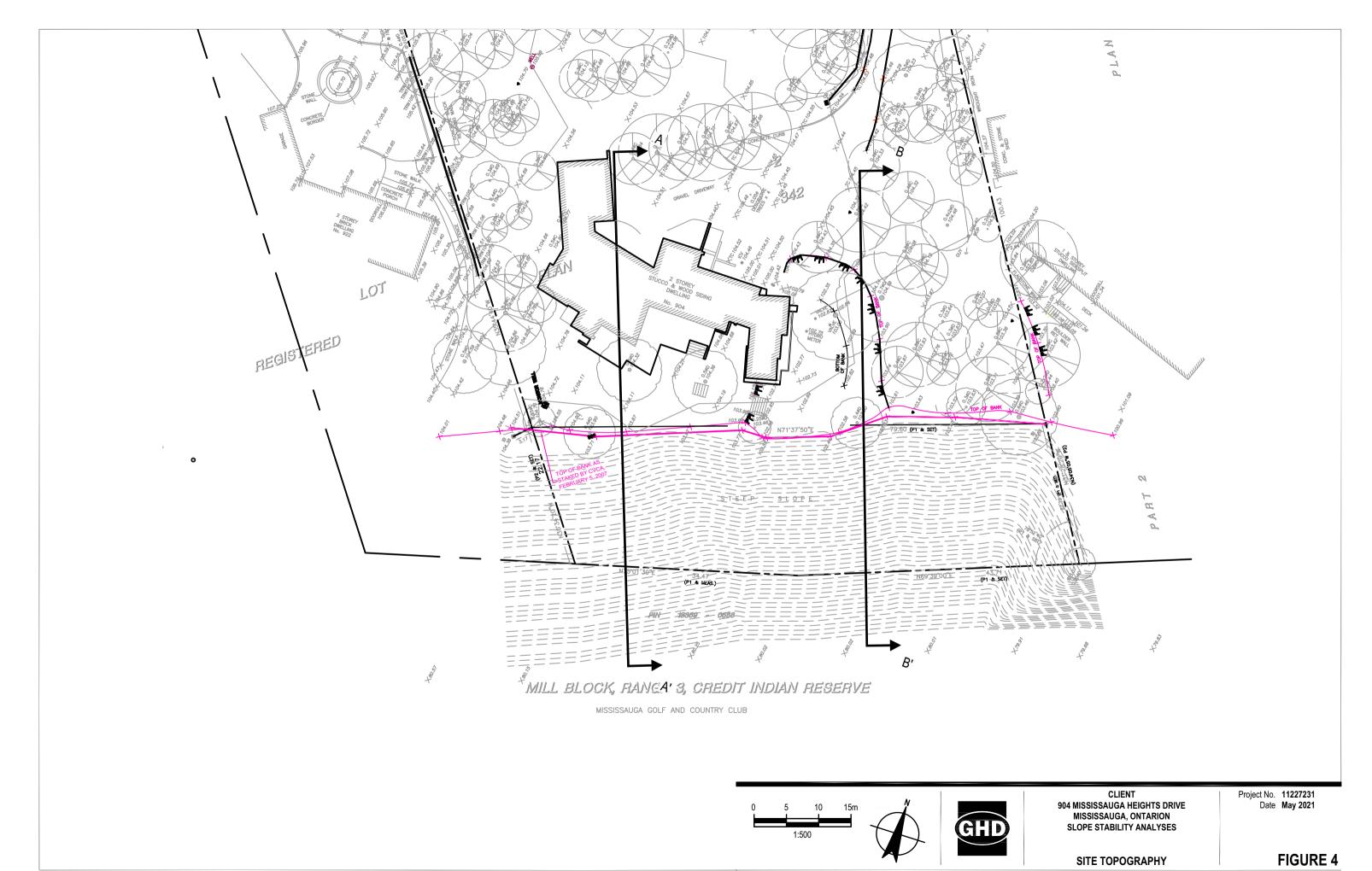
MR. POLLA 904 MISSISSAUGA HEIGHTS DRIVE, MISSISSAUGA, ON SLOPE STABILITY ANALYSES

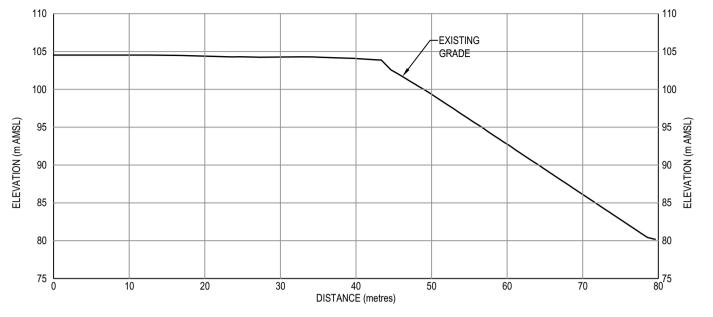
Project No. 11227231
Revision No. -

Date May 17, 2021

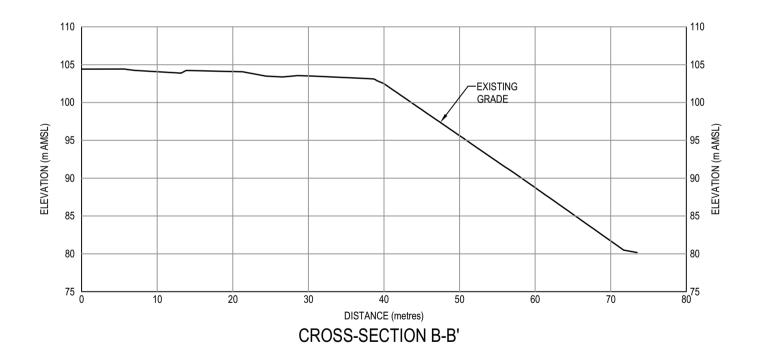
BEDROCK GEOLOGY

FIGURE 3





CROSS-SECTION A - A'

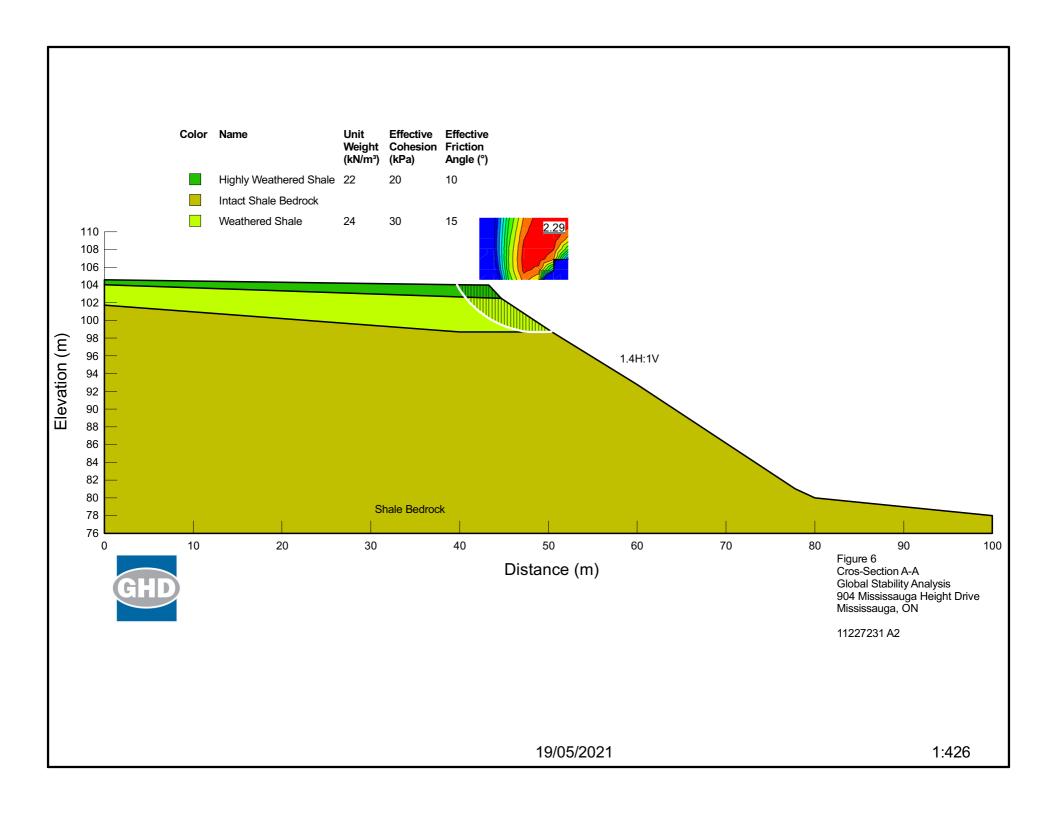




CLIENT
904 MISSISSAUGA HEIGHTS DRIVE
MISSISSAUGA, ONTARIO
SLOPE STABILITY ANALYSES

Project No. 11227231 Date May 2021

CROSS-SECTIONS A-A' AND B-B'



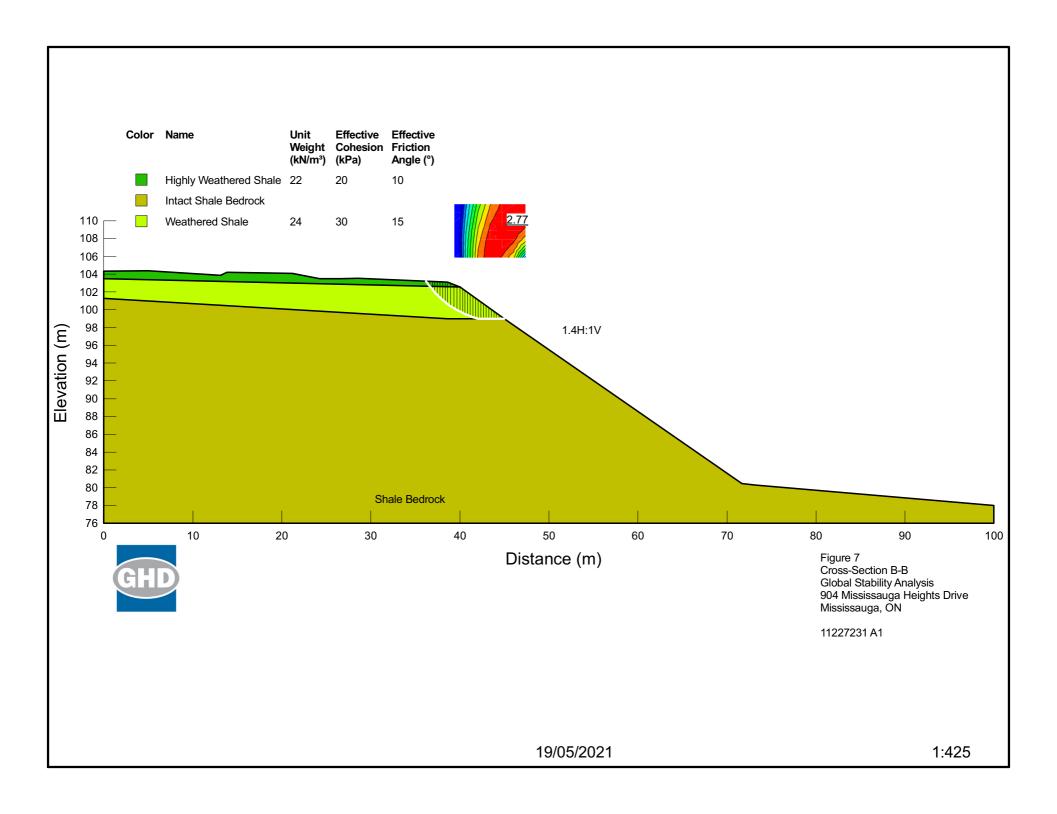




TABLE 1

CROSS-SECTION A-A SLOPE STABILITY RATING CHART LONG TERM STABLE TOP OF 904 MISSISSAUGA HEIGHTS DRIVE MISSISSAUGA, ON

Location:		Cross-section A - A		Project No.	11227231
Property O	wner:	Mario Polla		Inspection Date:	5-May-21
Inspected E	Зу:	Omar Badaoui P. E	ng.	Weather:	Sunny 10° C
			ion Task		Rating Value
1. SLOPE	INCLINATION	ON			
	Degrees	Horizor	ıtal:Vertical		
,	18 or less				0
,	b) 18 to 26				6
	more than				16
2. SOIL ST	_				
		estone, Granite (Bed	irock)		0
,	Sand, Grav	/ei			6
,	Glacial Till				9 12
	Clay, Silt Fill				16
,	Leda Clay				24
		SLOPE FACE			47
		ar bottom only			0
	Near mid-s				6
,		only or from several	levels		12
	4. SLOPE HEIGHT				
a)	2 m or less				0
b)	2.1 to 5 m				2
c)	5.1 to 10 m				4
	more than				8
		ER ON SLOPE FA			
•			or forested with mature tr		0
			weeds, occasional trees	, shrubs	4
	No vegetai				8
6. TABLE I			danas arras alama		٥
		flat, no apparent dra lage over slope, no a			0
,		ver slope, active ero			2 4
,		ATERCOURSE TO	. •		4
	_	ore from slope toe			0
		15 m from slope toe			6
		IDE ACTIVITY			·
-	No				0
,	Yes				6
			RATING	G VALUES TOTAL	. 24
SLO	SLOPE INSTABILITY RATING INVESTIGATION REQUIREMENTS				
1. Low Pote	ential	≤24	Site inspection only, of	confirmation, report	letter
2. Slight Po	2. Slight Potential 25 - 35 Site inspection and surveying, preliminary study, detailed repo				
3. Moderate	e Potential	>35	Boreholes, piezomete		
A	N. C.				

Notes:

- a) Choose only one rating value from each category; compare total rating value with above requirements
- b) If there is a waterbody (stream, creek, river, pond, bay, lake) at the slope toe, the potential for toe ersoion and undercutting should be evaluated in detail and protection provided if required.
- c) For leda clay and rock slopes, additional evaluation must be carried out

GHD

TABLE 2

CROSS-SECTION B-B SLOPE STABILITY RATING CHART LONG TERM STABLE TOP OF 904 MISSISSAUGA HEIGHTS DRIVE MISSISSAUGA, ON

Location:	Cross-section B - B	Project No.	11227231		
Property Owner:	Mario Polla	Inspection Date	e: 5-May-21		
Inspected By:	Omar Badaoui P. Eng.	Weather:	Sunny 10° C		
	Rating Value				
1. SLOPE INCLINATI	Inspection ON				
Degrees	Horizonta	:Vertical			
a) 18 or less			0		
b) 18 to 26	6				
c) more than	16				
2. SOIL STRATIGRA					
	nestone, Granite (Bedro	ck)	0		
b) Sand, Gra			6		
c) Glacial Til			9		
d) Clay, Silt			12		
e) Fill			16		
f) Leda Clay 3. SEEPAGE FROM			24		
			0		
	ear bottom only		0		
b) Near mid-		volo	6 12		
4. SLOPE HEIGHT	t only or from several lev	reis	12		
a) 2 m or les	e		0		
b) 2.1 to 5 m			2		
c) 5.1 to 10 r			4		
d) more than			8		
	/ER ON SLOPE FACE				
		orested with mature trees	0		
		eeds, occasional trees, shrubs	4		
c) No vegeta			8		
6. TABLE LAND DRA	AINAGE				
a) Table land	l flat, no apparent draina	age over slope	0		
	nage over slope, no act		2		
	over slope, active erosic		4		
	ATERCOURSE TO SLO	OPE TOE			
	ore from slope toe		0		
	15 m from slope toe		6		
8. PREVIOUS LANSI	LIDE ACTIVITY				
a) No			0		
b) Yes			6		
		RATING VALUES TOTA	AL 24		
SLOPE INSTA	SLOPE INSTABILITY RATING INVESTIGATION REQUIR				
1. Low Potential ≤24 Site inspection only, confirmation, report letter					
Slight Potential	25 - 35	Site inspection and surveying, prelimin			
3. Moderate Potential	>35	Boreholes, piezometers, lab tests, sur			

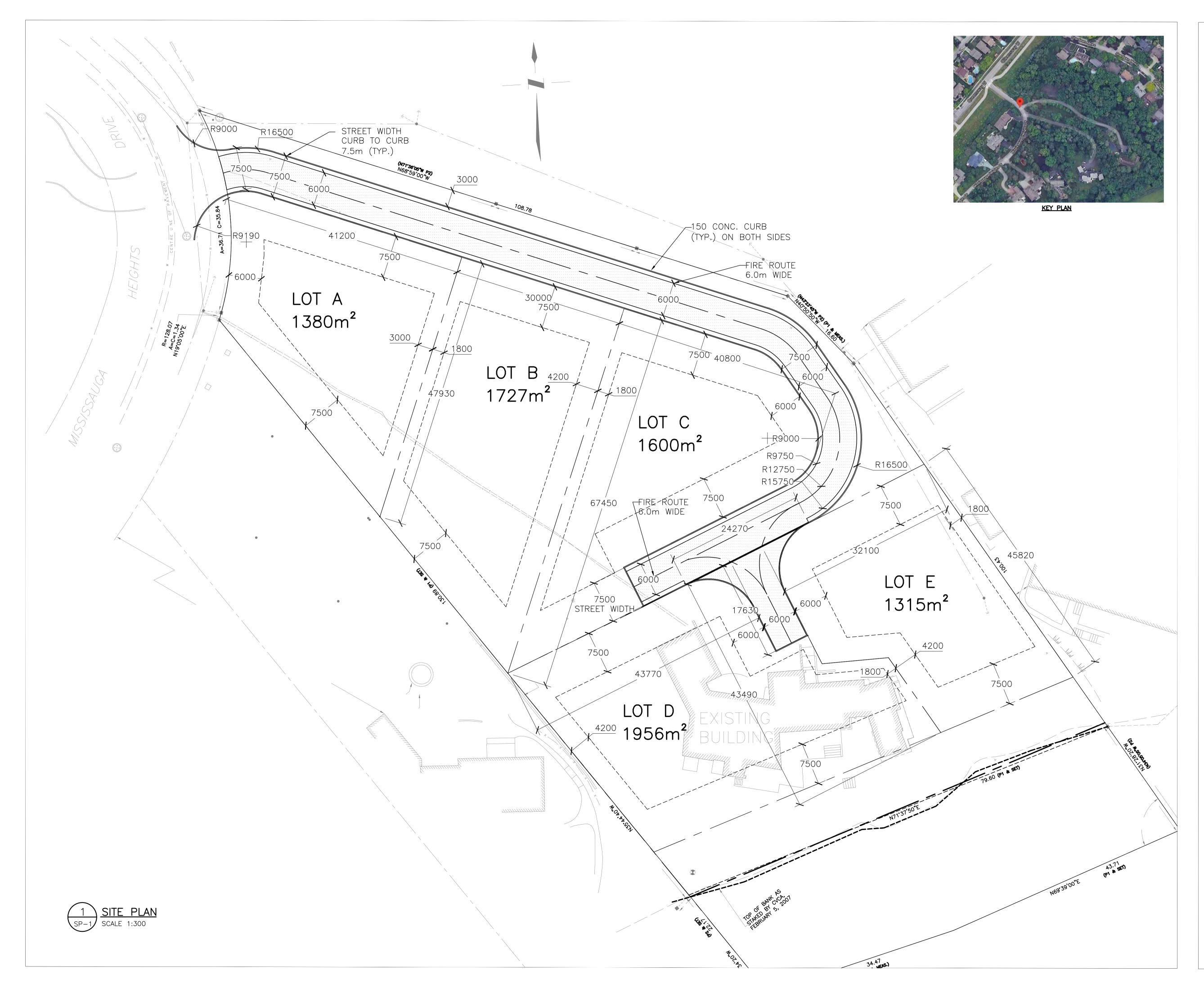
Notes

- a) Choose only one rating value from each category; compare total rating value with above requirements
- b) If there is a waterbody (stream, creek, river, pond, bay, lake) at the slope toe, the potential for toe ersoion and undercutting should be evaluated in detail and protection provided if required.
- c) For leda clay and rock slopes, additional evaluation must be carried out

Attachments

Attachment 1

Proposed Site Plan
Provided by Sajecki Planning



Sajecki→ Planning

904 MISSISSAUGA HEIGHTS DR MISSISSAUGA, ON

PROPOSED SITE PLAN

PLAN OF TOPOGRAPHY OF
PART OF LOT 2
REGISTERED PLAN 342
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

	LEGEND		
	IB SIB IP TC BC CCT MH CB WUP WV A/C GUY ICV TRW P1	DENOTES	IRON BAR STANDARD IRON BAR IRON PIPE TOP OF CURB BOTTOM OF CURB CURB CUT MANHOLE CATCH BASIN WOOD UTILITY POLE WATER VALVE AIR CONDITIONER GUY WIRE IRRIGATION CONTROL VALVE TOP OF RETAINING WALL TARASICK McMILLAN KUBICKI LTD., O.L.S., APRIL 9, 1986 PLAN 43R-21696
	(923)	DENOTES	TARASICK McMILLAN KUBICKI LTD., O.L.S.
1	0.2040	DENOTES	DECIDITORS THEE WITH THINK DIAMETED



0.200C DENOTES CONFEROUS TREE WITH TRUNK DIA

FIRE ROUTE - FULL WIDTH 6.0m

TREE CANOPIES ARE DRAWN TO SCALE.

ZONING CATEGORY: -		PROVIDED	BY-LAW REQUIREMENT
LOT A AREA		1380m²	
LOT B AREA		1727m²	
LOT C AREA		1600m²	
LOT D AREA		1956m²	
LOT E AREA		1315m²	
TOTAL LOT AREA		7978m²	
	LOT A	41.20m	
	LOT B	30.00m	
LOT FRONTAGE	LOT C	40.80m	
	LOT D	43.77m	
	LOT E	32.10m	
	LOT A	47.94m	
	LOT B	67.45m	
LOT DEPTH	LOT C	67.45m	
	LOT D	43.49m	
	LOT E	45.82m	
	LOT A	606.85m²	
	LOT B	981.15m²	
BUILDING AREA	LOT C	746.05m²	
	LOT D	1013.31m²	
LOT COVERAGE(%)	LOT E	651.26m²	
2	LOT A	43.97%	
<u> </u>	LOT B	56.81%	
	LOT C	46.63%	
2 1	LOT D	51.81%	
,	LOT E	49.53%	
	LOT A	7.5m	
	LOT B	7.5m	
FRONT YARD SETBACK	LOT C	7.5m	
	LOT D	7.5m	
	LOT E	7.5m	
	LOT A	6.0m	
	LOT B	1.8m	
SIDE YARD SETBACK	LOT C	1.8m	
	LOT D	4.2m	
	LOT E	4.2m	
	LOT A	3.0m	
OIDE VADO	LOT B	4.2m	
SIDE YARD SETBACK	LOT C	6.0m	
	LOT D	1.8m	
	LOT E	1.8m	
	LOT A	7.5m	
DEAD VADO	LOT B	7.5m	
REAR YARD SETBACK	LOT C	7.5m	
	LOT D	7.5m	
	LOT E	7.5m	

Attachment 2

Geotechnical Investigation Report Dated April 11, 2007



INSPEC-SOL INC. 111 Brunel Rd., Suite 200, Mississauga, Ontario L4Z 1X3 * Tel.: (905) 712-4771 * Fax: (905) 712-0515

DANIEL JOHNSON ARCHITECT INC.

Subsurface Investigation and Slope Stability Analyses
Proposed Residential Dwelling and Guesthouse
904 Mississauga Heights Road
Mississauga, Ontario

Date: April 11, 2007 Reference No: T040022-A1



INSPEC-SOL INC. 111 Brunel Rd., Suite 200, Mississauga, Ontario L4Z 1X3 • Tel.: (905) 712-4771 • Fax: (905) 712-0515

Reference No. T040022-A1

April 11, 2007

Mr. Daniel Johnson
Daniel Johnson Architect Inc.
90 Richmond Street East, Suite 100
Toronto, Ontario
M5C 1P1

Re:

Subsurface Investigation and Slope Stability Analyses Proposed Residential Dwelling and Guesthouse

904 Mississauga Heights Road

Mississauga, Ontario

Dear Mr. Johnson:

In accordance with your request, Inspec-Sol Inc. has conducted a subsurface investigation and slope stability analyses at the above-mentioned site and is pleased to present this report.

We trust that this information meets with your approval. Please do not hesitate to contact us, should any questions arise.

Yours very truly,

INSPEC-SOL INC.

Karl Roechner, P. Eng.,

Associate



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APPENDIX C Photograph Log	



1.0 INTRODUCTION

Inspec-Sol Inc. was retained by Daniel Johnson Architect Inc. to carry out a subsurface investigation and slope stability analyses at 904 Mississauga Heights Road, in Mississauga, Ontario (Site). The Site is irregular in shape, overlooking the Credit River, and is approximately 1.09 hectares (2.7 acres). A Site Location Plan is provided as Figure No. 1.

It is our understanding that the anticipated development activities include the demolition of the existing dwelling, construction of a 418 square metres (4,500 square feet) primary residence, and a 232 square metres (2,500 ft²) guest house. The primary residence will generally be located at the rear of the property on the footprint of the existing dwelling but will be slightly larger with no portion of the structure closer to the slope crest than the existing building. The guest house residential structure will be located in the central portion of the property. The rear portion of the property slopes down towards a branch of the Credit River. The slope is approximately 22 m high and the inclination varies between 1.3:1 to 3:1 (horizontal to vertical).

The purpose of the investigation was to assess the subsurface conditions adjacent to the existing slope situated along the rear boundary of the proposed development (south limit) in order to establish the stable slope allowance and the toe erosion allowance for the development. Engineering recommendations are also provided with regards to design and construction of the proposed residential dwelling and guest house, including measures to be undertaken to maintain long term stability of the existing slope. The scope of work included advancing three boreholes, installation of two piezometer for groundwater level measurements, a detailed visual slope inspection and mapping, and a stability analysis of one critical slope section.

2.0 FIELD PROCEDURES

The borehole exploration was carried out on March 9, 2007 under the supervision of an Inspec-Sol field representative. The work consisted of drilling and sampling one borehole (Borehole 1) in the area of the proposed guest house in the central portion of the site and two boreholes (Boreholes 2 and 3) at the rear of the existing dwelling adjacent to the crest of the slope. One of the boreholes (Borehole 2) was extended to a depth of 12.8 m to explore the subsurface conditions in the slope profile. The location of the boreholes advanced at the Site are shown on



the Borehole Location Plan provided as Figure No. 2. The detailed results of the individual boreholes are recorded on the accompanying Borehole Logs in Appendix A (Enclosures 1 to 5).

The stratigraphy at each borehole location has been referenced to the current grade level. The ground surface elevations at the borehole locations have been surveyed to a temporary benchmark (geodetic elevation of 107.38 m), which is the top of manhole at the intersection of the property driveway with Mississauga Heights Road.

The boreholes were advanced with a track-mounted continuous flight power auger for conventional augering and sampling. Representative disturbed samples of the strata penetrated were collected using a split-barrel sampler advanced by a 63.5-kg hammer dropping approximately 760 mm. The results of these Penetration Tests are reported as "N" values on the borehole logs at the corresponding depths. The supervising technician logged the borings and examined the samples as they were obtained. The samples were sealed in clean, airtight containers and transferred to our laboratory, where they were reviewed by a senior geotechnical engineer.

Ground water observations were made in the boreholes as drilling proceeded. Standpipe type peizometers were installed in Boreholes 2 and 3 to permit monitoring of the groundwater levels. The standpipes comprised of 19 mm I.D. PVC tubing, were saw-slotted near the base, and fitted with a cloth filter and bentonite seal.

Laboratory testing consisted of moisture content tests on all recovered samples and gradation analysis on two select samples obtained from the boreholes. The moisture content results are presented on the borehole logs and the grain size results are attached in Appendix B.

3.0 SUBSURFACE CONDITIONS

3.1 Stratigraphy

Details of the subsurface conditions encountered at the Site are summarized in this section. It should be noted that the subsurface conditions are confirmed only at the borehole locations and may vary elsewhere. The boundaries between the various strata, as shown on the Borehole Logs,



are based on non-continuous sampling. These boundaries represent an inferred transition between the various strata, rather than a precise plane of geological change.

A detailed description of the soils and the depths that they were encountered is presented on the accompanying Borehole Logs attached as Enclosures 1 through 5 (Appendix A).

3.1.1 Topsoil

All boreholes encountered a surficial topsoil layer at the ground surface. The topsoil generally ranged in thickness from 150 mm to 300 mm.

3.1.2 Earth Fill

Earth fill, consisting primarily of clayey silt, silty sand, and sand, was encountered immediately below the surficial topsoil in all boreholes and extended to depths ranging from 0.8 m to 1.5 m below existing grade.

The relative density of the fill materials was assessed by carrying out Standard Penetration Test (SPT). The SPT results obtained using standard sampling procedures yielded 'N' values ranging from 7 blows per 300 mm of penetration to 32 blows per 300 mm of penetration, indicating a loose to dense or stiff condition.

3.1.3 Clayey Silt Till

A stratum of glacial till with a matrix predominantly consisting of clayey silt size particles was encountered beneath the surficial fill in Borehole 1 at a depth of 1.5 m, and extended to 4.6 m below grade.

The penetration resistance measured in the clayey silt till by standard sampling procedures yielded 'N' values ranging from 44 blows per 300 mm of penetration to 50 blows per 25 mm of penetration. The shear strength of the stratum was measured using a pocket penetrometer and found to be greater than 225 kPa, indicating a hard consistency. The consistency of the undisturbed till generally increases with depth.



The moisture content of samples extracted from the native deposit generally varied between 11 and 21 percent by weight, indicating a moist to very moist condition.

3.1.4 Silty Sand and Gravel

A deposit of silty sand and sand and gravel till was encountered beneath the fill layer in Boreholes 2 and 3 and extended to a depth of 6.1 and 7.6 m below grade respectively. The layer is initially silty sand from a depth of 1.5 m to 4.6 m below grade and becomes silty sand and gravel at a depth of 4.6 m.

The penetration resistance measured in the native sandy deposit by standard sampling procedures yielded results ranging from 11 blows per 300 mm of penetration to 34 blows per 300 mm of penetration, indicating a relative density varying between compact and dense. The relative density of the deposit generally increases with depth.

Grain size distribution analyses were carried out on two (2) representative samples of the native soils, at depths ranging from 1.5 and 5.0 m below grade (Appendix B). A summary of the composition is presented below.

Borehole No.	Sample Depth	% Gravel	% Sand	% Silt	% Clay
BH 2	1.5 to 2.0 m	-	73	24	3
BH 2	4.6 to 5.0 m	27	54	15	4

The moisture content of samples extracted from the sandy soils generally varied between 3 and 16 percent by weight, indicating a moist to wet condition.

3.1.5 Weathered Shale (Bedrock)

Weathered shale bedrock was encountered beneath the clayey silt till in Borehole 1 and beneath the silty sand and gravel deposit in Boreholes 2 and 3. The weathered shale was encountered at depths ranging from 3.0 to 7.6 m and extended to the depths of the investigations (i.e. 4.6 m to 12.8 m below existing grade). The bedrock predominantly consisted of grey shale, which is thinly



laminated and friable, with interbeds of limestone and sandstone. Borehole 2 was terminated due to auger refusal on competent shale or limestone layers.

The weathered shale was generally in a hard state, with 'N' values varying between 50 blows per 100 mm of penetration to 50 blows per 25 mm penetration. The moisture content of samples extracted from the borings varied between 5 to 12 percent by weight.

4.0 GROUNDWATER

A standpipe type peizometer was sealed into Boreholes 2 and 3 in order to permit observation of the groundwater levels. The standpipes were comprised of 19-mm I.D. PVC tubing. The following table presents a summary of the depths at which groundwater was encountered in the open boreholes, upon completion of drilling, and in the two standpipe piezometers several days following drilling. Water level measurements were taken in the piezometers on March 21, 2007.

Location	Depth of Borehole	Water Level at Completion of Drilling (March 9, 2007)	Water Level in Standpipe on March 21, 2007
Borehole 1	5.0 m BG	3.0 m BG	N/A
Borehole 2	12.8 m BG	3.0 m BG	8.8 m BG
Borehole 3	9.2 m BG	dry	6.4 m BG

BG: Below Grade

N/A: No piezometer installed

It should be noted that groundwater levels are transient and tend to fluctuate with the seasons and periods of precipitation and temperature.

5.0 SLOPE INSPECTION

A detailed visual inspection of the slope condition was conducted by Inspec-Sol on March 19 and 27, 2007 and included an examination of the exposed soil and groundwater conditions, slope configuration, presence of seepage and erosional features, vegetation, and evidence of instability such as exposed scarps, slumps and sloughing. In addition, a topographical Site Plan obtained by



the City of Mississauga and cross sections of the slope profile prepared by Inspec-Sol were reviewed. The topographic contours for the slope are provided on Figure 2 and a cross section of the slope profile prepared by Inspec-Sol is presented on Figure 3.

Based on the topographical plan and the cross section, the slope along the rear (south) property has a height of approximately 22 meters, and locally varied in gradient from about 1.3 to 1 (horizontal to vertical) to about 3 to 1. The upper slope section was measured to have an inclination of approximately 2 to 1 and the lower portion was measured to be 3 to 1. The central portion of the slope was found to be steeper with an inclination of 1.3 to 1.

Based on our field observations, the slope face comprises of tall mature trees and shrubs. No significant evidence of erosion, sloughing, or instability were observed on the slope face and there were no tension cracks observed parallel to the slope crest. Also, no wet areas or evidence of water seepage was observed emanating from the slope. The slope face was observed to be dry. Also, there was no evidence of surface erosion associated with the surface water or runoff flow.

Minor gully features were also observed on the slope and found to be covered with grass. The features were relatively shallow and there were no signs of surficial erosion or slumping observed.

The existing dwelling is located approximately 12 to 24 m from the crest of the slope. The rear yard is generally flat and comprises of a grass lawn.

Typical photographs of the slope along the rear of the property taken on March 19 and 27, 2007 are presented in Appendix C.

6.0 ENGINEERING DISCUSSION AND ASSESSMENT

6.1 General

The known development activities will involve the demolition of the existing dwelling, and construction of a new primary residence and a guesthouse. The primary residence will be constructed adjacent to the existing slope on the footprint of the existing dwelling but will be



slightly larger with no portion of the structure closer to the slope crest than the existing building. The guest house will be located in the central portion of the property. The total floor area of the primary residence will be 418 square metres and the area of the guest house will be 232 square metres.

Based upon the above comments and on the borehole information, and assuming them to be representative of the subsoil conditions across the Site, the following comments and recommendations are offered:

6.2 Foundation Design Parameters For New Structures

All foundations must be designed to extend through the surficial earth fill materials and bear on the underlying undisturbed native strata. Footings exposed to freezing temperatures must be provided with at least 1.2 metres of earth cover for frost protection or equivalent insulation.

The undisturbed native clayey silt soil deposit encountered in Borehole 1 and the native silty sand deposit encountered in Borehole 2 and 3, at depth varying between 1.0 m and 1.8 m below existing grades, is considered suitable to support conventional spread footings. A maximum net allowable bearing pressure of 150 kPa is recommended for the design of spread footings established on the very stiff/compact native stratum. It is recommended that the minimum footing width for spread footings be 450 mm, and the minimum width for square or pad footings be 800 mm. The settlement of spread footings established on the native soils at this design bearing pressure is expected to be less than 25 mm.

The minimum founding depth at each of the borehole locations is summarized in the table below. Conventional spread footings or augered piers must be founded at least 0.3 metres into the undisturbed native soil for the allowable bearing capacity values provided.



Borehole Location	Minimum Founding Depth Below Existing Grade */ Elevation
1	1.0 m / 106.4 m
2	1.8 m / 103.0 m
3	2.3 m / 100.9 m

Note: * Footings exposed to freezing temperatures must be provided with at least 1.2 metres of earth cover for frost protection or equivalent insulation.

It is noted that seepage is anticipated in localized excavated areas during foundation construction from surface drainage and seepage from perched water within any preferentially permeable features in the earth fill or glacial till, such as thin sand / gravel seams. Since the till soils are, in general, of low permeability, the volume of water to be anticipated is such that temporary pumping from the excavations should suffice to control groundwater.

6.3 SLOPE STABILITY ASSESSMENTS AND STABILITY SETBACK

Analysis Method

Based on the topographic survey provided by the City of Mississauga representative slope profile (i.e. Sections A-A) was plotted as shown on Figure 3. An engineering analysis was carried out on the stability of the representative slope section utilizing borehole soil and groundwater information, and using long-term effective stress parameters.

The analyses was carried out using the SLOPE/W (Version 5.18) limit equilibrium software, adopting the Bishop method of slices, to evaluate the potential of movements of deep and shallow masses of soil over hypothetical failure surfaces. This assessment provides an estimate of the Factors of Safety against slope stability failure. A Factor of Safety of 1.0 or less is considered to represent a potential failure condition when the resisting forces to failure (soil shear strength) are equal to, or less than the driving gravitational forces tending to cause instability. For engineering design purposes a minimum Factor of Safety of 1.3 to 1.5 is generally considered acceptable depending on the type of slope soils and consequences of slope failure. A



Factor of safety of 1.5 is adequate for this Site given that a new residential dwellings will be constructed on the crest of the slope.

The analyses was conducted using the profile represented by section A-A. The inclination of the slope profile is approximately 2 to 1 (horizontal to vertical) in the upper slope, approximately 1.3 to 1 in the central slope, and then flattering near the base to approximately 3 to 1. Based on the borehole penetration data and the laboratory index properties, long-term effective stress soil strength parameters were estimated as presented in the following table.

Soil Type	Unit Weight (kN/m³)	Cohesion (kPa)	Angle of Internal Friction (Deg)
Fine Sand Fill	18	0	28
Native Silty Sand	19	0	34
Silty Sand & Gravel Till	20	0	38
Shale Bedrock	22	5	42

Note: Soil strength properties estimated using relationship between SPT 'N' values and soil friction established by Peck.

Factors of Safety (FOS)

Based on the subsurface conditions encountered at the boreholes and considering them to be representative of the overall site conditions, the following table presents the slope stability results:

Section	Overall S	Slope Inclination	FOS against Shallow Slope Failure	FOS against Intermediate/Deep Seated Slope Failure
A-A	Upper:	2:1	1.22	1.54
	Central	1.3:1		
	Lower:	3:1		



Based on the results of our engineering analyses, the existing slope represented by Section A-A is considered to be safe against intermediate and deep seated failure (FOS > 1.5).

It is noted that the slope face comprises of tall mature trees and shrubs. No significant evidence of erosion, sloughing, or instability were observed on the slope face and there were no tension cracks observed parallel to the slope crest. Also, no wet areas or evidence of water seepage was observed emanating from the slope. The slope face was observed to be dry. Based on our observations, experience and analysis, the existing slope represented by Section A-A is considered safe against shallow slope failure.

6.4 EROSION CONTROL ASSESSMENT AND EROSION SETBACK

The erosion setback is based on the nature of the soils present at the toe of the slope and banks of the drainage course and on the flood plain distances between the toe of the slope and the bank of the watercourse.

Based on the field visual investigation of the watercourse banks and the results of the subsurface investigation, the surficial soils encountered along the toe of the slope and adjacent to the watercourse consisted mainly of clayey silt, sand and silt, and sand and gravel soils. Also, there was no evidence of active erosion of the slope face or toe of slope.

The flood plain width obtained from the topographic survey (Figure 2) and the cross section plan (Figure 3) indicates the distance between the existing toe of slope and the watercourse channel varies between 35 m and 40m. Based on the results of our engineering analyses, no additional erosion setback is required for the proposed residential dwelling.

6.5 CRITERIA FOR MAINTAINING SLOPE STABILITY

To ensure that the stability of the existing slopes is not adversely affected by the proposed developments, the following general constraints are recommended:

 Development should be conducted in a manner that does not result in surface erosion of the slopes. In particular, site grading and drainage should be designed to prevent direct



concentrated or channelized surface run-off from flowing over the crest and face of the slope. Low velocity 'sheet flow' run-off over the slope crest should not result in erosion, provided the volume and flow velocities do not exceed existing conditions.

- Water drained from pools, downspouts, sumps, and the like, should not be allowed to flow from over the crest of the slope.
- A healthy vegetative cover should be maintained in all areas that may become disturbed as a result of construction.
- The configuration of the slope face and crest should not be altered without prior consultation with an experienced geotechnical engineer. In particular, the slopes should not be steepened, and fill materials should not be placed on the slope face, without engineering advice.
- Appropriate temporary silt fences should be erected and maintained until after construction is complete.
- An interceptor drainage swale should be constructed immediately upslope of any swimming pool areas to divert surface runoff around the pools.
- During construction, no equipment or earth stockpiles should be placed within 5 meters of the slope crest.

7.0 LIMITATIONS OF THE INVESTIGATION

This report is intended solely for the named consultant and their client. The material in this report reflects our best judgement in light of the information available to Inspec-Sol Inc. at the time of preparation. No portion of this report may be use as a separate entity, it is to be read in its entirety. 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.

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings

and specifications are complete, or if the final project details should differ from that mentioned in this report.

It is also important to emphasize that a soil investigation is in fact a random sampling of a site and the comments are based on the results obtained at the locations of the test results only. It is therefore, assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

We trust that this report meets with your present requirements. Please do not hesitate to contact us should any questions arise.

INSPEC-SOL INC.

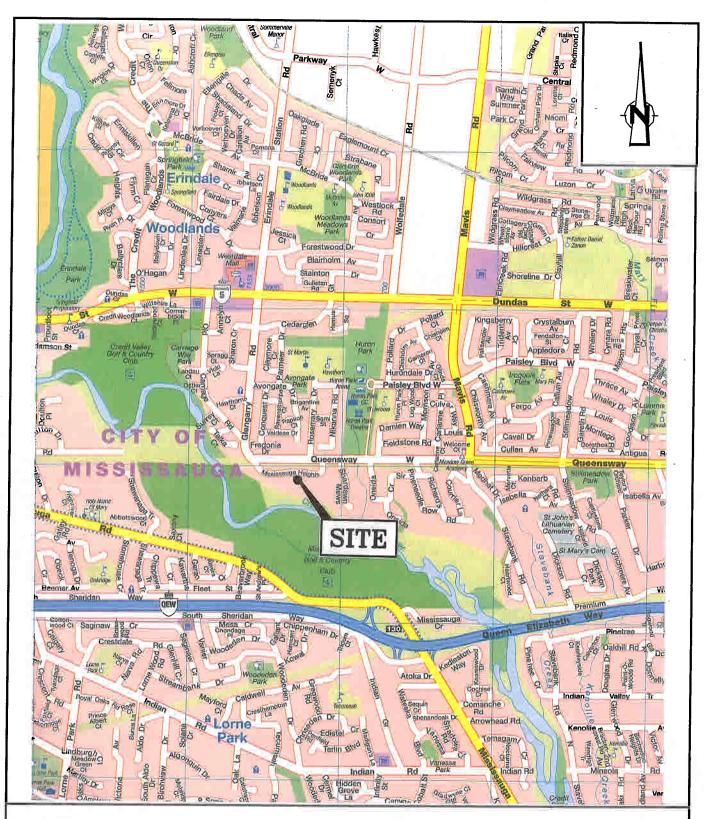
Helal Ahmed, P.Eng. Project Manager

Karl Roechner, P.Eng. Associate



FIGURES

Site Location Plan	Figure No. 1
Borehole and Cross Section Location Plan	Figure No. 2
Slope Profile	Figure No. 3
Stability Analysis Results	Figure No. 4 and 5

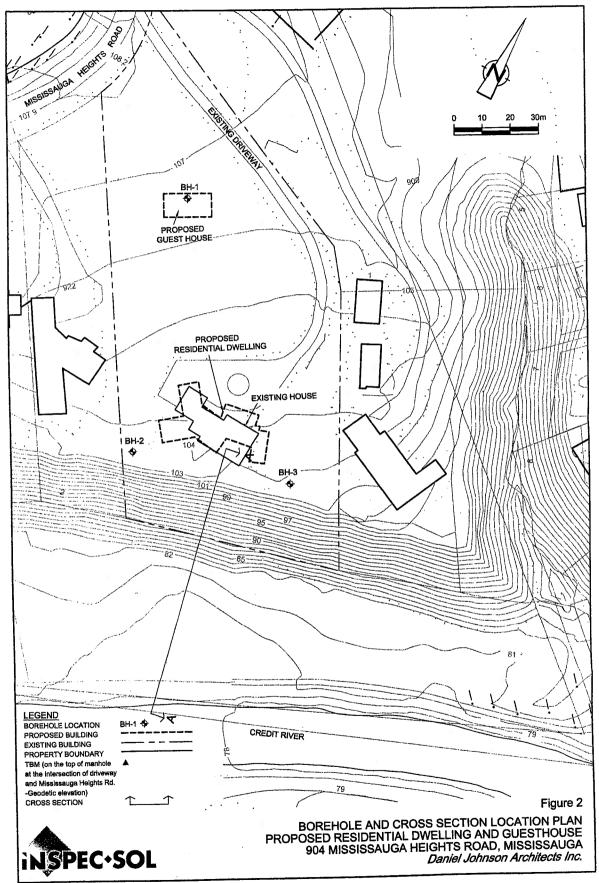


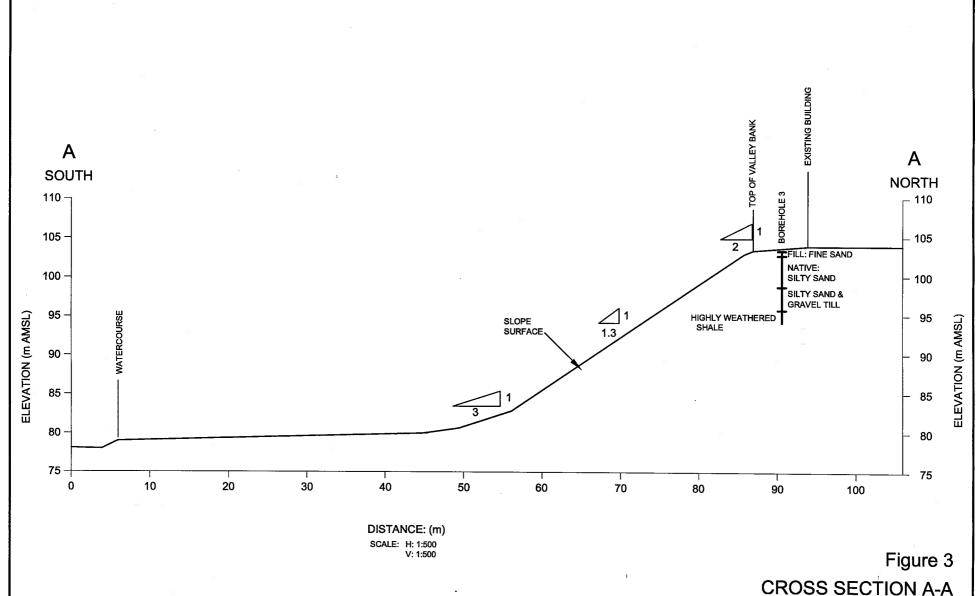
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figure 1

NSPEC-SOL

SITE LOCATION PLAN PROPOSED RESIDENTIAL DWELLING AND GUESTHOUSE 904 MISSISSAUGA HEIGHTS ROAD, MISSISSAUGA, ONTARIO Daniel Johnson Architects Inc.









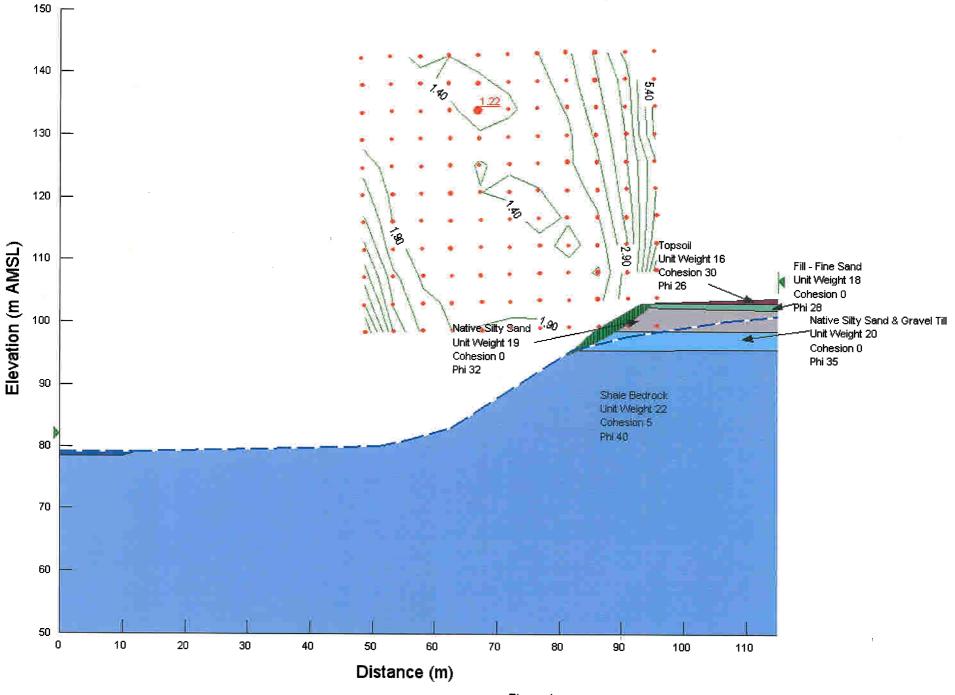




Figure 4 T040022-A1 Slope Stability Analyses Section A-A - Shallow Failure Proposed Residential Dwelling and Guesthouse 904 Mississauga Heights Road, Ontario

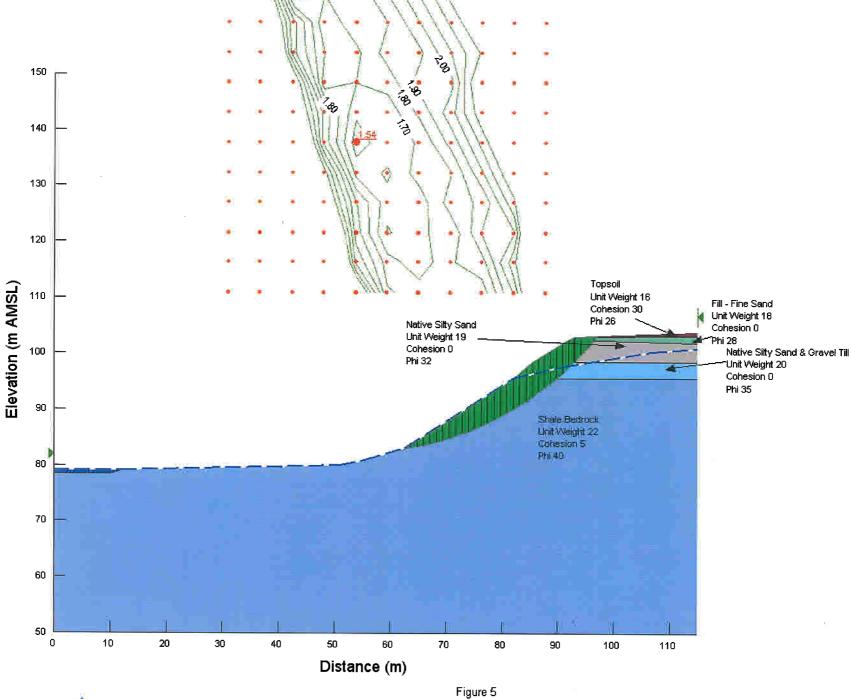




Figure 5 T040022-A1 Slope Stability Analyses Section A-A - Deep Failure Proposed Residential Dwelling and Guesthouse 904 Mississauga Heights Road, Ontario

APPENDIX A

BOREHOLES LOGS

ENCLOSURES 1 TO 5

REFERENCE No.: 1040022A1 ENCLOSURE No.: 1 BH-1 **BOREHOLE No.: BOREHOLE REPORT** INSPEC+SOL **ELEVATION:** 107.4m Page 1 of 1 Daniel Johnson Architect Inc. CLIENT:__ **LEGEND** Proposed Residential Dwelling and Guest House PROJECT: __ SS SPLIT SPOON 904 Mississauga Heights Road, Mississauga LOCATION: __ ST SHELBY TUBE ■ RC ROCK CORE A. Mazzuca Karl Roechner DESCRIBED BY: _____ CHECKED BY: __ WATER LEVEL DATE (START): _____ March 09, 2007 DATE (FINISH): March 09, 2007 STRATIGRAPHY SAMPLE **TEST RESULTS** SHEAR STRENGTH (C_U) Shear test (Cu) STRATIGRAPH) △ Field TYPE AND NUMBER ELEVATION (m) RECOVERY □ Lab. STATE **BLOWS** Sensivity (S) **DESCRIPTION OF** Water content (%) DEPTH 6 in/15 cm SOILS AND BEDROCK HAtterberg limits(%) or RQD • "N" Value (blows/12 in-30 cm) Feet **GROUND SURFACE** % Metres 107.4 KPa 10 20 30 40 50 60 70 80 90 Topsoil: 300mm SS-1 75 6-7-7-9 14 Clayey Silt, occasional rootlets. brown, moist, stiff 106.6 ... 0.8 Native: - 1.0 SS-2 Clayey Silt Till, brown, moist, hard 100 >225 9-16-28 5 50/ SS-3 56 >225 30-50/125mm 125mn 2.0 50/ SS-4 44 30-50/25mm 25mm 3.0 104.4 SS-5 11

50/50mm Highly weathered, Georgian bay 50mm shale, saturated seam 4.0 103.4 Auger grinding at 4.0m depth 15 -50/ SS-6 83 50/50mm 50mm 102.4 5.0 END OF BOREHOLE Borehole terminated at 5.0m depth Water level remained at 3.0m depth upon completion of drilling 6.0 20 7.0 8.0 9.0

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REFERENCE No.: T040022A1 ENCLOSURE No.: 3

INSPEC+SOL					BOREHOLE No.:					BUREHULE REPURT								
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T040022A1 REFERENCE No.:___ ENCLOSURE No.:_____ BH-3 **BOREHOLE No.: BOREHOLE REPORT** INSPEC+SOL **ELEVATION:** 103.2m Page 1 of 2 CLIENT:___ Daniel Johnson Architect Inc. **LEGEND** Proposed Residential Dwelling and Guest House PROJECT: _ SS SPLIT SPOON 904 Mississauga Heights Road, Mississauga LOCATION: ST SHELBY TUBE RC ROCK CORE A. Mazzuca Karl Roechner DESCRIBED BY: ____ _CHECKED BY: ___ WATER LEVEL DATE (START): March 09, 2007 DATE (FINISH): March 09, 2007 STRATIGRAPHY SAMPLE TEST RESULTS SHEAR STRENGTH (C_u) △ Field Shear test (Cu) STRATIGRAPH Ξ TYPE AND NUMBER RECOVERY Sensivity (S) ☐ Lab. ELEVATION STATE **BLOWS DESCRIPTION OF** o Water content (%) DEPTH 6 in/15 cm SOILS AND BEDROCK H Atterberg limits(%) or RQD • "N" Value (blows/12 in-30 cm) Feet **GROUND SURFACE** Metres % KPa Ν 103.2 20 30 40 50 60 70 80 Topsoil: 150mm 0.3 102.9 SS-1 12-8-3-5 Fill: 58 11 Fine Sand, orange, compact ... 0.8 102.4 0,9m becoming loose at 0.8m depth 1.0 SS-2 67 4-3-5 8 BENTONITE 5 -1.5 101.7 Silty Sand, trace clay, bedded, light SS-3 78 4-5-6 11 brown, moist, compact 2.0 SILICA SAND 2.3 100.9 becoming dense at 2.3m depth SS-4 78 6-12-20 32 -3.010 -07-03-09 SS-5 8-14-20 34 - 4.0 15 -4.6 98.6 Silty Sand and Gravel Till, trace clay, occasional saturated zone SS-6 7-18-36 5.0

20 SS-7 72 12-26-28 -- 7.0 96.2 Saturated seams at 7.0m depth WELL SCREEN VC 38mm Ø 25 --7.6 50/ 95.6 SS-8 50/50mm 100mm ° 17 Highly weathered shale, grey, hard - 8.0 8.5 Auger grinding at 8.5m depth MONITORING WELL

REFERENCE No.: T040022A1 ENCLOSURE No.: 5 BH-3 BOREHOLE No.: _ **BOREHOLE REPORT** INSPEC+SOL **ELEVATION:** 103.2m Page 2 of 2 CLIENT:___ Daniel Johnson Architect Inc. **LEGEND** Proposed Residential Dwelling and Guest House PROJECT: _ SS SPLIT SPOON 904 Mississauga Heights Road, Mississauga LOCATION: ___ ST SHELBY TUBE II RC ROCK CORE DESCRIBED BY: A. Mazzuca Karl Roechner ___CHECKED BY: ____ WATER LEVEL DATE (START): March 09, 2007 DATE (FINISH): _____ March 09, 2007 STRATIGRAPHY SAMPLE TEST RESULTS SHEAR STRENGTH (C_U) Shear test (Cu)
Sensivity (S)
O Water content (%)
H Atterberg limits(%)

"N" Value (blows/12 △ Field STRATIGRAPHY TYPE AND NUMBER RECOVERY ☐ Lab. STATE ELEVATION BLOWS **DESCRIPTION OF** DEPTH 6 in/15 cm SOILS AND BEDROCK or RQD • "N" Value (blows/12 in-30 cm) Feet **GROUND SURFACE** % Ν Metres KPa 10 20 30 40 50 60 70 80 90 30 94.0 50/ 9.2 SS-9 17 50/100mm Highly weathered shale, limestone 00mm fragments **END OF BOREHOLE** NOTE: --10.0 • Borehole terminated at 9.2m depth Borehole remained open and dry upon completion of drilling 35--11.0 -12.0 40--13.0 45-14.0 -15.0 50 --16.0 55--17.0 -18.0

T040022A1

APPENDIX B GRAIN SIZE ANALYSIS RESULTS

HYDROMETER ANALYSIS **ASTM D422**



PROJECT:

Proposed Residential Dwelling

FILE No.: T040022-A1

and Guest House

SAMPLE DATE: Mar. 9, 2007

LOCATION:

904 Mississauga Heights Drive, Mississauga, ON BOREHOLE No. BH2 - SS3

CLIENT:

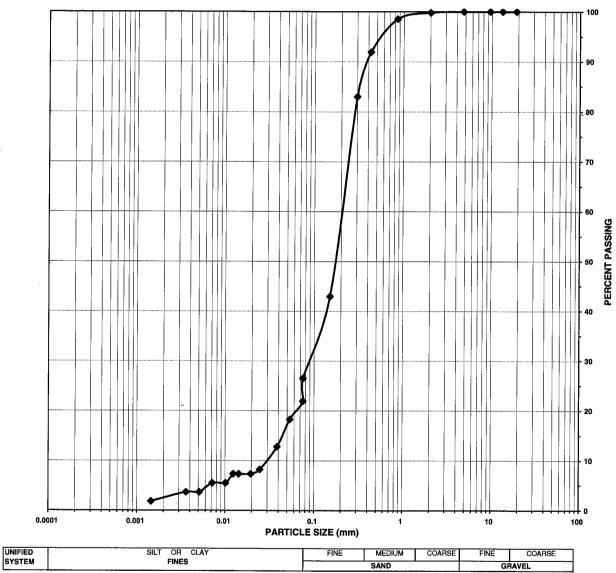
Daniel Johnson Architects Inc.

SAMPLE DEPTH: 1.5m - 2.0m

SOIL DESCRIPTION: Silty Sand, trace clay

SOIL COMPOSITION: Sand 73%, Silt 24%, Clay 3%

GRAIN SIZE DISTRIBUTION



SYSTEM		FINES		- 1142	SAND	00/11/02	GRAVEL			
MIT SYSTEM	CLAY	SILT	FINE	MED		E	GRAVE	L		

HYDROMETER ANALYSIS ASTM D422



PROJECT:

LINIELED

Proposed Residential Dwelling

and Guest House

SAMPLE DATE: Mar. 9, 2007

FILE No.: T040022-A1

BOREHOLE No. BH2 - SS6 SAMPLE DEPTH: 4.6m - 5.0m

LOCATION: CLIENT:

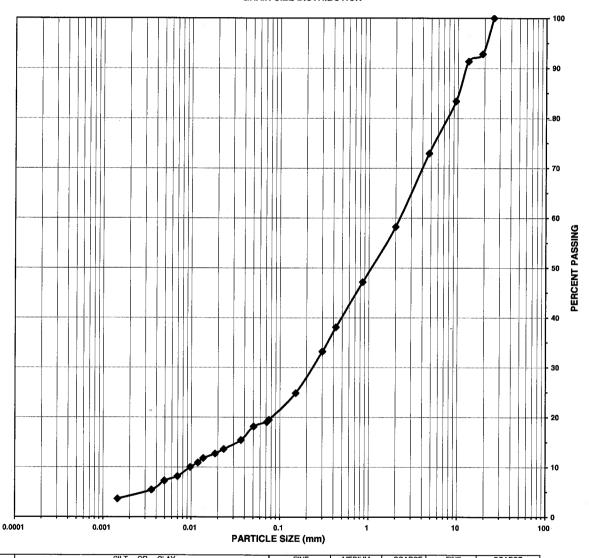
904 Mississauga Heights Drive, Mississauga, ON. Daniel Johnson Architects Inc.

SOIL COMPOSITION: Sand 54%, Gravel 27%

SOIL DESCRIPTION: Gravelly Sand, some silt, trace clay

Silt 15%, Clay 4%

GRAIN SIZE DISTRIBUTION



SYSTEM	SILI	FINES	FINE	MEDIUM	COARSE					
STSTEM		- INES		SAND		GF	RAVEL			
MIT	· · · · · ·		FINE MEDI							
SYSTEM	CLAY	SILT	SAN	iD		GRAVEL				

APPENDIX C
PHOTOGRAPH LOG



Photo No 1 - Mid Section of the Slope Cross Section



Photo No 2 – Lower Section of the Slope Cross Section





Photo No 3 – Upper Section of the Slope Cross Section



Photo No 4 - Mid and Upper Section of the Slope Cross Section





Photo No 5 – The bottom of the slope with the creek setback from the slope toe by a significant distance



Photo No 6 - Mid Section of the Slope CrossSection



Photo No 7 - A view of the Upper Section & Flat Rear Yard from the crest of the slope



Photo No 8 – Lower Section of the Slope Cross Section



Attachment 3

Photo Log



Photo 1 - Residential Structure setback from the existing top of the slope



Photo 2 - Looking downslope towards the fairway; the Credit River in the middle of picture



GHD Site Photographs Slope Stability Evaluation 904 Mississauga Heights Drive Mississauga, ON



Photo 3 - View of the upper slope face. Fairway at the toe and the river, and golf greens beyond.



Photo 4 - View of the lower slope face. Fairway at the toe visible.



GHD Site Photographs Slope Stability Evaluation 904 Mississauga Heights Drive Mississauga, ON



Photo 5 View of the slope looking up.



View of the slope along its toe.t Photo 6



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Photo 7 View of the slope and its toe area



Photo 8 General view of the slope face



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