

**GEOTECHNICAL INVESTIGATION FOR
PERFORMING SLOPE STABILITY ANALYSIS
PROPOSED DEVELOPMENT
51 TANNERY STREET
MISSISSAUGA, ONTARIO**

Prepared for:

NYX CAPITAL CORP

**PATRIOT ENGINEERING LTD.
Consulting Engineers**

Project 37105
May 21, 2019
March 24, 2017

80 Nashdene Road, Unit 62
Toronto, Ontario
M1V 5E4
416-293-7716

TABLE OF CONTENTS

TEXT

	Page
1.0 INTRODUCTION	1
2.0 FIELDWORK	3
3.0 SUBSURFACE CONDITIONS	4
4.0 SLOPE STABILITY ANALYSIS	6
4.1 Slope Geometry	6
4.2 Erosion Rates	6
4.3 Development Setback / Buffer Distance	7
4.4 Computerized Slope Stability Analysis	7
4.4.1 Safety Factor Requirements	8
4.4.2 Method of Analysis	8
4.4.3 Discussions and Recommendations	9
4.5 Precautionary Comments	12
TABLE 1: Measured Short Term Groundwater Levels Upon Completion of Drilling	5
TABLE 2: Summary of Results of Slope Stability Analysis Involving "Normal" Groundwater Levels	10
TABLE 3: Summary of Results of Slope Stability Analysis Involving "Elevated" Groundwater Levels	11

DRAWINGS

	Figure
Site Plan Showings the Approximate Borehole Locations and Slope Sections	1
Section AA "Normal" Groundwater Levels	1A
Section BB "Normal" Groundwater Levels	1B
Section CC "Normal" Groundwater Levels	1C
Section DD "Normal" Groundwater Levels	1D
Section AA "Elevated" Groundwater Levels	1E
Section BB "Elevated" Groundwater Levels	1F
Section CC "Elevated" Groundwater Levels	1G
Section DD "Elevated" Groundwater Levels	1H
Borehole Logs	2 to 5
Grain Size Distribution Curves	6 to 7

APPENDICES

Appendix A: Photographs of Existing Slope	
Appendix B: Slope Stability Definitions & Determination Guide Prepared by the Credit Valley Conservation	



**PATRIOT
ENGINEERING LTD.**
Consulting Engineers

Project 37105
Project 37105

May 21, 2019
March 24, 2017

NYX Capital Corp
1131a Leslie Street, Suite 201
Toronto, Ontario
M3C 3L8

Attention: Mr. Tim Jessop MES, MCIP, RPP
Development Manager

**Geotechnical Investigation For
Performing Slope Stability Analysis
Proposed Development
51 Tannery Street
Mississauga, Ontario**

1.0 INTRODUCTION

As requested, Patriot Engineering Ltd. has carried out a geotechnical investigation at the above site to determine the soil and groundwater conditions. The purpose of our investigation was to perform slope stability analysis in order to provide geotechnical comments on the long term stability of the existing slope for the construction of the proposed development. Authorization to proceed with this investigation was provided by Mr. Mike Grayhurst, of OHE Environmental Inc., on behalf of the owners the NYX Capital Corp.

Originally, we had submitted our findings in our Geotechnical Report No. 37105, dated March 24, 2017. However, since then, in general the following new scope of work and/or changes have been incorporated into our original report:

1. Determination of Design Erosion Allowance

Based on the Geomorphic Assessment Report, Project No. 217069.1, dated May 2019, prepared by Beacon Environmental Limited, the Design Erosion Allowance (D.E.A.) for the site is 6.0m. This new information has now been used in our analysis for determining the total setback distances.



2. Updated Slope Profiles

Previously, the slope geometry/profiles that were presented in our original report were obtained by Patriot Engineering Ltd. using onsite measurements with tape and level methods. The slope geometry/profiles have now been derived and geodetically referenced from the current Topographical Plan prepared by Fiddes Clipsham Inc., Ontario Land Surveyor, dated January 23, 2019. We have now carried out a new set of computerized slope stability analysis based on this new Topographical Plan.

3. Slope Stability Analysis with Elevated Groundwater Condition

Besides carrying out our slope stability analysis with "normal" groundwater levels, we have also carried out our slope stability analysis with the "elevated" groundwater condition of 1.0m below the existing crest of slope.

4. Change of Contact for Reporting Purposes

The original report was addressed to Mr. Mike Grayhurst, P.Eng. of OHE Consultants, 311 Matheson Boulevard East, Mississauga, Ontario, L4Z 1X8. This altered report has now been addressed to Mr. Tim Jessop MES, MCIP, RPP of the NYX Capital Corp, 1131a Leslie Street, Suite 201, Toronto, Ontario, M3C 3L8.

5. Altering the buffer distance from 10.0m to 7.0m to assist in development.

In this regard, we have revised and updated our original report to include the above items. Our subject revised and updated report has been designated as Report No. 37105, dated May 21, 2019.

Previously, we had also carried out a separate *Preliminary Geotechnical Investigation*, our *Report No. 37105, dated February 1, 2017*, and provided preliminary geotechnical comments for the proposed development, such as, type of foundations, safe soil bearing pressures, excavation and backfilling procedures, plus slab-on-grade floor construction. In this regard, this current report should be read in conjunction with the above mentioned *Preliminary Geotechnical Investigation Report No. 37105, dated February 1, 2017*.



The site is located approximately 1000m south and 500m west from the intersection of Queen Street South and Britannia Road West, in Mississauga, Ontario. The majority of the terrain is relatively flat, except for the northeast quadrant which is situated approximately 1.0m higher in elevation. An existing downward slope is also present along the western region of the property, which is the focus of our investigation.

We had established the slope contours at four sections of the subject slope along the west face of the property from the current Topographical Plan prepared by Fiddes Clipsham Inc., Ontario Land Surveyor, dated January 23, 2019. The slope heights and slope angles show some degree of variation at each section. From a general perspective, at the four subject sections, the existing slope heights were approximately 3.0m, 3.1m, 4.3m and 4.1m, respectively, and the average angles of the existing slope, β , were approximately 21, 26, 23 and 32 degrees, respectively.

The upper tablelands leading to the crest of the slope are generally covered with grass and are sufficiently vegetated. Currently, the slope face contains a sufficient amount of mature trees and is adequately covered with vegetation. The toe of the slope is generally dry and is also covered with vegetation. The flat limited lands beyond the toe are also vegetated and lead to Mullet Creek, which is at or in close proximity to the slope. Photographs of the slope are shown in the attached Appendix A.

At the time of our visit, there was no evidence of surface erosion/gullies, nor any tension cracks nor any evidence of features that would be of concern regarding the slope and its stability.

2.0 FIELDWORK

The fieldwork for this investigation took place on March 1, 2017, and consisted of drilling a total of four (4) boreholes (BH201 to BH204) to depths ranging from 7.7m to 9.2m, using solid stem augers.

The approximate borehole locations along with their surface elevations at the time of our drilling activity are shown on the Site Plan, Figure 1.

The ground surface elevations for the boreholes were determined by members of our field engineering staff and referenced at:

City of Mississauga bench mark at Station No. 00819638004. It is located on the north face of the foundation wall of the limehouse brick building at Tannery Road and Queen Street South. The tablet is set horizontally 490mm east of the northwest corner and 50mm below the brick work.

The elevation at this point is understood to be at Elev. 163.423m



The scope of work for the geotechnical investigation for this project is as it is presented in this report, which is being provided on the assumption that the applicable codes and standards will be met. If there are any changes in the design features relevant to the geotechnical analysis, or if there are any apparent deviations of the report from relevant codes and standards, our office should be contacted to review the design.

3.0 SUBSURFACE CONDITIONS

The detailed stratigraphy encountered in the boreholes is presented on the borehole logs, Drawings 2 to 5 inclusive.

In general, all boreholes with the exception of Borehole 202, were drilled from above a granular fill covered area and initially advanced through a 50mm thick layer of compact, brown, moist to very moist, crusher run limestone. While Borehole 202 was drilled from above a concrete paved region and initially advancing through the existing concrete, which was approximately 100mm in thickness. Below the concrete, loose, brown, moist, crusher run limestone was present. Its thickness was 100mm.

Beneath the above mentioned cover layers, earth fill materials were present in all boreholes. In Boreholes 202 and 204, the earth fill material was composed of loose to compact, brown, moist to very moist, sandy silt fill. This material also contained some clay, along with traces of gravel, cobbles, topsoil, rootlets and asphalt fragments. The moisture contents ranged from 12% to 17%. Below the sandy silt fill layer, a second fill layer was present in the same Boreholes 202 and 204 and consisted of firm to very stiff, brown and/or reddish brown, and/or dark brown, and/or grey, slightly moist to very moist, clayey silt fill. This fill material was also present in Boreholes 201 and 203, below the surficial granular cover materials. It also contained some sand, plus traces of gravel, cobbles, topsoil, rootlets, asphalt fragments, brick fragments and wood pieces. The moisture contents varied from 11% to 27%. Grain size distribution test results from a sample that was obtained from this clayey silt fill material is shown on Figure 6. The depth of the fill layers inside the boreholes extended to depths that varied from 4.0m to 4.9m below existing grade. The topsoil/organics that were detected within the fill layers, appeared to be infrequent, isolated and of insignificant concentrations.

Underlying the fill layers, native, compact to very dense, grey, and/or brown, moist to slightly moist, sandy silt till layer was encountered in all boreholes. Some clay, plus traces gravel, cobbles and shale fragments, as well as, isolated wet sand seams were also observed within this material. Minor dilation was noted in some of the soil samples extracted from this layer. The moisture contents that were recorded within this layer fell between 4% and 20%. Figure 7, shows the grain size distribution test results that was performed on a sample obtained from this sandy silt till material.



Below the overburden soil, all boreholes then encountered shale bedrock and were terminated in it. These boreholes penetrated the shale bedrock to depths ranging from approximately 0.6m to 2.8m. The shale was weathered and grey in colour. Based on the geology of the area, the shale is of the Georgian Bay formation, which is usually grey and mainly weathered on the upper strata.

At the borehole locations, the top surface of the shale bedrock varied slightly and was generally situated between Elev. 150.1m and Elev. 150.4m. Based on the site topography at the time of our investigation, this translated to approximate depths of 6.4m to 7.0m below the existing grade surface.

The short term groundwater levels that were recorded inside the boreholes upon completion of drilling are indicated below in Table 1. These groundwater level readings are also shown on the individual borehole logs.

Borehole No.	Depth of Borehole (m)	Borehole Surface Elevation (m)	Approximate Depth of Groundwater Level Below Existing Ground (m)	Approximate Groundwater Elevation (m)
201	9.2	156.6	4.3	152.3
202	7.7	156.8	4.1	152.7
203	7.7	156.9	4.9	152
204	7.7	157.1	5.5	151.6

Some seasonal fluctuations and higher water levels should be anticipated.

The soil and groundwater conditions presented in this report have been deduced from soil sampling that was noncontinuous and therefore, should not be taken to represent exact planes of geological change. Furthermore, the geotechnical recommendations and comments provided in this report have been based on boreholes that were widely spaced. Therefore, the soil and groundwater conditions between the boreholes could vary significantly.



The amount of boreholes required to determine the localized underground conditions between boreholes that would affect construction costs, sequencing, equipment, scheduling construction techniques, and the like, would be much greater than that which was carried out for design purposes. Contractors and/or subcontractors bidding on or undertaking the work should, in this light, decide on their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them and their scope of work.

4.0 SLOPE STABILITY ANALYSIS

A slope stability analysis was performed for the existing slope along the west face of the property. This analysis was carried out to establish whether the existing slope meets the criteria for long term stability. Our analysis was performed on four sections that were obtained in this area, Sections AA, BB, CC and DD, as shown on the Site Plan, Figure 1.

4.1 Slope Geometry

This part of the investigation involved establishing the inclination at Sections AA to DD from the current Topographical Plan prepared by Fiddes Clipsham Inc., Ontario Land Surveyor, dated January 23, 2019, plus advancing Boreholes 201 to 204 to depths ranging from 7.7m to 9.2m, to establish the soil stratigraphy at these four sections. Borehole 201 was used for Section AA. Borehole 202 was used for Section BB. Borehole 203 was used for Section CC. While Borehole 204 was used for Section DD. With this information, we then produced the cross-sectional profiles of:

Section AA, which is shown on Figures 1A, 1E
Section BB, which is shown on Figures 1B, 1F
Section CC, which is shown on Figures 1C, 1G
Section DD, which is shown on Figures 1D, 1H

Our reconnaissance indicated that the average angle of the existing slope, β , at each section is approximately as follows:

Section AA, $\beta = 21$ degrees
Section BB, $\beta = 26$ degrees
Section CC, $\beta = 23$ degrees
Section DD, $\beta = 32$ degrees

4.2 Erosion Rates

A review of the slope was made to determine the setback distances to be applied to the predicted stable slope crest based on the predicted erosion over a 100 year period.



As previously mentioned, the slope is at or in close proximity to Mullet Creek. The Geomorphic Assessment Report, Project No. 217069.1, dated May 2019, that was prepared by Beacon Environmental Limited, revealed that the Design Erosion Allowance (D.E.A.) for the site is 6.0m. According to Page 4, Figure 4b "*Calculation of Erosion Components of Total Setback with Defined Valley Slope*" of the "*Slope Stability Definition and Determination Guideline*", provided by the Credit Valley Conservation (CVC), Heading (B) "*Flood Plain Width Less than Design Erosion Allowance*", it states:

Erosion Component of Setback (E.C.) equals Design Erosion Allowance (D.E.A.) minus the Flood Plain (F.P.), Therefore,

$$E.C. = D.E.A. - F.P.$$

This correspondence has been attached in Appendix B. When applying this formula to Sections AA, Sections BB, Sections CC and Sections DD, the Erosion Component of Setback (E.C.) for each section is 6.0m, 6.0m, 6.0m and 0.2m, respectively. We have applied these setback distances to our analysis at the four sections.

4.3 Development Setback / Buffer Distance

As a general guideline, it is recommended that buildings should not be placed within 10m buffer distance of a long term stable top of slope. However, (a) since the height of the existing slope is relatively shallow and varies from 3.0m to 4.3m, (b) the inclination may not be perceived to be steep as it ranges from 21 to 32 degrees, plus, (c) the building loads will have minimal and insignificant effects on the long term stability of the slope, as they will be transferred and dissipated onto native, competent soils at substantial depths, with adequate bearing capacities using a deep foundation system consisting of caissons or helical piers, we feel that a 7.0m buffer distance is appropriate for this project site. The proposed buildings at this site are expected to be located outside of this 7m zone, and therefore, we have applied this buffer distance to our analysis at the four sections.

4.4 Computerized Slope Stability Analysis

Since various failure mechanisms may occur, a common mode of failure that was reviewed for this slope involved the possibility of rotational failure. This method is based on engineering modelling and computerized stability analysis to determine the long term stable slope. This analysis was carried out on the same Sections AA to DD, shown on the Site Plan, Figure 1.

For a rotational failure type mode, the failure plane may be assumed to be on a curved surface which may be approximated by a circular arc. Therefore, a method using the Bishop Method of Slices with effective stresses was used for our analysis, using computer software Slide (Version 7.0) developed by Rocscience.



The soil stratigraphy that was obtained from each borehole which was drilled for each corresponding profile section is shown on Figures 1A to 1D, respectively. In the absence of detailed direct shear and triaxial strength tests to establish cohesion and internal angles of friction, the soil parameters were estimated, as shown on the above mentioned Figures 1A to 1H.

4.4.1 Safety Factor Requirements

The possibility of slope movement is evaluated by comparing the forces resisting failure to those causing failure. This ratio is the factor of safety. At limiting equilibrium, the resisting and the driving forces are equal, and the factor of safety is 1.0. A factor of safety of less than 1.0 represents an undesirable failure condition.

A factor of safety which is commonly used for engineering design to assess the stability of slopes is 1.5m, for developments located close to the slope crest. Most common design guidelines are based on this criteria of using a 1.5 as a minimum factor of safety for active land use.

Therefore, a long term factor of safety of 1.5 or greater is recommended for this site.

The above mentioned factor of safety of 1.5 or greater is recommended for the scenario of "normal" groundwater levels. We had carried out of slope stability analysis, for the "normal" groundwater conditions using the actual groundwater elevations indicated on Table 1 (page 5 of this report).

Our slope stability analysis was also repeated for the second scenario of taking into consideration hypothetical "elevated" groundwater levels. We assumed that the elevated groundwater levels would be located at a depth of 1.0m below grade relative to the existing crest, for Section AA, Section BB, Section CC and Section DD. This corresponded to respective elevations of Elev. 155.2m, Elev. 154.7m, Elev. 155.3m and Elev. 155.5m. We had carried out slope stability analysis, for the "elevated" groundwater conditions using these shallow groundwater levels. A long term factor of safety of 1.3 or greater is recommended for this site for the scenario of "elevated" groundwater levels.

4.4.2 Method Of Analysis

A computerized circular failure analysis based on the Bishops Method using computer software Slide (Version 7.0) developed by Rocscience, applied the assumed soil and groundwater conditions to complete an effective stress analysis and calculate factors for safety for various circles.

The factor of safety is affected by variations in strength of the layered soils and seasonal fluctuations in the groundwater levels, and therefore the computed factor of safety will vary for different slope sections, and dry and wet seasons.



4.4.3 Discussions And Recommendations

The results of the Bishops Method using computer software Slide (Version 7.0) developed by Rocscience are shown on Figures 1A to 1H.

As previously mentioned, for the analysis involving "normal" groundwater levels, a minimum factor of safety of 1.5 is recommended for long term stability. It is our opinion that the stabilized crest of the slope occurs where a failure circle with a minimum factor of safety of 1.5 intercepts the ground surface at the upper tablelands.

At Section AA (Figure 1A), Section BB (Figure 1B), Section CC (Figure 1C) and Section DD (Figure 1D)

The stabilized crest of the slope with a failure circle that has a minimum factor of safety of 1.5 which intercepts the ground surface at the upper tablelands is indicated on our Section AA (Figure 1A), Section BB (Figure 1B), Section CC (Figure 1C) and Section DD (Figure 1D). From the existing crest of the slope, it is located inward by a distance of 0.3m, 0.3m, 0.4m and 0.6m, for Section AA, Section BB, Section CC and Section DD, respectively. A standard precaution is to add the Erosion Component of Setback (E.C.) distance of 6m, 6m, 6m and 0.2m, for Section AA, Section BB, Section CC and Section DD, respectively, as discussed in Item 4.2 of this report. Furthermore, to add a 7m buffer distance at each section. Relative to the existing crest, the above results yield total combined setback distances of 13.3m, 13.3m, 13.4m and 7.8m for Section AA, Section BB, Section CC and Section DD, respectively. These total combined setback distances at each section, we referred to as the "Proposed Limit of Development". Development of the buildings can then take place inward of the "Proposed Limit of Development". This is illustrated in Figures 1A, 1B, 1C and 1D.

A summary of the results of our slope stability analyses for "normal" groundwater levels, indicating the safety factors and setback distances relative to the existing crest of the slope at each of the four sections (Figures 1A to 1D) is shown below on Table 2.



Table 2 Summary of Results of Slope Stability Analysis Involving "Normal" Groundwater Levels						
Profile Section	Figure No.	Factor of Safety (F.S.)	Distance from Existing Crest of Slope to Stabilized Crest of Slope (m)	Toe Erosion Setback Distance (m)	Development Setback Distance (m)	Total Combined Setback Distance Relative to Existing Crest of Slope (m)
AA	1A	1.5	0.3	6.0	7.0	13.3
BB	1B	1.5	0.3	6.0	7.0	13.3
CC	1C	1.5	0.4	6.0	7.0	13.4
DD	1D	1.5	0.6	0.2	7.0	7.8

For the analysis involving "elevated" groundwater levels, a minimum factor of safety of 1.3 is recommended for long term stability. It is our opinion that the stabilized crest of the slope occurs where a failure circle with a minimum factor of safety of 1.3 intercepts the ground surface at the upper tableland.

At Section AA (Figure 1E), Section BB (Figure 1F), Section CC (Figure 1G) and Section DD (Figure 1H)

The stabilized crest of the slope with a failure circle that has a minimum factor of safety of 1.3 which intercepts the ground surface at the upper tablelands is indicated on our Section AA (Figure 1E), Section BB (Figure 1F), Section CC (Figure 1G) and Section DD (Figure 1H). From the existing crest of the slope, it is located inward by a distance of 0.3m, 0.2m, 0.4m and 0.5m, for Section AA, Section BB, Section CC and Section DD, respectively. A standard precaution is to add the Erosion Component of Setback (E.C.) distance of 6m, 6m, 6m and 0.2m, for Section AA, Section BB, Section CC and Section DD, respectively, as discussed in Item 4.2 of this report. Furthermore, to add a 7m buffer distance at each section. Relative to the existing crest, the above results yield total combined setback distances of 13.3m, 13.2m, 13.4m and 7.7m for Section AA, Section BB, Section CC and Section DD, respectively. These total combined setback distances at each section, we referred to as the "Proposed Limit of Development". Development of the buildings can then take

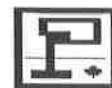


place inward of the "Proposed Limit of Development". This is illustrated in Figures 1E, 1F, 1G and 1H.

A summary of the results of our slope stability analyses for "elevated" groundwater levels, indicating the safety factors and setback distances relative to the existing crest of the slope at each of the four sections (Figures 1E to 1H) is shown below on Table 3.

Table 3 Summary of Results of Slope Stability Analysis Involving "Elevated" Groundwater Levels						
Profile Section	Figure No.	Factor of Safety (F.S.)	Distance from Existing Crest of Slope to Stabilized Crest of Slope (m)	Toe Erosion Setback Distance (m)	Development Setback Distance (m)	Total Combined Setback Distance Relative to Existing Crest of Slope (m)
AA	1	1.3	0.3	6.0	7.0	13.3
BB	1F	1.3	0.2	6.0	7.0	13.2
CC	1G	1.3	0.4	6.0	7.0	13.4
DD	1H	1.3	0.5	0.2	7.0	7.7

In conclusion, for the analysis involving "normal" groundwater levels, the proposed buildings are expected to be located behind the imaginary circles with an estimated factor of safety of 1.5 in Sections AA, BB, CC and DD, along with respective setback distances of 13.3m, 13.3m, 13.4m and 7.8m added inward to each of these sections, relative to their existing crest. Similarly, for the analysis involving "elevated" groundwater levels, the proposed buildings are expected to be located behind the imaginary circles with an estimated factor of safety of 1.3 in Sections AA, BB, CC and DD, along with respective setback distances of 13.3m, 13.2m, 13.4m and 7.8m added inward to each of these sections, relative to their existing crest. Based on the soil and groundwater conditions encountered in the boreholes and our analysis of the stability of the slope, it is our opinion that the existing slope is stable with respect to long term stability and we do not expect a deep seated failure to occur. Therefore the proposed buildings are at low risk of slope failure. However, we do expect minor localized erosion to occur at the slope face, if surface water runoff is not adequately controlled and if the slope is not sufficiently vegetated. Also, the building loads will have minimal and insignificant effects on the long term stability of the slope, as they will be



transferred and dissipated onto native, competent soils at substantial depths, with adequate bearing capacities using a deep foundation system consisting of caissons or helical piers.

4.5 Precautionary Comments

Some slope creep and loss of ground due to localized erosion and sloughing of the slope faces may occur, however, this can be controlled by the owner with regular inspections and maintenance, as needed. The following precautionary measures should be complied with in order to maintain slope stability:

- (a) No temporary or permanent surcharge loads, or fills should be placed near the slope crest. Overstressing of the soil can cause sudden failure damaging surrounding land and structures.
- (b) Further measures should be taken to protect against surface erosion by installing interceptor drains at the top of the slope to prevent surface water runoff and prevent perched groundwater levels. Seepage and groundwater pressures should be decreased by drainage systems and surface water should be controlled to decrease infiltration to potential side areas.
- (c) Surface drainage from the structure or any paved surface should not be permitted to discharge over the slope. Such surface discharge should be directed away from the flow of the slope.
- (d) Vegetation should be promoted as a further measure to reduce surface erosion. Grass, deep rooted vegetation and mature trees should be planted and maintained.
- (e) No heavy and or vibratory equipment should be used near the slope crest.
- (f) Water pipe outlets and the like should not discharge over the slope crest.
- (g) Any nearby erosion gullies should be stabilized, if and when they develop.
- (h) In the event that remedial work may be required in the future, grout injections may be performed to strengthen the soil and fill cavities in the soil, provided that the soil permeability is satisfactory. Such work should be carried out under the direction of a consultant.
- (i) During the construction period, a sediment fence must be installed at the rear of the lot to alleviate the transport of sediment down the slope.
- (j) The toe of the slope must be protected from erosion and undercutting.



It is important to note that there are above normal risks associated with buildings constructed near slopes versus flat ground, and therefore some future slope creep, cracking and maintenance must be anticipated by the owners. The information contained within this report should be applied to its intended purpose in accordance with the relevant building codes and municipal regulations.

Considering the above recommendations, we feel that from a geotechnical viewpoint, it is feasible to construct the proposed buildings at the area inward of the "Proposed Limit of Development" as indicated in Figures 1A to 1H, provided that all geotechnical recommendations and the current Ontario Building Code requirements are followed.

We trust this report will assist you with your proposed development. Should you have any questions, please do not hesitate to contact our office.

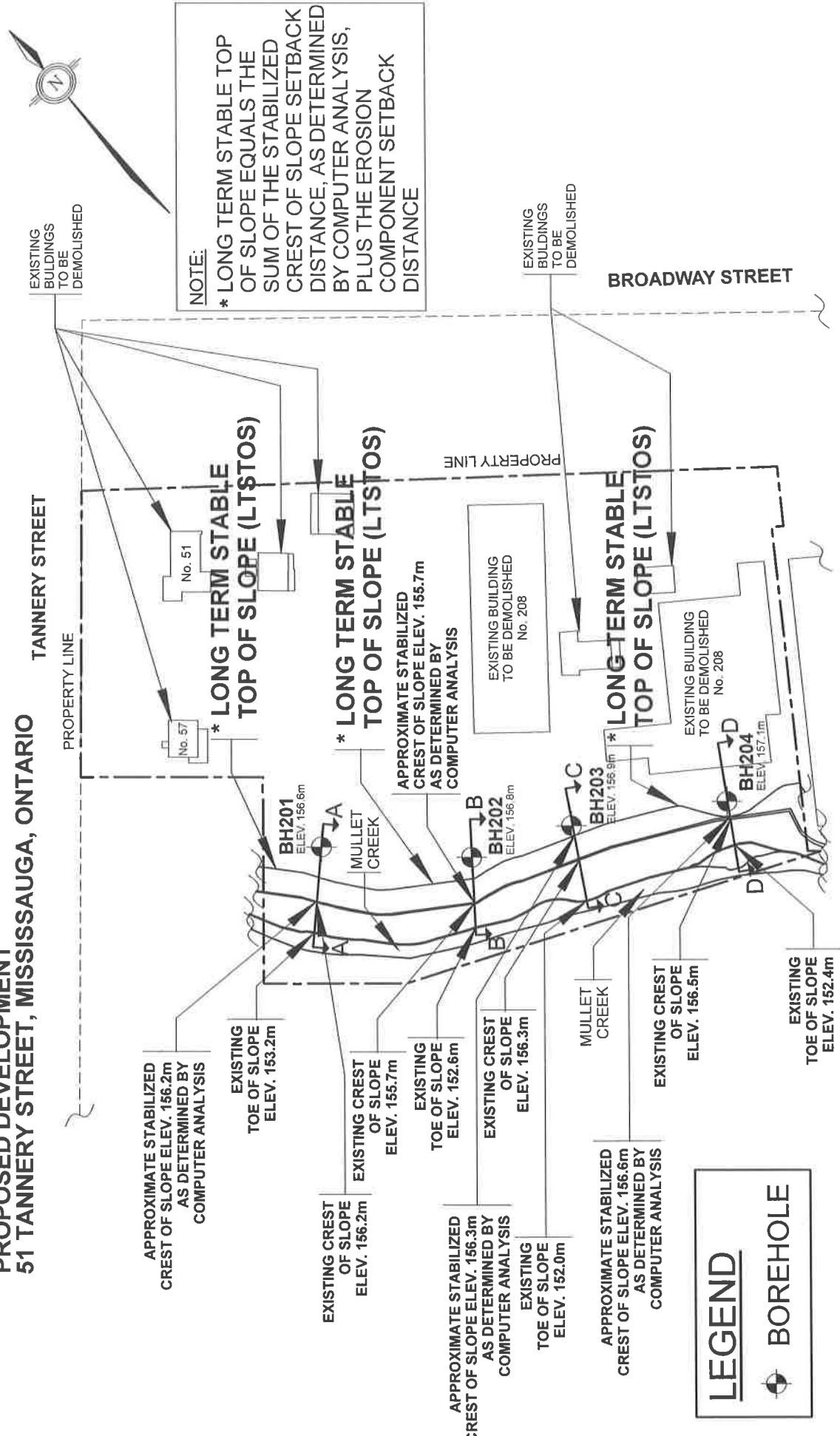
Sincerely,
PATRIOT ENGINEERING LTD.

Larry Galimanis, P.Eng.
Principal/Consulting Engineer



Distribution: Mr. Tim Jessop, NYX Capital Corp (4)

FIGURE 1: SITE PLAN SHOWING THE APPROXIMATE BOREHOLE LOCATIONS AND SLOPE SECTIONS PROPOSED DEVELOPMENT 51 TANNERY STREET, MISSISSAUGA, ONTARIO



REFERENCE:		PATRIOT ENGINEERING LTD.	
SITE PLAN INFORMATION ADAPTED FROM PROJECT 17-1562 DRAWING NO. T-1 PREPARED BY FIDDES CLIPSHAM INC., DATED JANUARY 23, 2019.		Consulting Engineers	
Drawn By	S.B.	Date	March '19
Checked By	L.G.	Date	March '19
Revisions		Project	37105
Scale	1:1400	Figure	1

FIGURE 1A: "NORMAL" GROUNDWATER LEVELS PROPOSED DEVELOPMENT

ELEV. (m)

51 TANNERY STREET, MISSISSAUGA, ONTARIO



PROPOSED LIMIT
OF DEVELOPMENT

TOTAL SETBACK DISTANCE
13.3 m

7.0 m
BUFFER

*EROSION
COMPONENT
6.0m*

LONG TERM STABLE
TOP OF SLOPE (LTSTOS)

F.S. = 1.5

APPROXIMATE
STABILIZED
CREST OF SLOPE
ELEV. 156.2m
AS DETERMINED
BY COMPUTER
ANALYSIS

EXISTING
CREST OF SLOPE
ELEV. 156.2m

EXISTING
TOE OF SLOPE
ELEV. 153.2m

$\beta = 21^\circ$
(approx.)

FLOOD PLAIN = 0m

MULLET CREEK

FILL - CLAYEY SILT

SANDY SILT TILL

SHALE

SECTION AA SCALE 1:150

SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH201
LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES



Material Name	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Fill - Clayey Silt	20	0	29
Sandy Silt Till	21	4	34

* E.C. = D.E.A. - F.P. (GVC (2014), Pg. 6, Fig. 4b.)
D.E.A. (DESIGN EROSION ALLOWANCE) = 6m
F.P. (FLOOD PLAIN) = 0m
E.C. (EROSION COMPONENT) = 6m - 0m = 6m

- Notes:
- Slope geometry is derived and geotechnically referenced from Topographical Plan prepared by Fiddes, Cliphsham Inc., Ontario Land Surveyor, dated January 23, 2019.
 - The average slope β of 21° is estimated.
 - For "Normal" groundwater levels, using the computer software Slide (Version 7.0) developed by Rocscience, to perform our slope stability analysis with Bishop's Method, the stabilized crest of slope is estimated where the failure circle with a Factor of Safety of 1.5 intercepts the ground surface at the upper tableland.
 - As per the Draft Geomorphic Assessment Report, Project No. 217069.1, dated February 2019, prepared by Beacon Environmental Limited, the Design Erosion Allowance (D.E.A.) for this site is equal to 6m.
 - ▼ = "Normal" groundwater level at Elev. 152.3m.

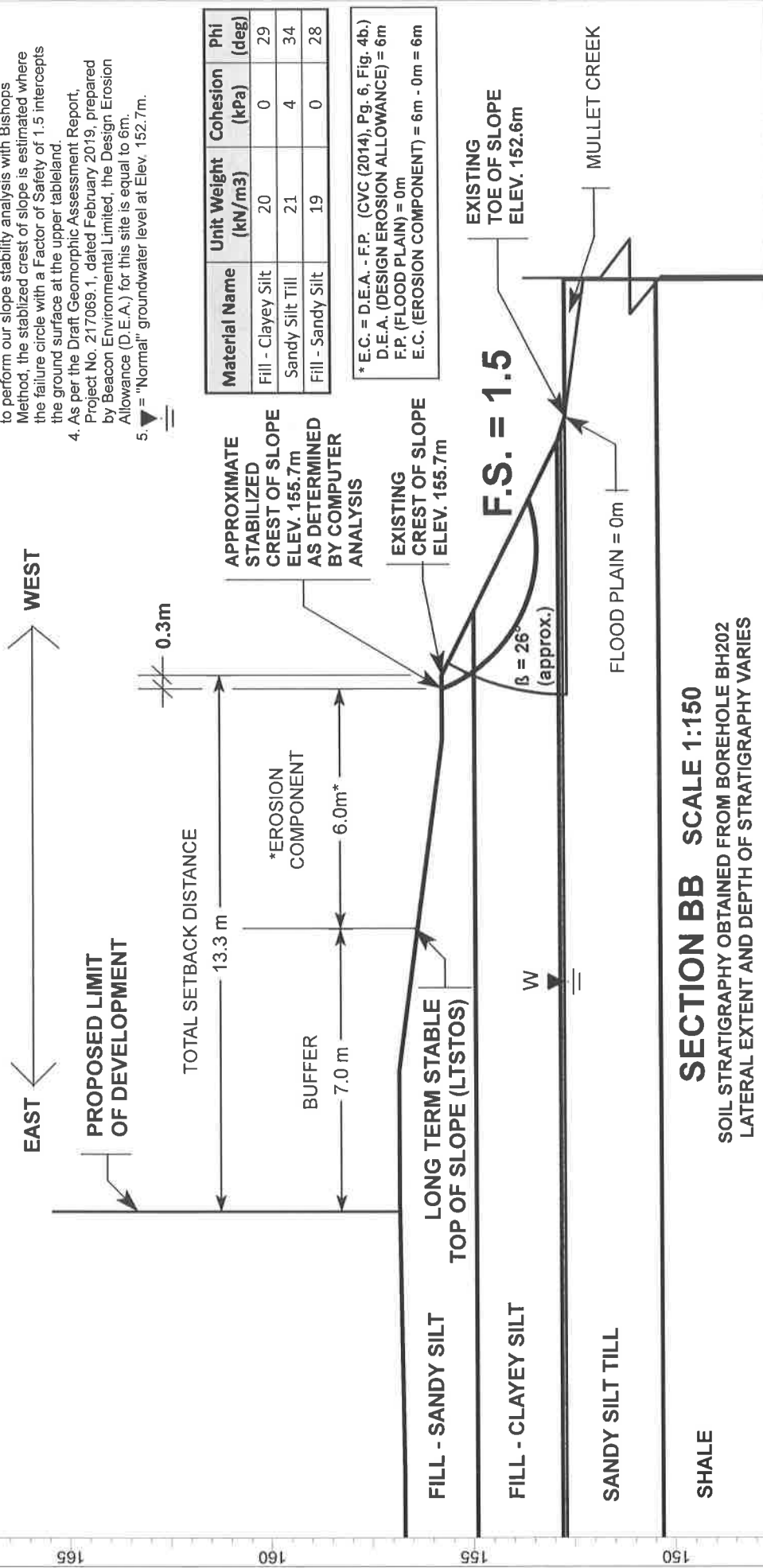


**PATRIOT
ENGINEERING LTD.**
Consulting Engineers

Project	37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario		
Analysis Description	SECTION AA - EXISTING SLOPE - "NORMAL" GROUNDWATER LEVELS - BISHOP'S METHOD		
Drawn By	S.B.	Scale	1:150
Date	2019-02-25	Company	Patriot Engineering Ltd.
		File Name	37105-SectionAA.slim
		Figure:	1A

FIGURE 1B: "NORMAL" GROUNDWATER LEVELS PROPOSED DEVELOPMENT 51 TANNERY STREET, MISSISSAUGA, ONTARIO

ELEV. (m)



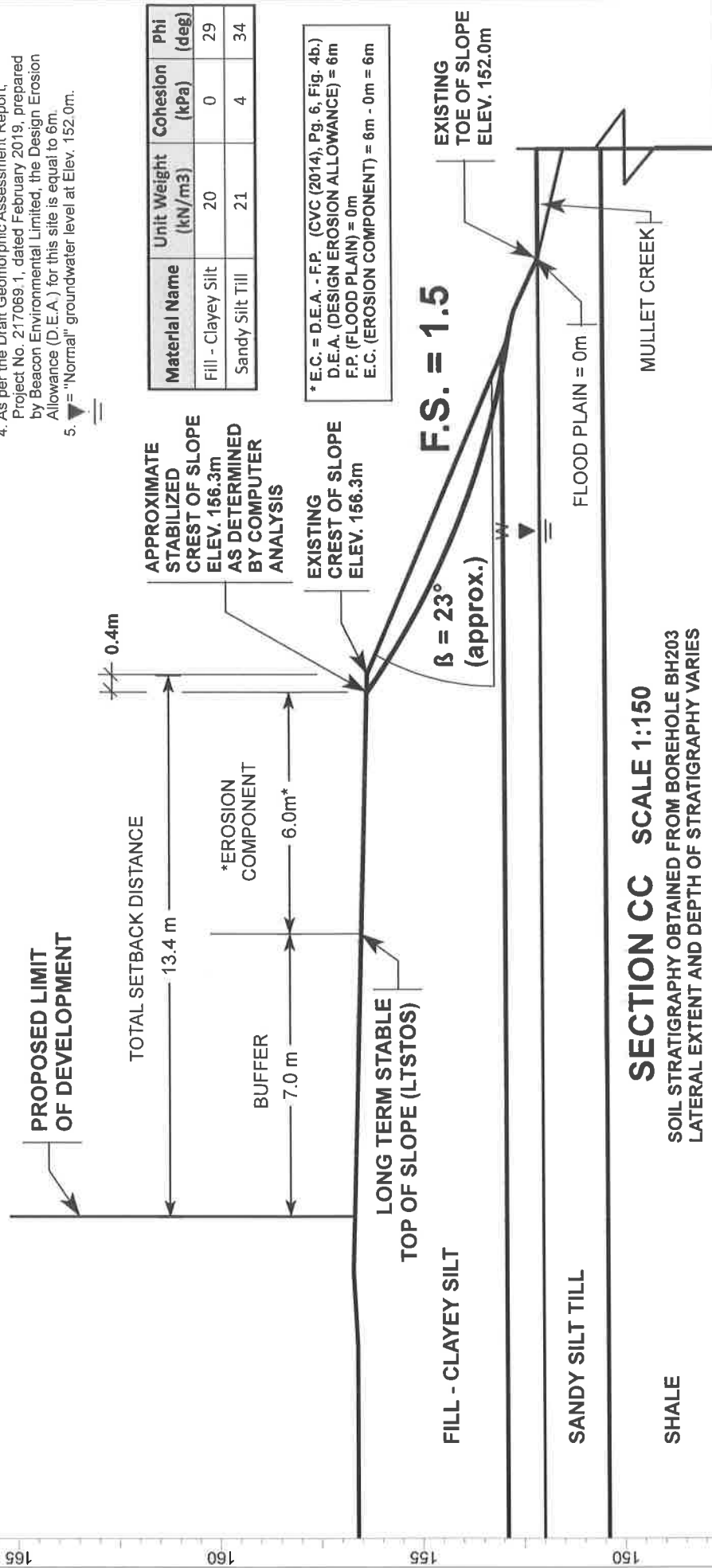
PATRIOT ENGINEERING LTD.
Consulting Engineers

Project	37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario		
Analysis Description	SECTION BB - EXISTING SLOPE - "NORMAL" GROUNDWATER LEVELS - BISHOP'S METHOD		
Drawn By	S.B.	Scale	1:150
Date	2019-02-25		Company Patriot Engineering Ltd.
			File Name 37105-SectionBB.slim
			Figure: 1B

FIGURE 1C: "NORMAL" GROUNDWATER LEVELS PROPOSED DEVELOPMENT

51 TANNERY STREET, MISSISSAUGA, ONTARIO

ELEV. (m)



SECTION CC SCALE 1:150

SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH203
LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES

Project		37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario	
Analysis Description		SECTION CC - EXISTING SLOPE - "NORMAL" GROUNDWATER LEVELS - BISHOP'S METHOD	
Drawn By	Scale	Company	Figure:
S.B.	1:150	Patriot Engineering Ltd.	1C
Date	File Name		
2019-02-25	37105-SectionCC.slim		

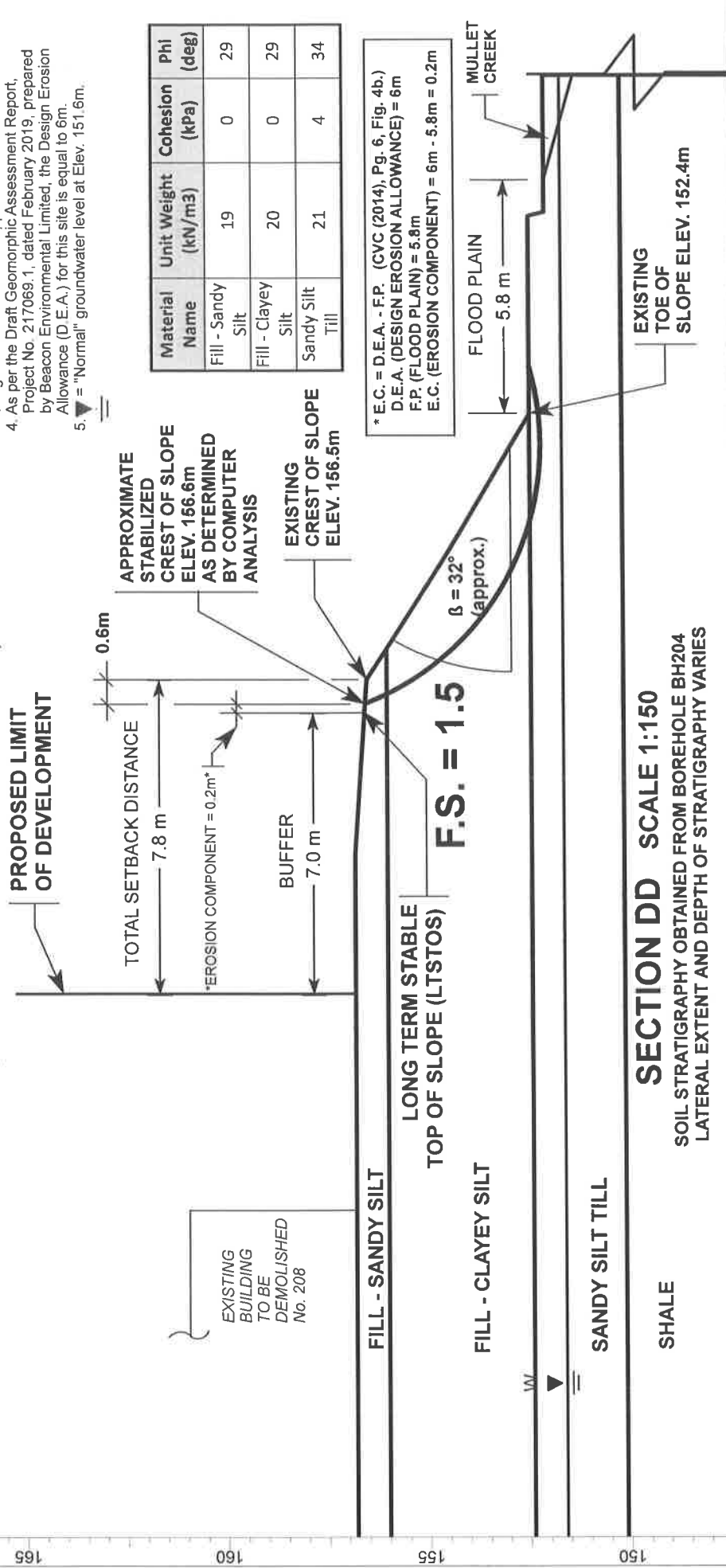


PATRIOT ENGINEERING LTD.
Consulting Engineers

FIGURE 1D: "NORMAL" GROUNDWATER LEVELS PROPOSED DEVELOPMENT

ELEV. (m)

51 TANNERY STREET, MISSISSAUGA, ONTARIO

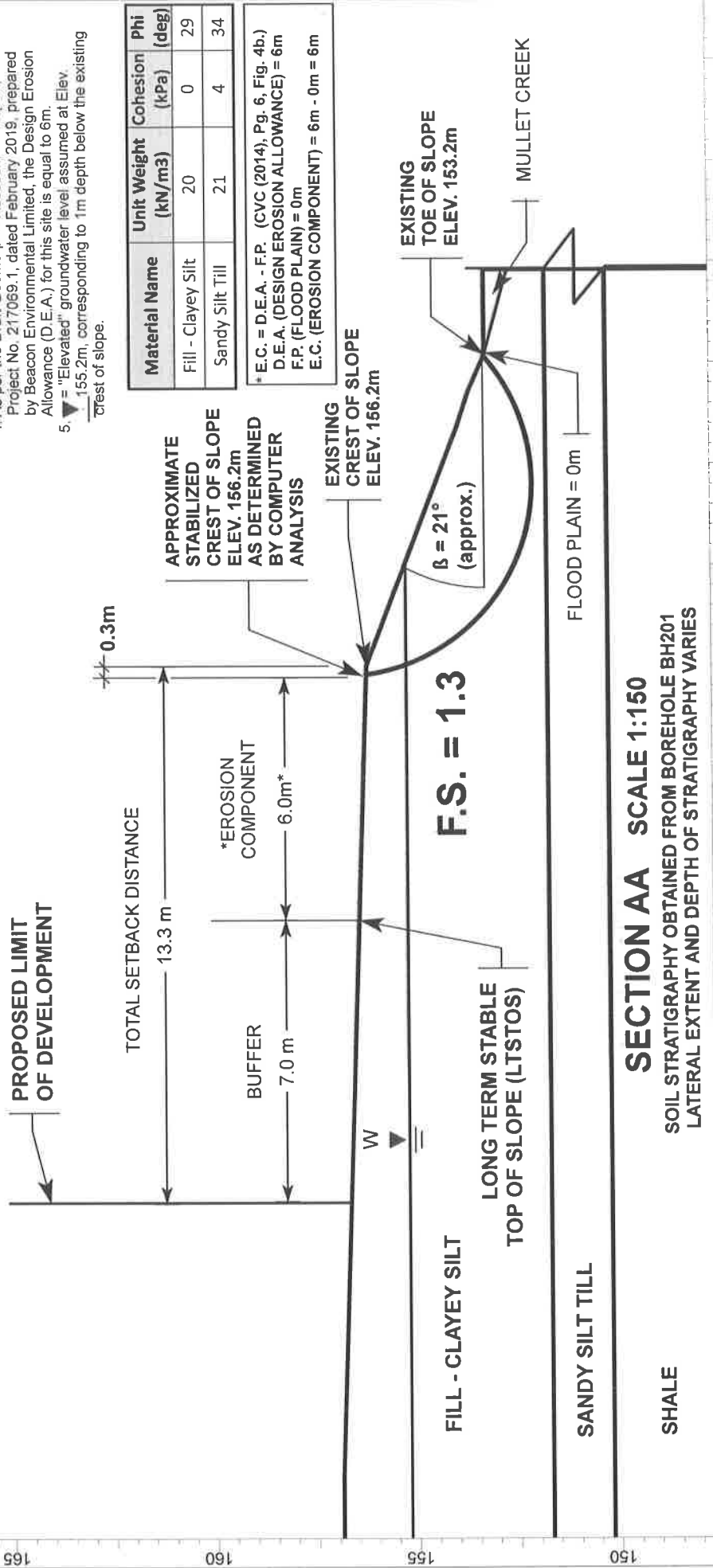


SECTION DD SCALE 1:150
SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH204
LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES

<p>PATRIOT ENGINEERING LTD. Consulting Engineers</p>	Project 37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario	
	Analysis Description SECTION DD - EXISTING SLOPE - "NORMAL" GROUNDWATER LEVELS - BISHOP'S METHOD	
Drawn By S.B.	Scale 1:150	Company Patriot Engineering Ltd.
Date 2019-02-25	File Name 37105-SectionDD.slim	Figure: 1D

FIGURE 1E: "ELEVATED" GROUNDWATER LEVELS PROPOSED DEVELOPMENT 51 TANNERY STREET, MISSISSAUGA, ONTARIO

ELEV. (m)



Material Name	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Fill - Clayey Silt	20	0	29
Sandy Silt Till	21	4	34

* E.C. = D.E.A. - F.P. (CVC (2014), Pg. 6, Fig. 4b.)
 D.E.A. (DESIGN EROSION ALLOWANCE) = 6m
 F.P. (FLOOD PLAIN) = 0m
 E.C. (EROSION COMPONENT) = 6m - 0m = 6m

- Notes:
- Slope geometry is derived and geodetically referenced from Topographical Plan prepared by Fiddes Clipsham Inc., Ontario Land Surveyor, dated January 23, 2019.
 - The average slope β of 21° is estimated.
 - For "Elevated" groundwater levels, using the computer software Slide (Version 7.0) developed by Rocscience, to perform our slope stability analysis with Bishop's Method, the stabilized crest of slope is estimated where the failure circle with a Factor of Safety of 1.3 intercepts the ground surface at the upper tableland.
 - As per the Draft Geomorphic Assessment Report, Project No. 217069.1, dated February 2019, prepared by Beacon Environmental Limited, the Design Erosion Allowance (D.E.A.) for this site is equal to 6m.
 - "Elevated" groundwater level assumed at Elev. 155.2m, corresponding to 1m depth below the existing Crest of slope.

PATRIOT ENGINEERING LTD.
Consulting Engineers

Project: 37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario

Analysis Description: SECTION AA - EXISTING SLOPE - "ELEVATED" GROUNDWATER LEVELS - BISHOP'S METHOD

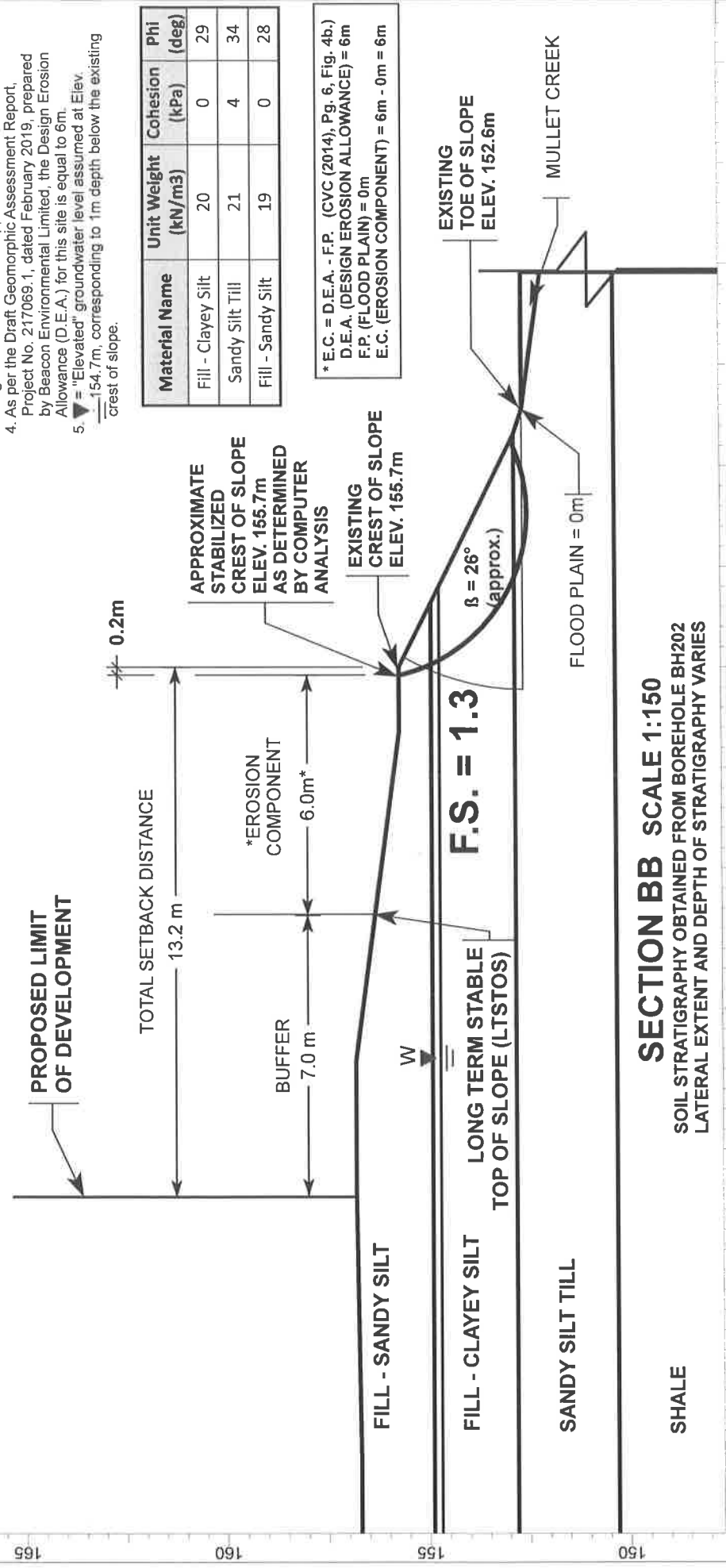
Drawn By: S.B. **Scale:** 1:150 **Company:** Patriot Engineering Ltd.

Date: 2019-02-25 **File Name:** 37105-SectionAA.slim **Figure:** 1E

SLIDEINTERPRET 7.022

FIGURE 1F: "ELEVATED" GROUNDWATER LEVELS PROPOSED DEVELOPMENT 51 TANNERY STREET, MISSISSAUGA, ONTARIO

ELEV. (m)



F.S. = 1.3

Material Name	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Fill - Clayey Silt	20	0	29
Sandy Silt Till	21	4	34
Fill - Sandy Silt	19	0	28

* E.C. = D.E.A. - F.P. (CVC (2014), Pg. 6, Fig. 4b.)
D.E.A. (DESIGN EROSION ALLOWANCE) = 6m
F.P. (FLOOD PLAIN) = 0m
E.C. (EROSION COMPONENT) = 6m - 0m = 6m

- Notes:
- Slope geometry is derived and geodetically referenced from Topographical Plan prepared by Fiddes Cliphsham Inc., Ontario Land Surveyor, dated January 23, 2019.
 - The average slope β of 26° is estimated.
 - For "Elevated" groundwater levels, using the computer software Slide (Version 7.0) developed by Rocscience, to perform our slope stability analysis with Bishop's Method, the stabilized crest of slope is estimated where the failure circle with a Factor of Safety of 1.3 intercepts the ground surface at the upper tableland.
 - As per the Draft Geomorphic Assessment Report, Project No. 217069.1, dated February 2019, prepared by Beacon Environmental Limited, the Design Erosion Allowance (D.E.A.) for this site is equal to 6m.
 - ▲ = "Elevated" groundwater level assumed at Elev. 154.7m, corresponding to 1m depth below the existing crest of slope.

SECTION BB SCALE 1:150

SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH202
LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES

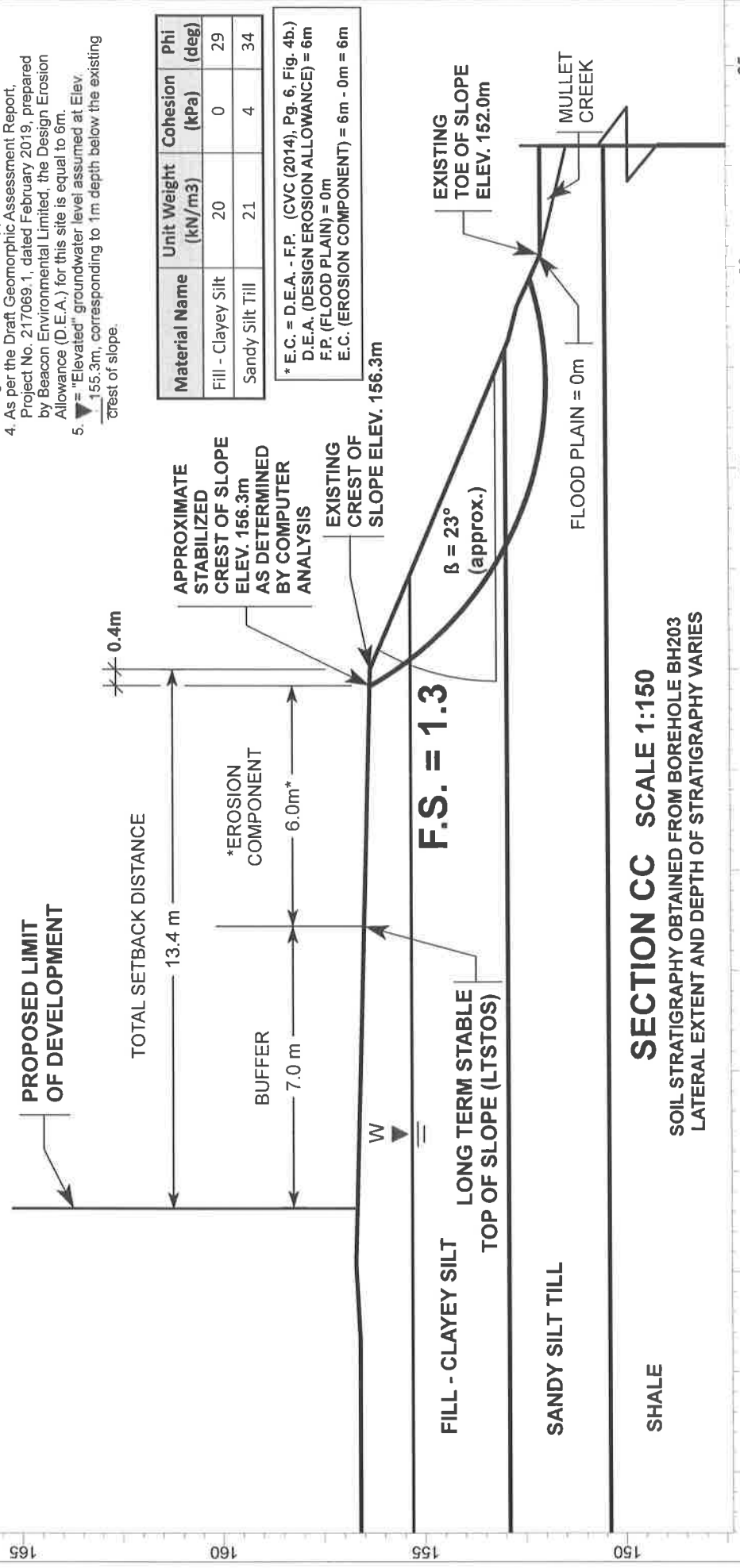
Project		37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario	
Analysis Description		SECTION BB - EXISTING SLOPE - "ELEVATED" GROUNDWATER LEVELS - BISHOP'S METHOD	
Drawn By	Scale	Company	Patriot Engineering Ltd.
S.B.	1:150		
Date	File Name	Figure:	
2019-02-25	37105-SectionBB.slim	1F	



PATRIOT ENGINEERING LTD.
Consulting Engineers

FIGURE 1G: "ELEVATED" GROUNDWATER LEVELS PROPOSED DEVELOPMENT

51 TANNERY STREET, MISSISSAUGA, ONTARIO



Material Name	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Fill - Clayey Silt	20	0	29
Sandy Silt Till	21	4	34

* E.C. = D.E.A. - F.P. (CVC (2014), Pg. 6, Fig. 4b.)
 D.E.A. (DESIGN EROSION ALLOWANCE) = 6m
 F.P. (FLOOD PLAIN) = 0m
 E.C. (EROSION COMPONENT) = 6m - 0m = 6m

- Notes:
- Slope geometry is derived and geodetically referenced from Topographical Plan prepared by Fiddes Cliphsham Inc., Ontario Land Surveyor, dated January 23, 2019.
 - The average slope β of 23° is estimated.
 - For "Elevated" groundwater levels, using the computer software Slide (Version 7.0) developed by Rocscience, to perform our slope stability analysis with Bishop's Method, the stabilized crest of slope is estimated where the failure circle with a Factor of Safety of 1.3 intercepts the ground surface at the upper tableland.
 - As per the Draft Geomorphic Assessment Report, Project No. 217069.1, dated February 2019, prepared by Beacon Environmental Limited, the Design Erosion Allowance (D.E.A.) for this site is equal to 6m.
 - "Elevated" groundwater level assumed at Elev. 155.3m, corresponding to 1m depth below the existing crest of slope.

SECTION CC SCALE 1:150

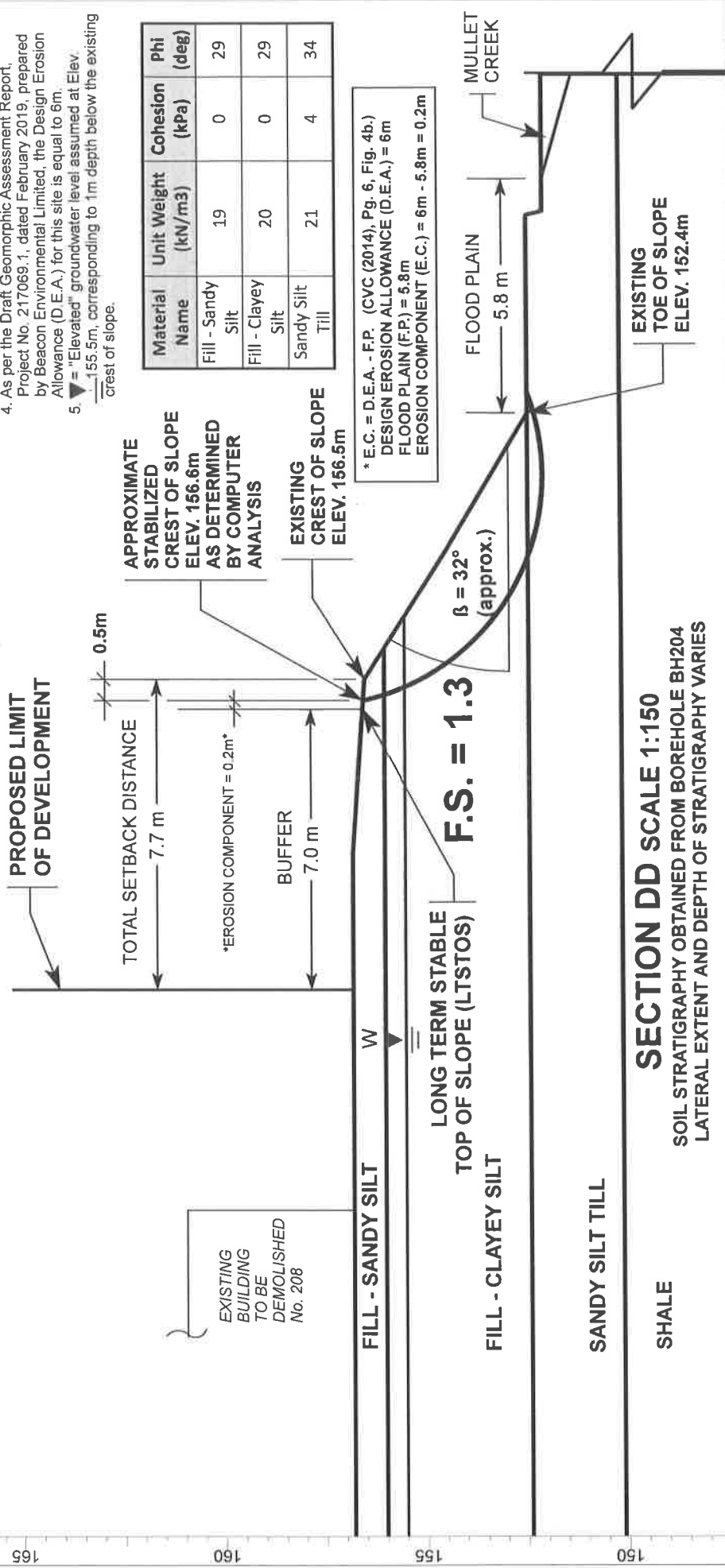
SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH203
 LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES

	Project: 37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario	
	Analysis Description: SECTION CC - EXISTING SLOPE - "ELEVATED" GROUNDWATER LEVELS - BISHOP'S METHOD	Company: Patriot Engineering Ltd.
Drawn By: S.B.	Scale: 1:150	File Name: 37105-SectionCC.slm
Date: 2019-02-25	Figure: 1G	

FIGURE 1H: "ELEVATED" GROUNDWATER LEVELS PROPOSED DEVELOPMENT 51 TANNERY STREET, MISSISSAUGA, ONTARIO

ELEV. (m)

EAST ← → WEST



Material Name	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (deg)
Fill - Sandy Silt	19	0	29
Fill - Clayey Silt	20	0	29
Sandy Silt Till	21	4	34

* E.C. = D.E.A. - F.P. (CVC (2014), Pg. 6, Fig. 4b.)
DESIGN EROSION ALLOWANCE (D.E.A.) = 6m
FLOOD PLAIN (F.P.) = 5.8m
EROSION COMPONENT (E.C.) = 6m - 5.8m = 0.2m

EXISTING BUILDING TO BE DEMOLISHED No. 208

SECTION DD SCALE 1:150
SOIL STRATIGRAPHY OBTAINED FROM BOREHOLE BH204
LATERAL EXTENT AND DEPTH OF STRATIGRAPHY VARIES

Project		37105 - Proposed Development - 51 Tannery Street, Mississauga, Ontario	
Analysis Description		SECTION DD - EXISTING SLOPE - "ELEVATED" GROUNDWATER LEVELS - BISHOP'S METHOD	
Drawn By	Scale	Company	Patriot Engineering Ltd.
S.B.	1:150		
Date	File Name	Figure: 1H	
2019-02-25	37105-SectionDD.Slim		



PATRIOT ENGINEERING LTD.
Consulting Engineers

Project No: 37105

Borehole #: BH201

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 2



SUBSURFACE PROFILE				SAMPLE			Standard Penetration 'N' Cone				Shear Str. Vane				Moisture			
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U. Wt. (kN/m ³)	Standard Penetration 'N' Cone				Shear Str. Vane				Moisture		
								20	40	60	80	50	100	150	200	x	Moisture%	x
								○ - SPT Blows/300mm ○				▲ Penetrometer ▲				x Moisture% x		
								20 40 60 80				50 100 150 200				10 20 30		
0		Ground Surface	156.6															
		GRANULAR FILL - 50mm CRUSHER RUN LIMESTONE compact, brown, slightly moist		SS1	21	50												x
1		FILL - CLAYEY SILT very stiff to stiff, reddish brown becoming grey with depth, slightly moist to very moist, some sand, trace gravel, trace cobbles, trace topsoil, isolated pockets of topsoil, trace asphalt fragments, trace wood pieces		SS2	14	60												x
2				SS3	9	65												x
3				SS4	8	80												x
4				SS5	11	60												x
5		SANDY SILT TILL compact to very dense, grey, moist to slightly moist, some clay, trace gravel, trace cobbles, trace shale fragments, isolated wet sand seams, oxidized	151.7	SS6	10	80												x
6			150.2	SS7	50	100				○ /50mm								x
7		SHALE weathered, grey, Georgian Bay Formation																
8				SS8	50	100				○ /50mm								
9			147.4	SS9	50	100				○ /25m								
10		GRINDING AUGER REFUSAL See notes on next page.																

Drill Method: S/S Auger

PATRIOT ENGINEERING LTD.

Datum: Geodetic

Drill Date: March 1, 2017

80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4

Checked by: L.G.

Phone: (416) 293-7716 Fax: (416) 293-6722

e-mail: info@patrioteng.ca

Project No: 37105

Borehole #: BH201

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 2



SUBSURFACE PROFILE				SAMPLE				Standard Penetration 'N' Cone				Shear Str. Vane				Moisture		
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt. (kN/m ³)	● 20 40 60 80 ●				□ 50 100 150 200 □				x Moisture% x		
								○ - SPT Blows/300mm ○				▲ Penetrometer ▲				10 20 30		
11		Notes: 1. Borehole was advanced using solid stem augers to a depth of 9.2m on March 1, 2017. 2. Short term groundwater level measured at 4.3m depth upon completion of drilling.																
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Drill Method: S/S Auger

PATRIOT ENGINEERING LTD.
80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4
Phone: (416) 293-7716 Fax: (416) 293-6722
e-mail: info@patrioteng.ca

Datum: Geodetic
Checked by: L.G.

Drill Date: March 1, 2017

Project No: 37105

Borehole #: BH202

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 3



SUBSURFACE PROFILE				SAMPLE			Standard Penetration 'N' Cone				Shear Str. Vane				Moisture				
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U Wt. (kN/m ³)	Standard Penetration 'N' Cone				Shear Str. Vane				Moisture			
								20	40	60	80	50	100	150	200	x	Moisture%	x	
								○ - SPT Blows/300mm ○				▲ Penetrometer ▲				x Moisture% x			
								20	40	60	80	50	100	150	200	10	20	30	
0		Ground Surface	156.8																
		CONCRETE SLAB - 100mm	156.6																
		GRANULAR FILL - 100mm																	
		CRUSHER RUN LIMESTONE																	
		loose, brown, slightly moist																	
1		FILL - SANDY SILT																	
		loose to compact, brown, slightly moist to moist, some clay, trace gravel, trace topsoil, trace rootlets																	
2		FILL - CLAYEY SILT	154.9																
		stiff, reddish brown, moist, some sand, trace gravel, trace cobbles, trace asphalt fragments, trace wood pieces, trace rootlets																	
3																			
4		SANDY SILT TILL	152.8																
		compact to very dense, grey, moist to slightly moist, some clay, trace gravel, trace cobbles, trace shale fragments, isolated wet sand seams, oxidized, minor dilation detected in SS6																	
5																			
6																			
7		SHALE	150.3																
		weathered, grey, Georgian Bay Formation																	
8		GRINDING AUGER REFUSAL	149.1																
		Notes:																	
		1. Borehole was advanced using solid stem augers to a depth of 7.7m on March 1, 2017.																	
		2. Short term groundwater level measured at 4.1m depth upon completion of drilling.																	
10																			

Drill Method: S/S Auger

PATRIOT ENGINEERING LTD.

Datum: Geodetic

Drill Date: March 1, 2017

80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4

Checked by: L.G.

Phone: (416) 293-7716 Fax: (416) 293-6722

e-mail: info@patrioteng.ca

Project No: 37105

Borehole #: BH203

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 4



SUBSURFACE PROFILE				SAMPLE			Standard Penetration 'N' Cone				Shear Str. Vane				Moisture			
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt. (kN/m ³)	20 40 60 80				50 100 150 200				x Moisture% x		
								○ - SPT Blows/300mm ○				▲ Penetrometer ▲				10 20 30		
0		Ground Surface	156.9															
0		GRANULAR FILL - 50mm CRUSHER RUN LIMESTONE compact, brown, slightly moist		SS1	17	75		○										x
1		FILL - CLAYEY SILT very stiff to firm, brown becoming grey with depth, slightly moist to very moist, some sand, trace gravel, trace cobbles, trace topsoil, isolated pockets of topsoil, trace asphalt fragments, trace brick fragments, trace rootlets		SS2	12	80		○										x
2				SS3	13	75		○										x
3				SS4	5	80		○										x
4			152.9	SS5	15	90		○										x
5		SANDY SILT TILL compact to very dense, grey, moist to slightly moist, some clay, trace gravel, trace cobbles, trace shale fragments, isolated wet sand seams, oxidized, minor dilation detected in SS6		SS6	15	90		○										x
6																		
7		SHALE weathered, grey, Georgian Bay Formation	150.4	SS7	82	90												x
8		GRINDING AUGER REFUSAL Notes: 1. Borehole was advanced using solid stem augers to a depth of 7.7m on March 1, 2017. 2. Short term groundwater level measured at 4.9m depth upon completion of drilling.	149.3	SS8	50	100												
9																		
10																		

Drill Method: S/S Auger

PATRIOT ENGINEERING LTD.
80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4
Phone: (416) 293-7716 Fax: (416) 293-6722
e-mail: info@patrioteng.ca

Datum: Geodetic

Drill Date: March 1, 2017

Checked by: L.G.

Project No: 37105

Borehole #: BH204

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 5



SUBSURFACE PROFILE				SAMPLE			Standard Penetration 'N' Cone				Shear Str. Vane				Moisture			
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt. (kN/m ³)	Standard Penetration 'N' Cone				Shear Str. Vane				Moisture		
								20	40	60	80	50	100	150	200	x	Moisture%	x
0		Ground Surface	157.1															
0		GRANULAR FILL - 50mm CRUSHER RUN LIMESTONE compact, brown, very moist		SS1	18	75												x
1		FILL - SANDY SILT compact, brown, very moist to moist, some clay, trace gravel, trace cobbles, trace asphalt fragments	156.0	SS2	68*	80												x
2		FILL - CLAYEY SILT very stiff to stiff, brown becoming dark brown with depth, moist to very moist, some sand, trace gravel, trace cobbles		SS3	12	75												x
3				SS4	9	80												x
4				SS5	12	90												x
5		SANDY SILT TILL very dense, brown, becoming grey below 5.0m depth, moist, some clay, trace gravel, trace cobbles, trace shale fragments, isolated wet sand seams, oxidized, minor dilation detected in SS6	152.4	SS6	55	90												x
6				SS7	55	90												x
7		SHALE weathered, grey, Georgian Bay Formation	150.1															
8		GRINDING AUGER REFUSAL See notes on next page.	149.5	SS8	50	100												
9																		
10																		

Drill Method: S/S Auger

PATRIOT ENGINEERING LTD.
80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4
Phone: (416) 293-7716 Fax: (416) 293-6722
e-mail: info@patrioteng.ca

Datum: Geodetic

Drill Date: March 1, 2017

Checked by: L.G.

Project No: 37105

Borehole #: BH204

Project: Proposed Development

Borehole Location: See Figure 1

Location: 51 Tannery Street, Mississauga, Ontario

Project Engineer: L.G.

Client: OHE Consultants

Drawing No.: 5



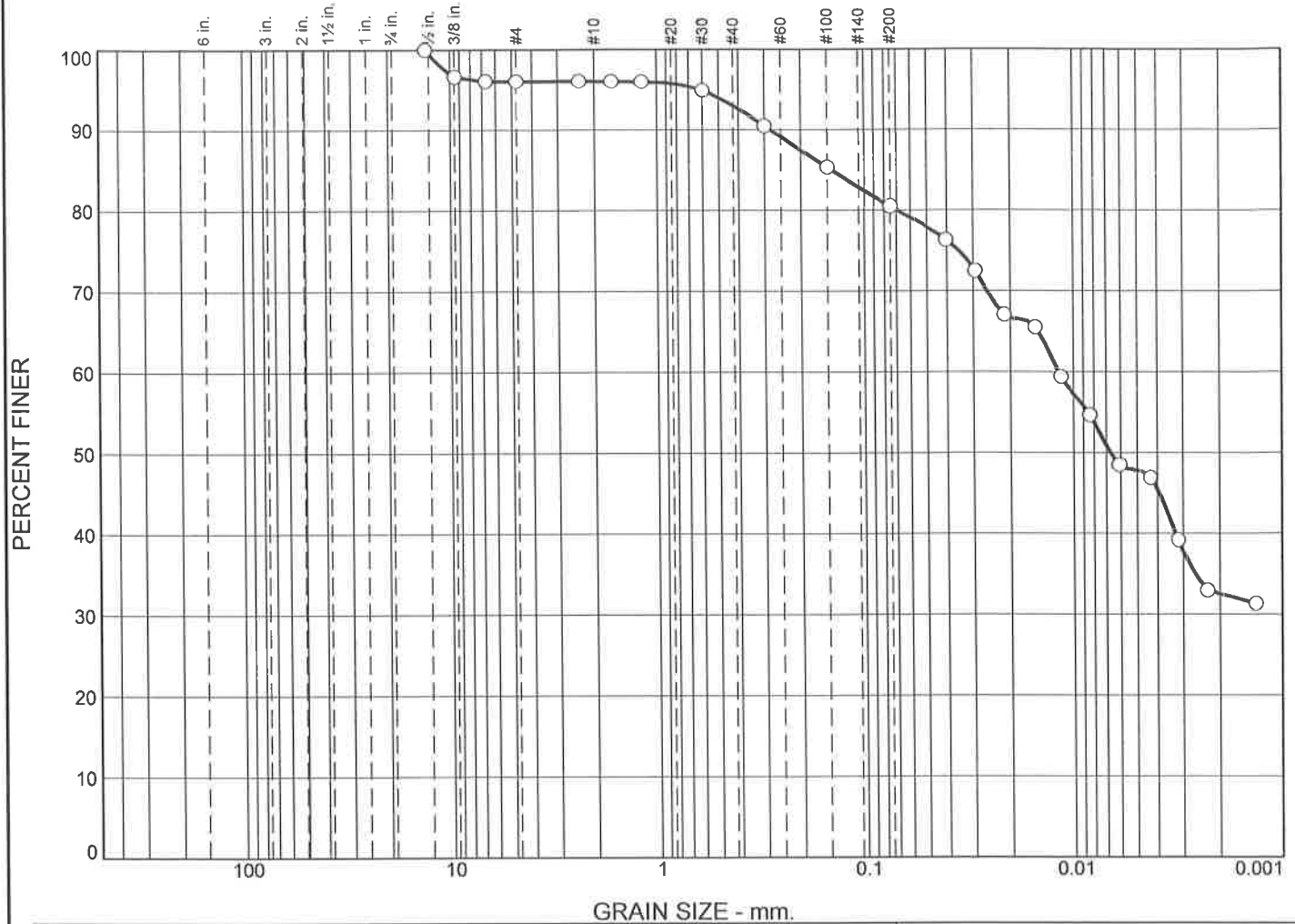
SUBSURFACE PROFILE				SAMPLE			Standard Penetration 'N'				Shear Str. Vane				Moisture			
Depth (m)	Symbol	Description	Elevation (m)	Type	N = Blows/300mm	Recovery (%)	U.Wt. (kN/m ³)	Cone				Vane				x Moisture% x		
								20	40	60	80	50	100	150	200	10	20	30
11		Notes: * "N" value (blows/foot) not representative due to a cobble obstruction. 1. Borehole was advanced using solid stem augers to a depth of 7.7m on March 1, 2017. 2. Short term groundwater level measured at 5.5m depth upon completion of drilling.																
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Drill Method: S/S Auger
Drill Date: March 1, 2017

PATRIOT ENGINEERING LTD.
80 Nashdene Road., Unit 62, Toronto, ON, M1V 5E4
Phone: (416) 293-7716 Fax: (416) 293-6722
e-mail: info@patrioteng.ca

Datum: Geodetic
Checked by: L.G.

Particle Size Distribution Report

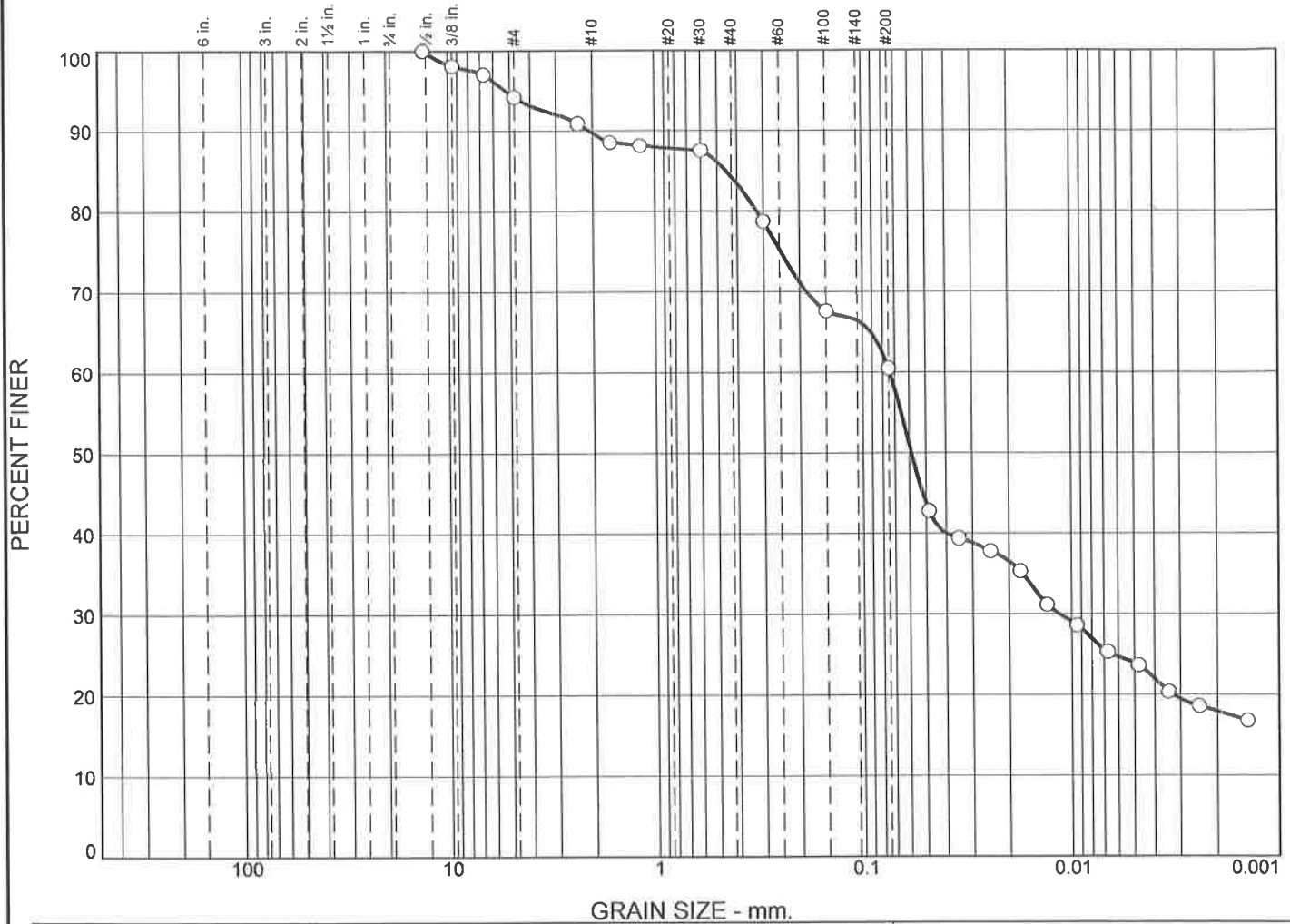


	% Cobbles	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	4.0	0.0	3.0	12.5	48.0	32.5		
×	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
○			0.1447	0.0119	0.0067					

Material Description	USCS	AASHTO
○ Clayey silt, some sand, trace gravel		

Project No. 37105 Client: OHE Consultants Project: Proposed Development, 100 Emby Drive, Mississauga, Ontario ○ Source: BH202 SS4 Depth: 7.5' to 9' Sample No.: R3802	Remarks: ○ Date of Sampling: March 1, 2017
---	---

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	5.8	4.5	5.4	23.8	42.6	17.9		
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			0.4511	0.0739	0.0586	0.0115				

Material Description	USCS	AASHTO
○ Sandy silt, some clay, trace gravel		

Project No. 37105 **Client:** OHE Consultants
Project: Proposed Development, 100 Emby Drive, Mississauga, Ontario

 ○ **Source:** BH203 SS7 **Depth:** 20' to 21.5' **Sample No.:** R3803

Remarks:
 ○ Date of Sampling:
 March 1, 2017

APPENDIX A

**PHOTOGRAPHS OF EXISTING SLOPE
PROPOSED DEVELOPMENT
51 TANNERY STREET
MISSISSAUGA, ONTARIO**



Photograph 1: View of slope



Photograph 2: View of well preserved slope



Photograph 3: View of well vegetated slope

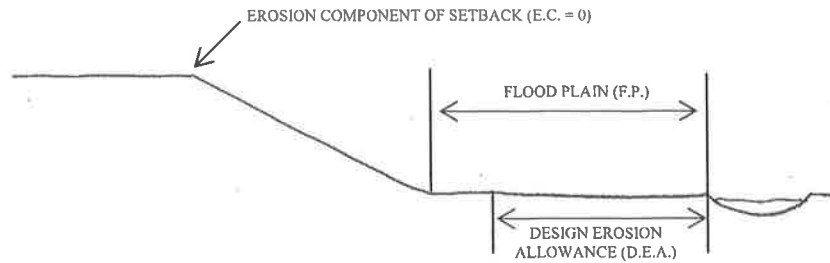
APPENDIX B

**SLOPE STABILITY DEFINITION & DETERMINATION GUIDELINE
PREPARED BY THE CREDIT VALLEY CONSERVATION
PROPOSED DEVELOPMENT
51 TANNERY STREET
MISSISSAUGA, ONTARIO**

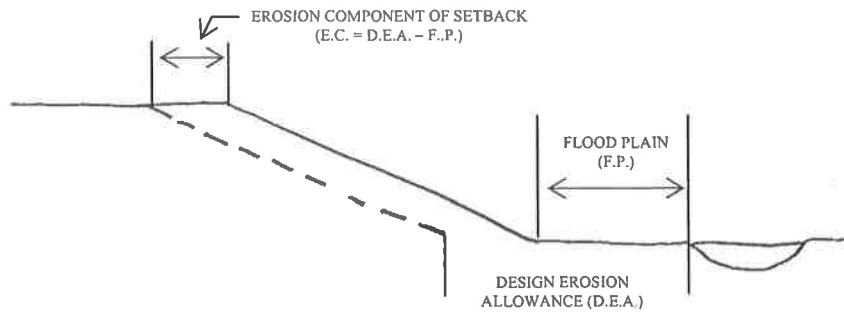
SLOPE STABILITY DEFINITION & DETERMINATION GUIDELINE

Figure 4b. Calculation of Erosion Component of Total Setback with Defined Valley Slope

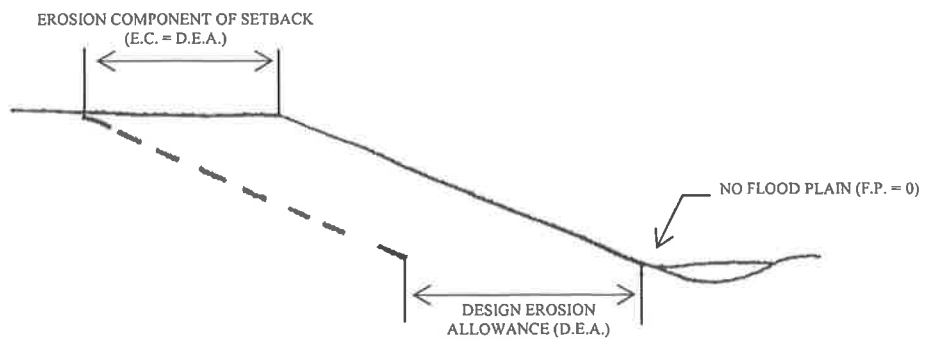
(A) FLOOD PLAIN WIDTH GREATER THAN DESIGN EROSION ALLOWANCE



(B) FLOOD PLAIN WIDTH LESS THAN DESIGN EROSION ALLOWANCE



(C) NO FLOOD PLAIN AT THE TOE OF SLOPE



N.T.S.



EXPLANATION OF THE FORM BORING LOG

PENETRATION RESISTANCE

Standard Penetration Resistance 'N'-The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3m , into subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The description of the soil is based on visual examination of the samples and laboratory tests. Each stratum is described according to the following classification and terminology:

<u>Classification*</u>	<u>Particle Size</u>	<u>Particle Size or Sieve No. (U.S. Standard)</u>
Clay	less than 0.002 mm	less than 0.002 mm
Silt	from 0.002 to 0.075 mm	from 0.002 mm to #200 sieve
Sand	from 0.075 to 4.75 mm	from #200 sieve to #4 sieve
Gravel	from 4.75 to 75 mm	from #4 sieve to 3 in.
Cobbles	from 75 to 200 mm	from 3 in. to 8 in.
Boulders	larger than 200 mm	over 8 in.

<u>Terminology</u>	<u>Proportion</u>
Trace, or occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

* Unified Soil Classification System (ASTM D2487-75).

The relative density of cohesionless soils and the consistency of cohesive soils are defined by the following:

<u>Relative Density</u>	<u>Penetration Resistance "N" Blows 0.3 m or Blows foot</u>	<u>Consistency</u>	<u>Underdrained Shear Strength**</u>	
			<u>kPa</u>	<u>psf</u>
Very loose	0 to 4	Very soft	0 to 12	0 to 250
Loose	4 to 10	Soft	12 to 25	250 to 500
Compact	10 to 30	Firm	25 to 50	500 to 1000
Dense	30 to 50	Stiff	50 to 100	1000 to 2000
Very dense	over 50	Very Stiff	100 to 200	2000 to 4000
		Hard	over 200	over 4000

** The compressive strength obtained from the quick (Q) triaxial test is equal to twice the shear strength of the clay.