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January 30, 2017

Reference No. 1406-S151
Related Reference No.0709-S028
Page 1 of 5

DiBlasio Homes
6620 Rothschild Trail
Mississauga, Ontario
L5W 0A6

Attention: Mr. Alvaro DiBlasio

**Re: Slope Stability Assessment
Proposed Residential Development
6620 Rothschild Trail
City of Mississauga**

Dear Sir:

As requested, we have carried out a slope stability assessment at the captioned site to determine the stability of the existing slopes along the east and west property boundaries.

Background

The subject property is located at the end of Rothschild Trail, near Fletchers Creek, in the City of Mississauga. It is irregular in shape and has an area of approximately 9,200 sq. m. The property is currently occupied by a residential house. Fletchers Creek flows along the east side of the property while a tributary of Fletchers Creek flows along the west side of the property. The slopes of concern are located along the east and west property boundaries.

Field Work

Based on the Soil Report dated August 2014 (Reference No. 1406-S151), seven (7) boreholes (Boreholes 1 to 7, inclusive) were advanced to depths of 4.7 to 5.3 m below the existing ground surface. The location of the boreholes are provided on Drawing No. 1.



The boreholes have revealed that beneath a veneer of topsoil fill in some locations, overlying a layer of earth fill, the site is generally underlain by a stratum of silty sand till; strata and lenses of silty clay till, sand and gravel, and silt were found embedded in and/or below the silty sand till at various depths and locations. Shale bedrock was found in Boreholes 4 and 5 at a depth of $4.6\pm$ m from the prevailing ground surface. Refusal to augering occurred at depths ranging from 4.9 to $5.3\pm$ m at Boreholes 1, 2 and 3, which indicates that boulders and/or bedrock occurred at these depths.

Groundwater was not observed upon completion in the majority of the boreholes. Signs of wetness were observed within the silt in Boreholes 6 and 7 at depths of 4.5 m and 1.5 m below grade, respectively. Groundwater was detected in Borehole 7 at a depth of $4.6\pm$ m in the sand and gravel layer.

Visual Inspection

The site inspection indicates that the slopes are well vegetated with shrubs and trees. Bare spots were observed occasionally along the slopes. No sign of sloughing and creep was evident along the slopes at the time of the inspection.

Fletchers Creek is located at the bottom of slope along the east side of the property. Active erosion along the edge of the creek is evident. The tributary at the west side of the property is at least 6 m away from the bottom of the slope and no erosion is evident along the tributary.

The overall height of the east slope is approximately $7\pm$ m, with a slope gradient of 1V:1.83 \pm H while the west slope is approximately $3\pm$ m high with a slope gradient of 1V:2.4 \pm H.

Modelling

The slope stability analysis was carried out at 2 cross sections (Cross Sections A-A and B-B). The surface profile was interpolated from the contours shown on the topographic maps



provided by the client in 2007 and 2014, and the subsurface soil information was derived from the borehole findings. The locations of the cross-sections are shown on Drawing No. 1. The existing slope details at the cross sections are presented on Drawing Nos. 2A, 2B and 3.

The analysis was carried out using force-moment-equilibrium criteria with the soil strength parameters shown in the following table. Where applicable, the groundwater levels measured in the boreholes were incorporated into the analysis as a phreatic surface.

Strength Parameters For Slope Stability Analysis			
Material Type	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Internal Friction Angle (degrees)
Earth Fill	20.0	0	26
Silty Sand Till	22.5	3	35
Shale	Infinite Strength		

The results of the analyses are summarized in the table below:

Cross Section	Existing Slope Gradient	Existing FOS	Remodeled Slope Gradient	Remodeled FOS
A-A (Local)	1V:1.83H	1.344	1V:2.5H (Earth Fill)	1.607
A-A (Global)		1.712	1V:2H (Silty Sand Till) 1V:1.4H (Shale)	1.880
B-B	1V:2.4H	1.521	-	-

The factor of safety (FOS) for the existing slopes at the cross sections are generally above the Ontario Ministry of Natural Resources (OMNR) and Credit Valley Conservation Authority (CVC) requirement (FOS of 1.5), except Cross Section A-A (Local). The results of the analysis are presented on Drawing Nos. 2A, 2B and 3.

In accordance to the CVC toe erosion allowance requirement, the visual inspection along the creek and the borehole information, a toe erosion allowance of 5.0 m is considered adequate for shale with active erosion at the east slope near Fletchers Creek. Since the tributary along the west slope is located at least 6.0 m away from the bottom of slope, which exceeded the



recommended toe erosion allowance of 4.0 m for silty sand till, it was not necessary to incorporate a toe erosion allowance setback component for the west slope.

The slope at Cross Section A-A is remodeled and re-analyzed for its stability. The resulting FOS of the remodeled slope are 1.607 (Local) and 1.880 (Global), which meets the OMNR and CVC requirements. Therefore, the remodeled slope can be considered as geotechnically stable. The results of the analysis are presented on Drawing Nos. 4A and 4B.

The staked top of bank and the Long Term Stable Slope Line (LTSSL), as determined by incorporating the stability setback and toe erosion allowance, are shown on Drawing No. 1.

A development setback buffer for man-made and environmental degradation based on the CVC policy will be required. This is subject to the discretion of CVC.

In future development, should any alteration be carried out in the slope area, the slope should either be restored to its original or better than its original condition. For future site grading, all of the proposed slope should maintain a gradient of 1V:3H or flatter for stability. Any slope steeper than the mentioned gradient will require further stability analysis and it may require to be constructed as a reinforced earth slope.

In order to prevent disturbance of the existing stable slope and to enhance the stability of the bank for the proposed project, the following geotechnical constraints should be stipulated:

1. The prevailing vegetative cover must be maintained, since its extraction would deprive the bank of the rooting system that is reinforcement against soil erosion by weathering. If for any reason the vegetation cover is stripped, it must be reinstated to its original, or better than its original, protective condition.
2. The leafy topsoil cover on the bank face should not be disturbed, since this provides an insulation and screen against frost wedging and rainwash erosion.
3. Grading of the land adjacent to the bank must be such that concentrated runoff is not allowed to drain onto the bank face. Landscaping features which may cause runoff to



pond at the top of the bank, as well as saturation of the crown of the bank must not be permitted.

4. Where the construction is carried out near the top of the bank, stripping of topsoil or vegetation and dumping of loose fill over the bank must be prohibited.

In case of any removal of vegetation during the course of construction, restoration with selective native plantings, including deep rooting systems which would penetrate the original topsoil, shall be carried out after the development to ensure slope stability.

Provided that all the above recommendations are followed, the proposed development at the tableland should not have any adverse effect on the stability of the slope.

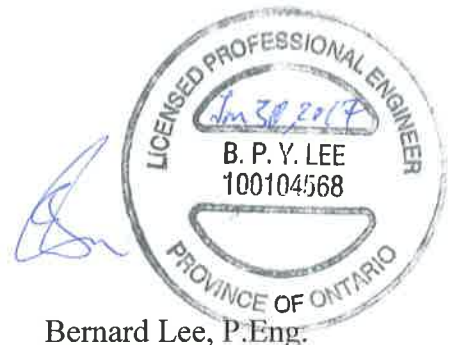
The above recommendations should be reviewed and are subject to the approval of CVC.

We trust the above satisfies your present requirements. Should you have any further queries, please feel free to contact this office.

Yours truly,

SOIL ENGINEERS LTD.

Kin Fung Li, B.Eng.
KFL/BL:dd

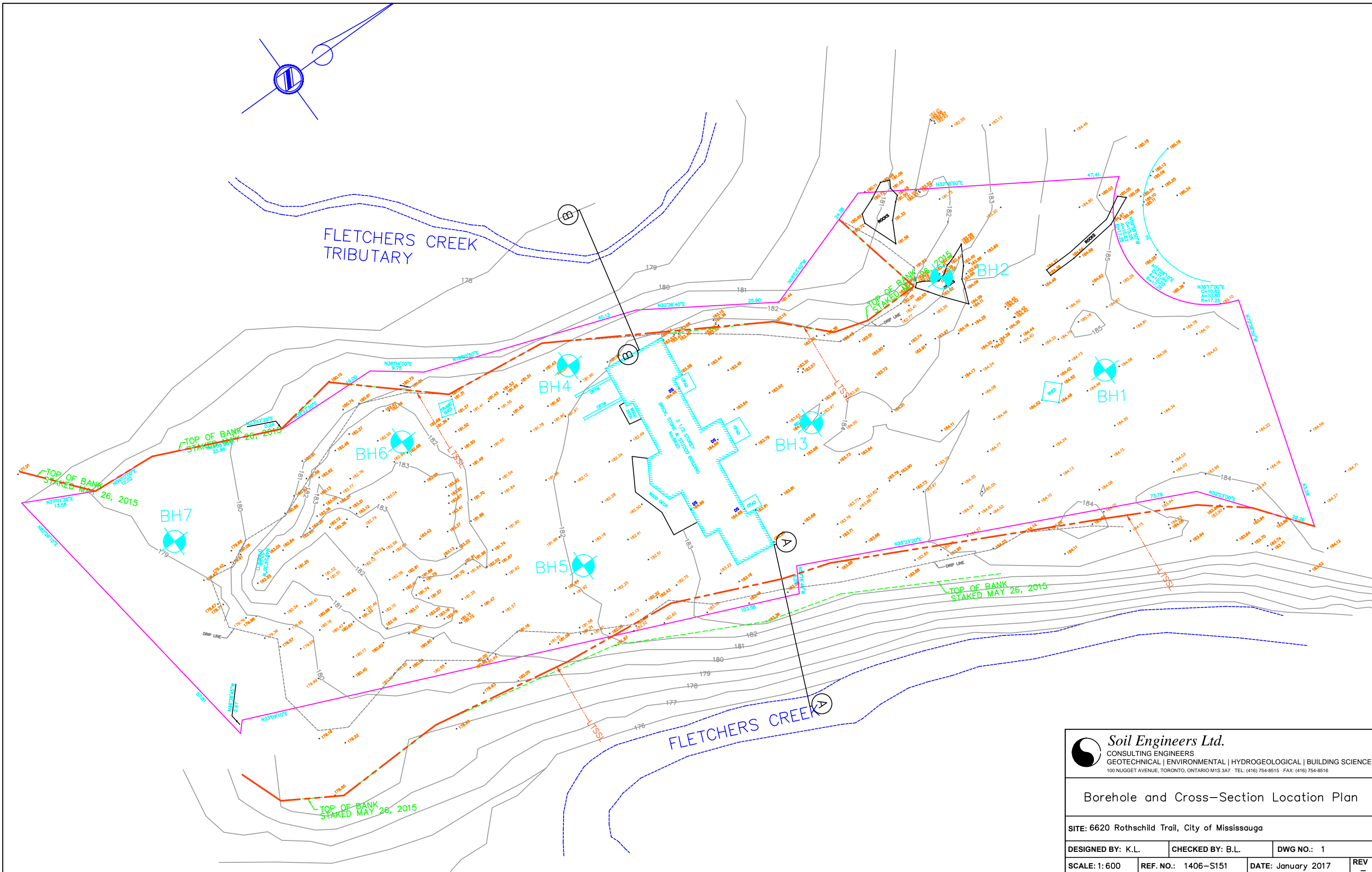



Bernard Lee, P.Eng.

ENCLOSURES

Borehole and Cross-Section Location Plan.....	Drawing No. 1
Cross-Sections A-A and B-B (Existing Condition)	Drawing Nos. 2A, 2B and 3
Cross-Section A-A (Geotechnically Stable Condition).....	Drawing Nos. 4A and 4B

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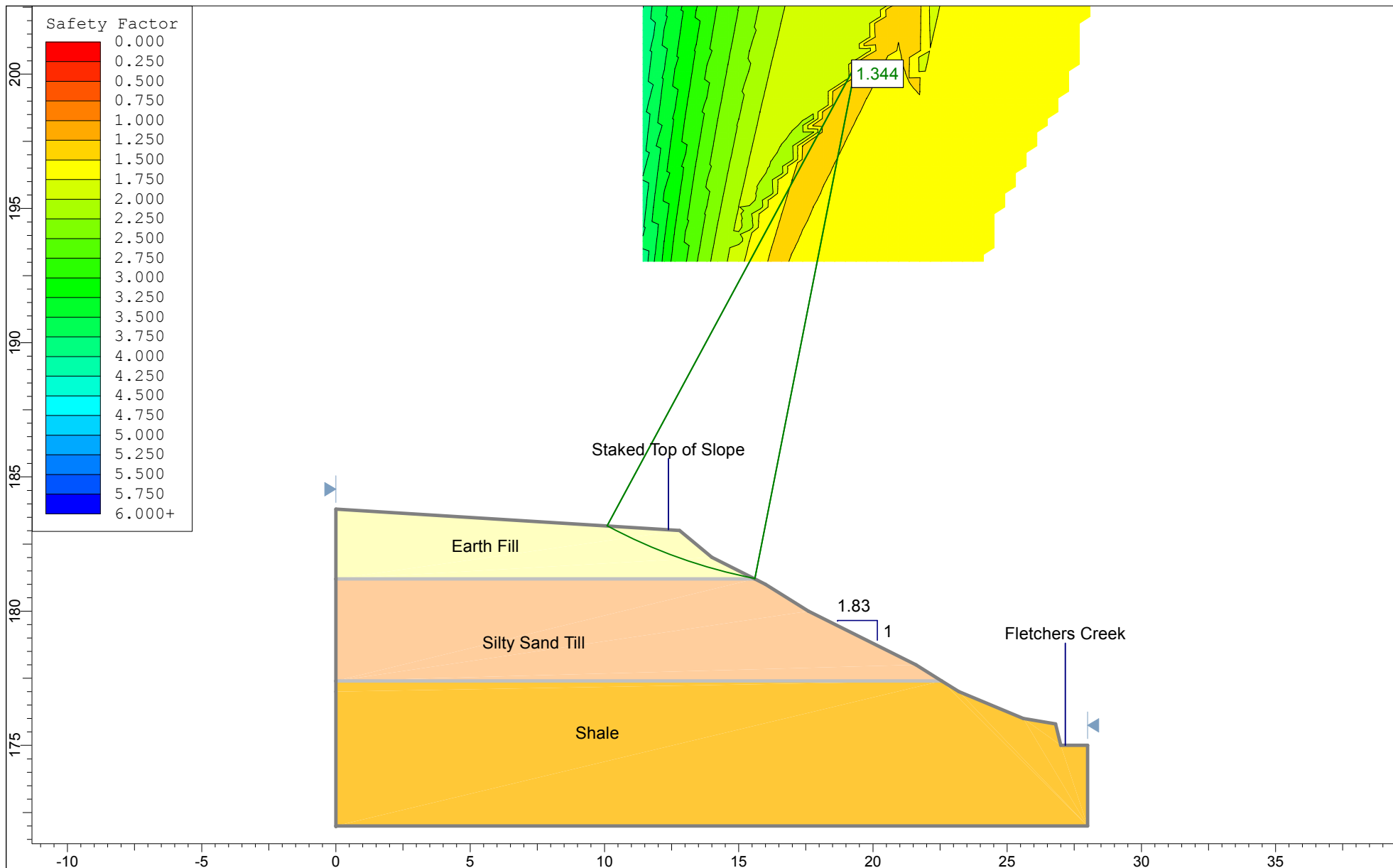


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Borehole and Cross-Section Location Plan

SITE: 6620 Rothschild Trail, City of Mississauga

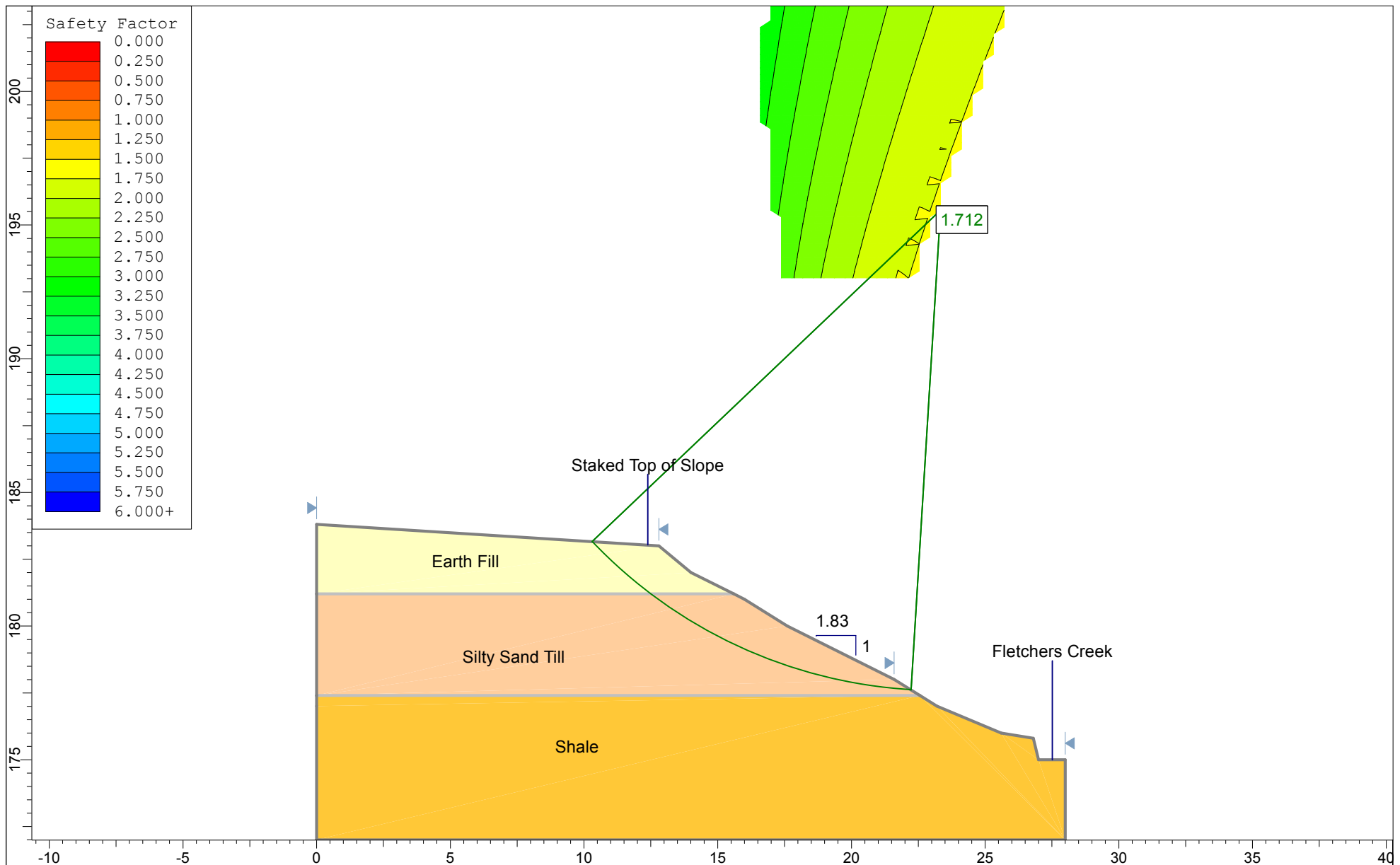
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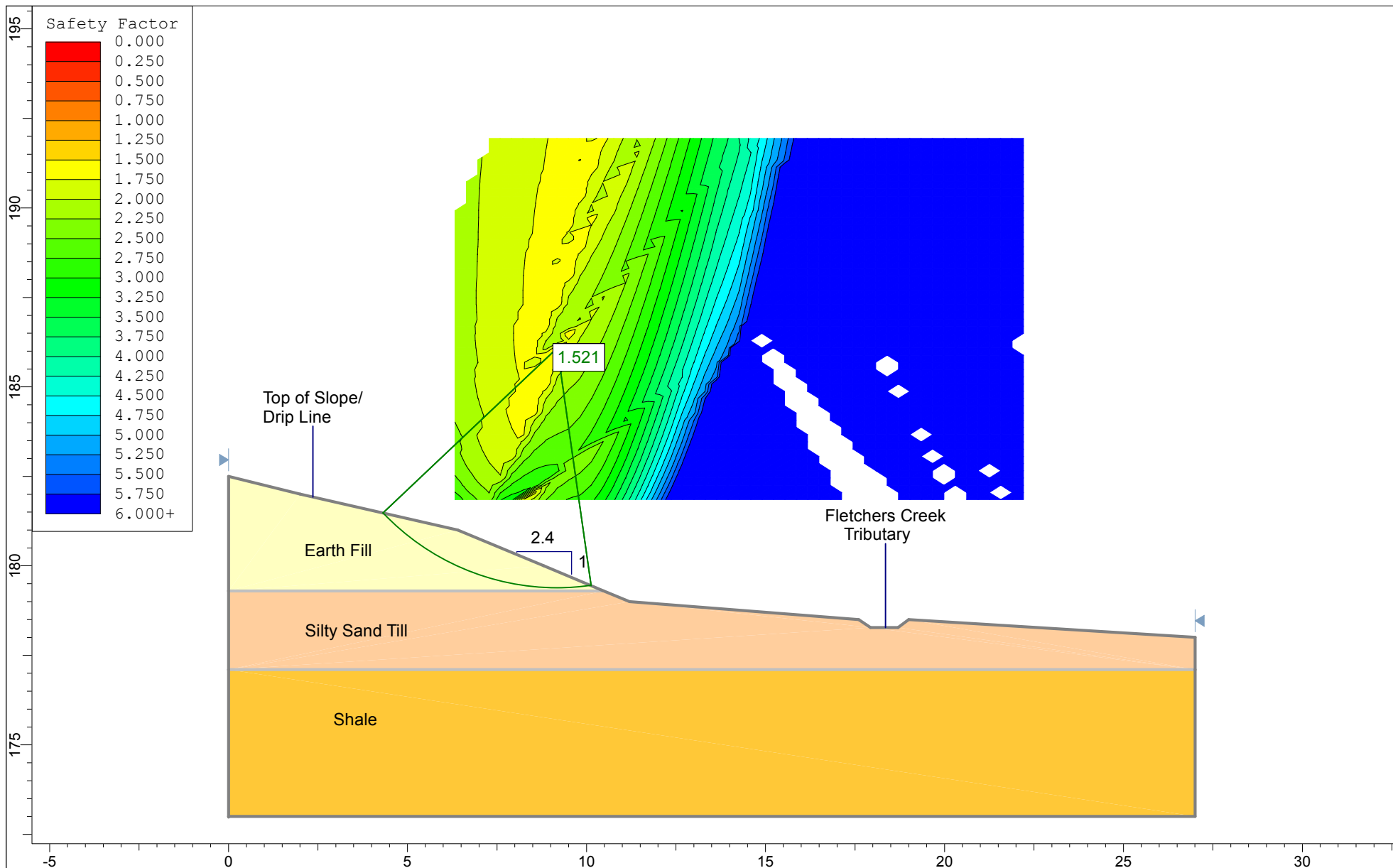
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Date				January 2017				Reference No.				1406-S151				Drawing No.		2A	



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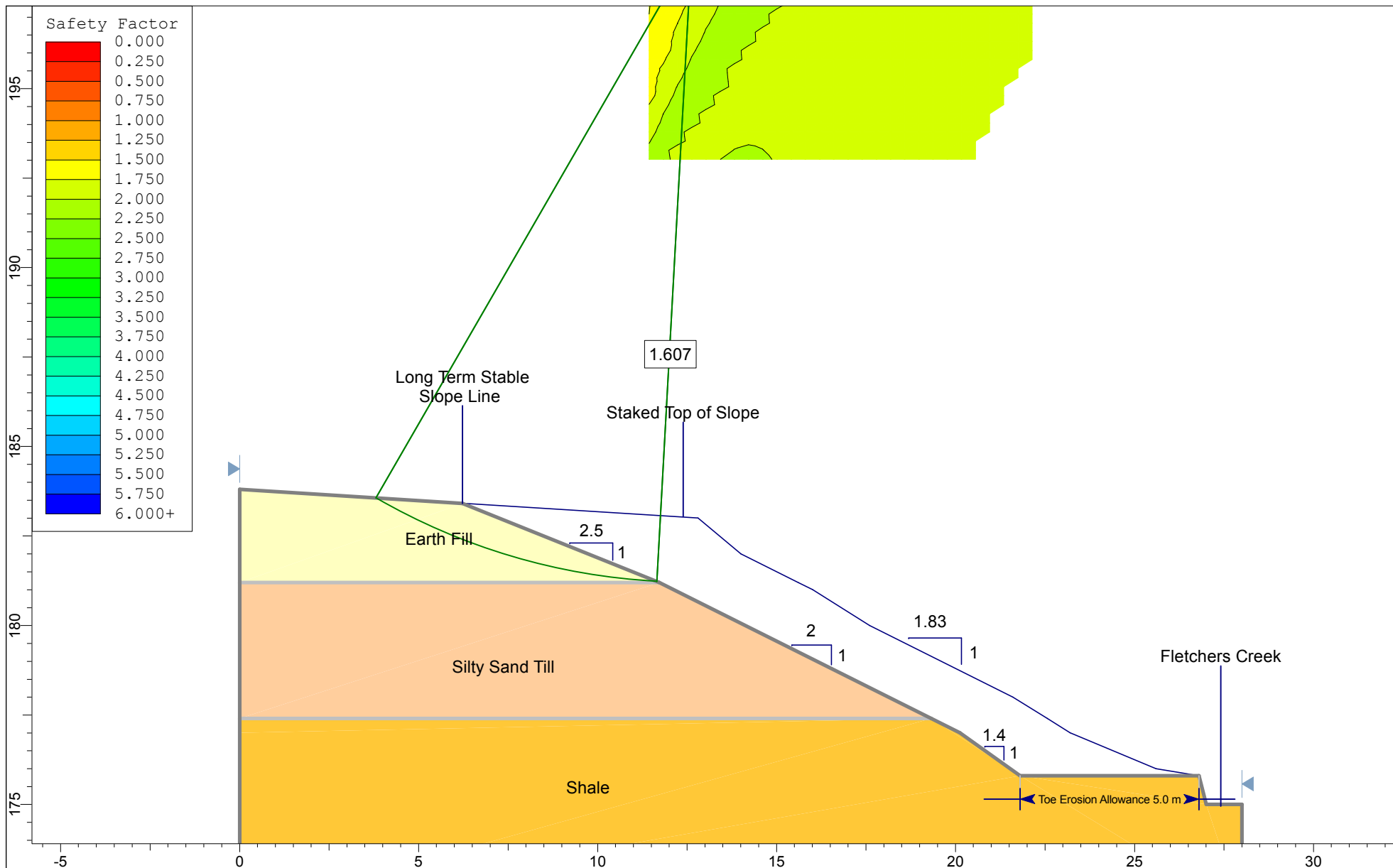
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Scale		1:200		Revision		-	
Date		January 2017		Reference No.		1406-S151	
Drawing No.		2B					



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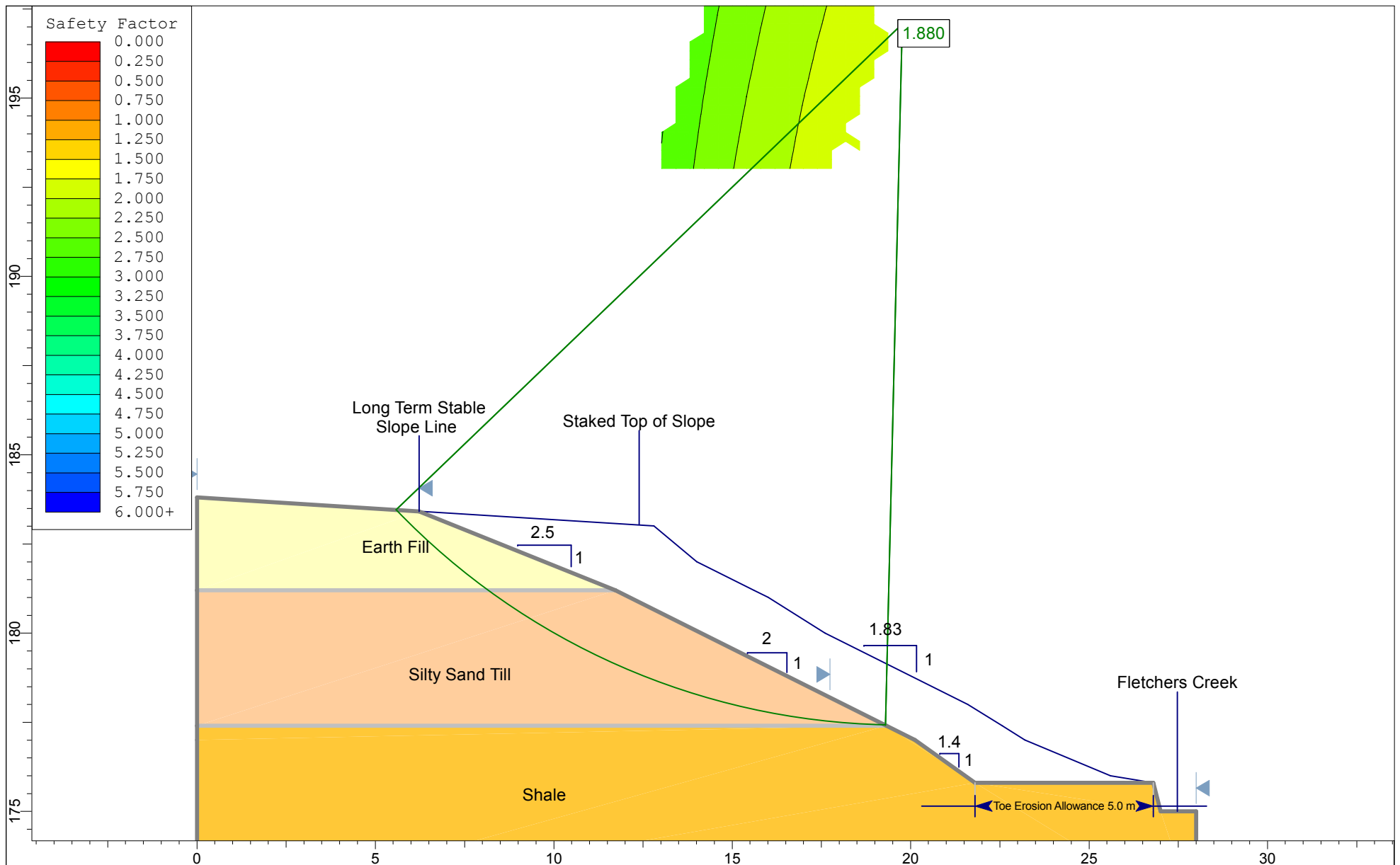
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						-	
Date				January 2017		Reference No.	
						1406-S151	
						Drawing No.	
						3	



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Project Title			Slope Stability Assessment		Load Case Cross-Section A-A (Local) (Geotechnically Stable Condition)	
Location			6620 Rothschild Trail, City of Mississauga			
Drawn By		K.L.	Checked By		B.L.	Scale 1:150
Date		January 2017		Reference No.		1406-S151
				Revision		-
				Drawing No.		4A



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Project Title				Load Case	
Slope Stability Assessment				Cross-Section A-A (Global) (Geotechnically Stable Condition)	
Location					
6620 Rothschild Trail, City of Mississauga					
Drawn By		Checked By		Revision	
K.L.		B.L.		-	
Scale		1:150			
Date		Reference No.		Drawing No.	
January 2017		1406-S151		4B	