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Preliminary Slope Assessment - Beaverbrook Community, 323 Oxford Street West and 92 & 825 Proudfoot Lane, London, Ontario

Palmer Project #

2303401

Prepared For

Sam Katz Developments Limited

June 30, 2023

June 30, 2023

Sam Katz Developments Limited
140 Ann Street, Suite 202
London, Ontario N6A 1R3

Re: Preliminary Slope Assessment - Beaverbrook Community, 323 Oxford Street West and 92 & 825 Proudfoot Lane, London, Ontario
Project #: 2303401

Palmer is pleased to submit this letter describing the results of our preliminary slope study for the project at the subject site ("the Site") located in London, Ontario. This study is to supplement the previously completed preliminary geotechnical investigation (Palmer# 180261, 2018) to address the comments made by Upper Thames River Conservation Authority (UTRCA) regarding slope stability assessment. The report provides site information from our site investigation, analysis, and our interpretations/recommendations for your consideration.

1. Site

The Site consists of agricultural lands with wooded areas located at 323 Oxford Street West and 92 & 825 Proudfoot Lane, London, Ontario. The proposed area for development is about 37 hectares in total with a tributary of the Thames River, Mud Creek, on site bisecting from northwest to southeast. The site is generally flat with sloping from the north and south down into the tributary. The vegetation on the site is primarily low-cut grasses in the fields with dense wooded areas between the lots.

2. Slopes

The observational method was used to assess the slopes on site following the MNR Technical Guidelines. The observational method involves the assessment of the performance of the existing slope by visual examination of the site and features. The slopes were observed along the tributary between Blocks 7 and 8 and the most critical section of the slope was identified. The critical section of the slope will be refenced as section A. No recent mechanical manipulation of the slope was observed including the critical section A. However, active toe erosion was observed over the length of the tributary.

The purpose of this study was to determine the current slope conditions to comment on the planned earthworks to realign Mud Creek.

A summary of the slope reconnaissance is recorded on the attached MNR slope rating chart in **Figure 1** which represents the critical section A.

Results of the reconnaissance are as follows:

- Based on BH18-7 from Palmer# 180261 (2018) The soil in the area in the tributary is generally known to silt/sand fill over compact silt tills and dense sandy gravel over hard silty clay / clayey silt tills;
- Slope 1 had a maximum height from crest to toe of about 5 m;
- At the critical section, the slope had areas where inclinations were more than 2 horizontal to 1 vertical (2H:1V) while the slopes throughout the tributary area were generally more that 3H:1V;
- Vegetation on the slope was moderate to dense consisting of mature trees and bushes (**Photograph 1 and 2**);
- Evidence of table land drainage was observed near the toe;
- No evidence of deep-seated instability was observed;
- No evidence of seepage coming from the slope face was observed;
- Active erosion was observed at the creek bed directly at the toe of the slope with fallen trees and slumps into the creek (**Photograph 3 and 4**);

3. Long Term Stable Top of Slope

Based on the MNR Slope Stability Rating Chart, a slope's potential for instability is characterized as "low", "slight" or "moderate". After slope reconnaissance and the application of the slope stability rating for the current conditions at the critical section, the rating of 43 was determined for section A which corresponds to "moderate" potential for instability.

Section A-A' mentioned on **Drawing 1** and seen in **Figure 2** is shown as a representation of the critical slope section from Palmer's slope reconnaissance. Soil stratigraphy is assumed from Palmer's preliminary geotechnical investigation (2018).

The Long-Term Stable Top of Slope (LTSTOS) is estimated in accordance with the UTRCA and Section 3.1.1.1 of the MNR Technical Guide. A toe erosion setback of 5 m and a minimum slope angle of 3H:1V was applied to section A. The results shown on **Drawing 1** show the LTSTOS at section A is setback about 8.0 m from the current physical top of slope. To determine the LTSTOS along any section of the tributary of the Thames River on the site, the 5 m toe erosion allowance and a 3H:1V slope angle from the toe of the slope was applied. The resulting red line seen in **Drawing 1** indicates the setback of the LTSTOS including the 5 m toe erosion allowance.

While this setback line does not encroach upon the planned development area for Block 7, it may encroach upon the planned development area for Block 6.

However, it should be noted that there are plans to reroute the tributary along with channel widening that will reduce the final slope angle to an average of 5H:1V. Since the results of this assessment has determined that an existing slope of 3H:1V is considered stable, the final, more shallow slope face of the planned reroute is also considered stable. This can be applied to any further planed earthworks in Blocks 6, 7 and 10, slopes will be stable as long as angles are at least 3H:1V or shallower. Both the proposed LTSTOS and development setback of the planned channel widening can be seen in **Drawing 1.**

To maintain slope stability of proposed slopes, construction should include a vegetation cover upon the slope face to aid with erosion protection.

Palmer considers this as a desktop study for planning level analysis. It should be noted that this LTSTOS limit does not include the additional development setbacks which will be specified by the UTRCA and will determine the limit of development on the property. The typical value of 6 m has been applied in **Drawing 1** for visual purposes only.

4. General Recommendations for Slopes

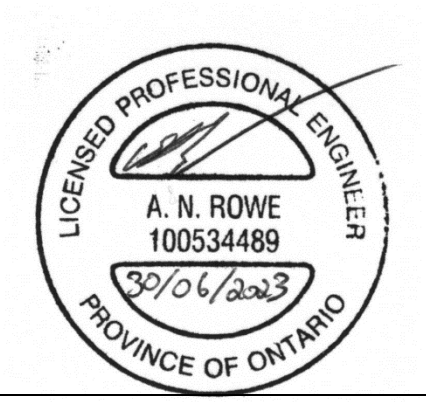
Below are several recommendations for developments near and around slopes:

- The stockpiling of fill, construction materials, forage waste or any other materials should not be placed on the slope face and at least 5 m away from slope crests to prevent the build up of hydrostatic pressures and the reduction of the stability of the slope.
- Rainwater discharge should be piped to the toe of the slope to prevent surface runoff on the slope
- The site grade at the top of the slope should not be raise more than 300 mm.

- Damage to the existing slope must be kept to a minimum and deep-rooted vegetation should be introduced to the slope face and surrounding areas to reduce surface erosion.

Thank you for the opportunity to be of service on this project. We trust that this report will be satisfactory for your current needs. If you have any questions or require further information, please contact our office at your convenience. This report is subject to the Statement of Limitations provided at the end of this report.

Yours truly,



Alonzo Rowe, P.Eng.
Geotechnical Engineer

Matthew D. St Denis, P.Eng.
Team Lead, Geotechnical Engineering

5. References

ASTM International. 2018. ASTM D1586 / D1586M-18, Standard test method for standard penetration test (SPT) and split-barrel sampling of soils.

Canadian Geotechnical Society. 2006. Canadian Foundation Engineering Manual, 4th Edition.

Chapman, L.J. and Putnam, D.F. 1984. Physiography of southern Ontario; Ontario Geological Survey

Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release— Data 128 – Revised.

Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1.

General Comments and Limitations of Report

Palmer 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, Palmer 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 and test pits required to determine the localized underground conditions between boreholes and test pits 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 and test pit results, so that they may draw their own conclusions as to how the subsurface conditions may affect them. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

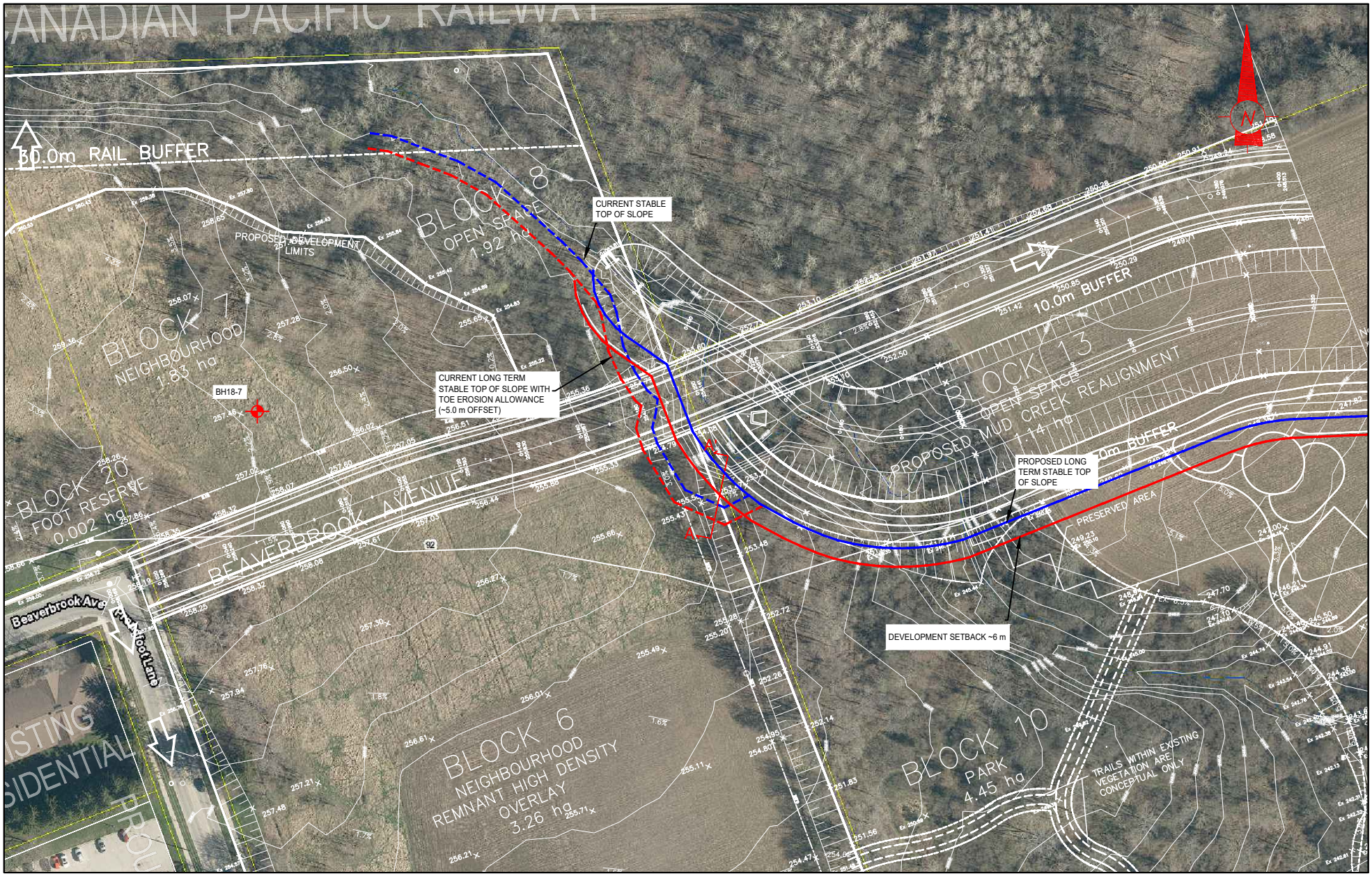
This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to Palmer at the time of preparation. Unless otherwise agreed in writing by Palmer, it shall not be used to express or imply warranty as to the fitness of the property 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 test hole 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 test holes may differ from those encountered at the test hole 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 test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

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. 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. Palmer 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.

Drawings



LEGEND

Borehole Location (Palmer 2018)

A A' Section (see Figure 2)

Client:	**Sam Katz Developments Limited**			Project No.: **2303401**	Drawing No.: **1**
Drawn:	**AR**	Approved:	**MDS**	Title:	**Site Plan**
Date:	**June, 2023**	Scale:	**As Shown**	Project:	**Preliminary Slope Assessment** **323 Oxford At. W, 92 & 825 Proudfoot Lane, London, ON**
Original Size:	**Letter**	Rev:		Palmer™	871 Equestrian Court Oakville, Ontario N6A 1R3

Figures

TABLE 8.1 - SLOPE STABILITY RATING CHART

Site Location:	323 Oxford Street West, London, Ontario	Project No.:	2303401
Client:	Sam Katz Developments Limited	Inspection Date:	May 12, 2023
Inspected By:	Alonzo Rowe, P.Eng	Weather	Sunny, 16ºC

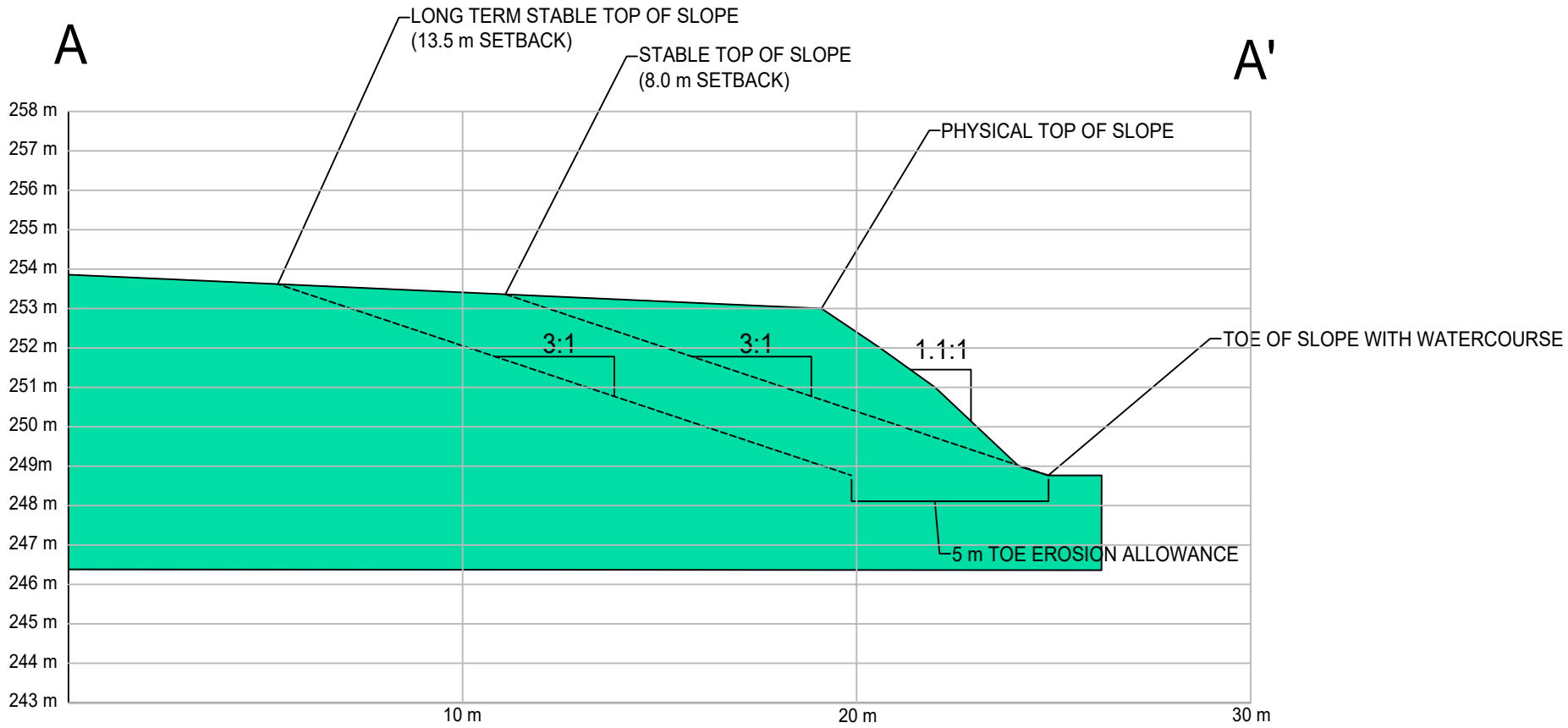
				Rating Value
1.	**SLOPE INCLINATION**			
		degrees	**horiz. : vert.**	
	a)	18 or less	3 : 1 or flatter	0
	b)	18 - 26	2 : 1 to more than 3 : 1	6
	c)	more than 26	steeper than 2 : 1	(16)
2.	**SOIL STRATIGRAPHY**			
	a)	Shale, Limestone, Granite (Bedrock)		0
	b)	Sand, Gravel		6
	c)	Glacial Till		(9)
	d)	Clay, Silt		12
	e)	Fill		16
	f)	Leda Clay		24
3.	**SEEPAGE FROM SLOPE FACE**			
	a)	None or Near bottom only		(0)
	b)	Near mid-slope only		6
	c)	Near crest 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
	d)	more than 10 m		8
5.	**VEGETATION COVER ON SLOPE FACE**			
	a)	Well vegetated; heavy shrubs or forested with mature trees		(0)
	b)	Light vegetation; Mostly grass, weeds, occasional trees, shrubs		4
	c)	No vegetation, bare		8
6.	**TABLE LAND DRAINAGE**			
	a)	Table land flat, no apparent drainage over slope		0
	b)	Minor drainage over slope, no active erosion		2
	c)	Drainage over slope, active erosion, gullies		(4)
7.	**PROXIMITY OF WATERCOURSE TO SLOPE TOE**			
	a)	15 meters or more from slope toe		0
	b)	Less than 15 meters from slope toe		(6)
8.	**PREVIOUS LANDSLIDE ACTIVITY**			
	a)	No		0
	b)	Yes		(6)

SLOPE INSTABILITY RATING — **RATING VALUES TOTAL** — **INVESTIGATION REQUIREMENTS** — **TOTAL 43**

RATING VALUES

I.	Low potential	< 24	Site inspection only, confirmation, report letter.
2.	Slight potential	25-35	Site inspection and surveying, preliminary study, detailed report.
(3)	Moderate potential	> 35	Boreholes, piezometers, lab tests, surveying, detailed report.

NOTES: a) Choose only one from each category; compare total rating value with above requirements.
b) If there is a water body (stream, creek, river, pond, bay, lake) at the slope toe; the potential for toe erosion and undercutting should be evaluated in detail and, protection provided if required.



Client:	**Sam Katz Developments Limited**			Project No.: **2303401**	FIgure No.: **2**
Drawn: **AR**		Approved: **MDS**		Title:	**Section A - A'**
Date: **June, 2023**		Scale: **As Shown**		Project:	**Preliminary Slope Assessment** **323 Oxford At. W, 92 & 825 Proudfoot Lane, London, ON**
Original Size: **Letter**		Rev:		Palmer™	871 Equestrian Court Oakville, Ontario N6A 1R3

Site Photographs

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Palmer™

Borehole Log

Palmer# 180261 (2018)

Palmer

LOG OF BOREHOLE BH18-7

PROJECT: Preliminary Geotechnical Investigation - 323 Oxford Street

CLIENT: The ESAM Group

PROJECT LOCATION: London, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers

Diameter: 205 mm

Date: Sep-07-2018

REF. NO.: 180261

ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
256.5 / 0.0	Ground Surface				
256.4 / 0.1	**TOPSOIL:** 150 mm				
256.3 / 0.2	**FILL:** sandy silt, trace clay, trace gravel, trace rootlets, trace organics, contains pockets of clayey silt, contains pockets of organics, dark brown to brown, moist, compact to loose	1	SS	13	256
		2	SS	5	
255.1 / 1.4					255
254.8 / 1.7	**FILL:** silt, trace clay, trace sand, trace rootlets, contains pockets of organics, brown, wet, compact	3	SS	13	
	SILT: trace clay, trace sand, brown, wet, compact				
		4	SS	22	254
253.7 / 2.8					
253.5 / 3.0	**SANDY SILT:** some gravel, trace clay, brown, wet, compact				
	SANDY SILT TILL: trace clay, trace gravel, contains pockets of sand, contains cobbles and boulders, brown, moist, compact	5	SS	26	253
252.4 / 4.1	**SANDY GRAVEL:** trace silt, brown, saturated, dense				252
		6	SS	40	
251.5 / 5.0	**CLAYEY SILT TILL:** some sand, trace gravel, contains pockets of sand, contains cobbles and boulders, grey, moist, hard				251
250.9 / 5.6	**SILTY CLAY:** trace sand, trace gravel, grey, moist, hard				
		7	SS	39	250
249.8 / 6.7	**END OF BOREHOLE**				

Notes:
1. Upon completion of drilling, a 50mm diameter monitoring well was installed in the borehole.
2. Water Level Readings:

Date	W. L. Depth (mBGS)
Oct 4, 2018	3.13
Oct 15, 2018	3.12

GROUND WATER CONDITIONS: Concrete; Holeplug; W. L. 253.4 m Oct 15, 2018; Sand Screen; Natural Pack

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

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

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

Spoon Wet
Auger Grinding
Auger Grinding
Auger Grinding
Auger Grinding
Auger Grinding
Auger Grinding
Auger Grinding

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

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