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January 21, 2016 Reference No. 0803-S002

678604 Ontario Inc.
c/o James Lethbridge Planning Inc.
2030 Bristol Circle
Unit 201
Oakville, Ontario
L6H 0H2

Attention: Mr. James Lethbridge

Re: Supplementary Slope Stability Study Letter Report
Proposed Employment Lands
Dezen Industrial – Phase 2
Southwest Quadrant of Highway 407 and Hurontario Street
City of Mississauga

Dear Sir:

Further to the email request from Mr. James Lethbridge dated December 15, 2015, we have reviewed the comments issued by the Credit Valley Conservation (CVC) for the captioned site. In response, we herein present our supplementary slope stability study findings and recommendations.

In 2008, a soil investigation consisting of 4 boreholes to depths ranging from 4.9 to 7.9 m was carried out onsite for a slope stability study. Subsequent to the 2008 report, an addendum was issued in 2012 to provide additional analyses and clarifications to address the CVC comments dated February 28, 2012. The topographic map for the

site has since been updated. The previously analyzed cross-sections are therefore revised accordingly.

FINDINGS

Based on the 2008 borehole information, beneath a layer of topsoil, 15 to 30± cm thick, the site is underlain by a layer of generally hard silty clay till and very dense sandy silt till.

All boreholes remained dry upon completion of field work. However, a groundwater level of El. 195.0± m was included in the modeling at the request of CVC and was assumed to taper towards Fletcher's Creek. In the absence of well data, the use of this zone where the colour of the soil changes from brown to grey best represents the potential groundwater regime.

SLOPE STABILITY STUDY

The slope stability study focuses on the eastern bank of Fletcher's Creek, meandering along the western and southern limits of the subject site. The drainage feature downstream to the pond in the centre of the site has been identified as a watercourse by CVC and therefore has been added to the slope study. At the time of the 2008 inspection, the drainage ditch was dry.

Cross-Sections A-A to E-E, were selected to represent the most critical portions of the slope. The locations of the cross-sections are shown on Drawing No. 1. These sections have an overall slope height of 3.0± to 8.0± m, measured from the tableland to the toe of slope, with an overall gradient of 1V:1.9 ± to 3.4± H and a local gradient of 1V:0.9 H. The surface profiles of the cross-sections are interpreted from the

contours on the topographic plan provided by James Lethbridge Planninc Inc.; the subsurface profiles are interpreted from the borehole logs. Cross-Sections A-A to E-E are shown on Drawing Nos. 2 to 8, inclusive.

As noted in the previous report and letter, visual inspection revealed that the slope is generally well-vegetated with dense grass- and weed-covers and sparse trees in the northern region where the slope is gentle. In the southern region where the slope is the steepest, tree growth was more prominent. No signs of seepage or major deep-seated failure were observed; however, minor channelization and surface creeping were noted in the proximity of Cross-Section B-B. In addition, active toe erosion was observed in the absence of a flood plain along the creek bank at Cross-Sections A-A and B-B (Boreholes 1 and 2). No active erosion was noted along the drainage/gulley features.

The slope stability was analyzed using force-moment-equilibrium criteria of the Bishop Method with the soil strength parameters shown in the table below.

Strength Parameters For Slope Stability Analysis

	γ (kN/m^3)	c (kPa)	ϕ (degrees)
Silty Clay Till	22.0	5	30
Sandy Silt Till	22.0	0	31

The result from the analysis indicates that the slope at Cross-Sections B-B to E-E has a factor of safety (FOS) ranging from 1.79 and 2.40, which satisfies the OMNR guideline requirements for infrastructure and public land uses (minimum FOS of 1.5). These existing slopes are therefore considered geotechnically stable. The results are presented on Drawing Nos. 4, 6, 7 and 8.

For Cross-Section A-A, the result shows that the existing slope has a FOS of 1.45, which fails to meet the OMNR requirements. The result is presented on Drawing No. 2. Therefore, the existing valley slope at this location is considered to be geotechnically unacceptable for the proposed development. A gradient of 1V:2.2H is recommended for use in sound native clay till. The remodelled slope, yielding a FOS of 1.55, which meets the OMNR requirements, is presented on Drawing No. 3.

In the absence of an adequate flood plain, a toe erosion allowance of 8 m will be required where active erosion was observed. This is mainly applicable for Cross-Sections A-A and B-B and surrounding areas. For the latter, a geotechnically stable gradient of 1V:2H is used behind the toe erosion setback. The remodelled slope, with a FOS of 1.57, meets the OMNR requirements and is presented on Drawing No. 5.

The long-term stable slope line (LTSSL), incorporating the geotechnically stable gradients and toe erosion allowance where applicable is established on the Borehole and Cross-Section Location Plan, Drawing No. 1. For the most part, the LTSSL coincides with the Top of Bank (staked with CVC on November 9, 2001) or the Farm Pond Drainage Area (staked July 6, 2012).

Lastly, a development setback buffer for man-made and environmental degradation of the bank will be required. The distance of the buffer is subject to the discretion and approval of CVC.

In future development, should any alteration be carried out in the slope areas, it should either be restored to its original condition or better than its original condition.
In order to prevent the occurrence of localized surface slides in the future and to enhance the stability of the slope, the following geotechnical constraints should be stipulated:

1. The prevailing vegetative cover must be maintained, since its extraction would deprive 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. Restoration with selective native plantings including deep rooting systems which would penetrate the original buried topsoil shall be carried out to ensure bank stability.
2. Grading of the land adjacent to the slope must be such that concentrated runoff is not allowed to drain onto the slope face. Landscaping features which may cause runoff to pond at the top of the slope must not be permitted.
3. The leafy topsoil cover on the bank face should not be disturbed, since this provides insulation and a screen against frost wedging and rainwash erosion.
4. Where development is carried out near the top of the slope, there are other factors to be considered related to possible human environmental abuse. Soil saturation from maintenance of landscaping features, stripping of topsoil or vegetation, and dumping of loose fill over the bank must not be allowed.

The above recommendations are subject to the approval of the CVC.

We trust this letter satisfies your present requirements; however, should any queries arise, please feel free to contact this office.

Yours truly,
SOIL ENGINEERS LTD.

Hui Wing Yang, B.A.Sc.

Bernard Lee, P.Eng.
HWY/BL:

ENCLOSURES

Borehole and Cross-Section Location Plan	Drawing No. 1

Cross-Sections

Cross-Section A-A (Existing Condition)	Drawing No. 2
Cross-Section A-A (Stable Condition)	Drawing No. 3
Cross-Section B-B (Existing Condition)	Drawing No. 4
Cross-Section B-B (Stable Condition)	Drawing No. 5
Cross-Section C-C (Existing Condition)	Drawing No. 6
Cross-Section D-D (Existing Condition)	Drawing No. 7
Cross-Section E-E (Existing Condition)	Drawing No. 8

c. Soil Engineers Ltd. (Mississauga) Attn: Mr. Benjamin Lee

SKETCH ILLUSTRATING
TOPOGRAPHIC DETAIL
DEZEN INDUSTRIAL LANDS PHASE 2
CITY OF MISSISSAUGA
REGIONAL MUNICIPALITY OF PEEL

SCALE 1: 500

David B. Searles Surveying Ltd.
ONTARIO LAND SURVEYORS

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

BENCHMARK NOTE

ELEVATIONS ARE REFERRED TO THE CITY OF MISSISSAUGA BENCHMARK No. 1079 BENCHMARK IS SET HORIZONTALLY AT THE BASE OF A 750mm CONCRETE HUMPO POLE AT THE NORTH EAST CORNER OF TOPLEAST DRIVE AND HURONTARIO STREET. ELEVATION = 157.140m.

VERTICAL DATUM CANADIAN GEODETIC DATUM 1928
(NOT 1978 SOUTHERN ONTARIO READJUSTMENT)

LEGEND

FH	DENOTES FIRE HYDRANT
EB	DENOTES EDGE OF BANK
BF	DENOTES BOARD FENCE
CB	DENOTES CATCH BASIN
CBMH	DENOTES CATCH BASIN MANHOLE
CLF	DENOTES CHAIN LINK FENCE
CRWD	DENOTES CROSS WALK DRAIN
CSP	DENOTES CORRUGATED STEEL PIPE
CSW	DENOTES CONCRETE SIDE WALK
DCB	DENOTES DOUBLE CATCH BASIN
EW	DENOTES EDGE OF WATER
LS	DENOTES LIGHT STANDARD
MH	DENOTES MAINTENANCE HOLE COVER
MH(SAN)	DENOTES MAINTENANCE HOLE COVER (SANITARY)
MH(STM)	DENOTES MAINTENANCE HOLE COVER (STORM)
PF	DENOTES POST AND WIRE FENCE
TOB	DENOTES TOP OF BANK
VP	DENOTES VENT PIPE
WM	DENOTES WATER METER
x	DENOTES SHRUB No.
	DENOTES BOTTOM OF SLOPE
	DENOTES EDGE LINE
	DENOTES CREST
	DENOTES TOP OF SLOPE
	DENOTES CONIFEROUS TREE
	DENOTES DECIDUOUS TREE
	DENOTES TREE LINE

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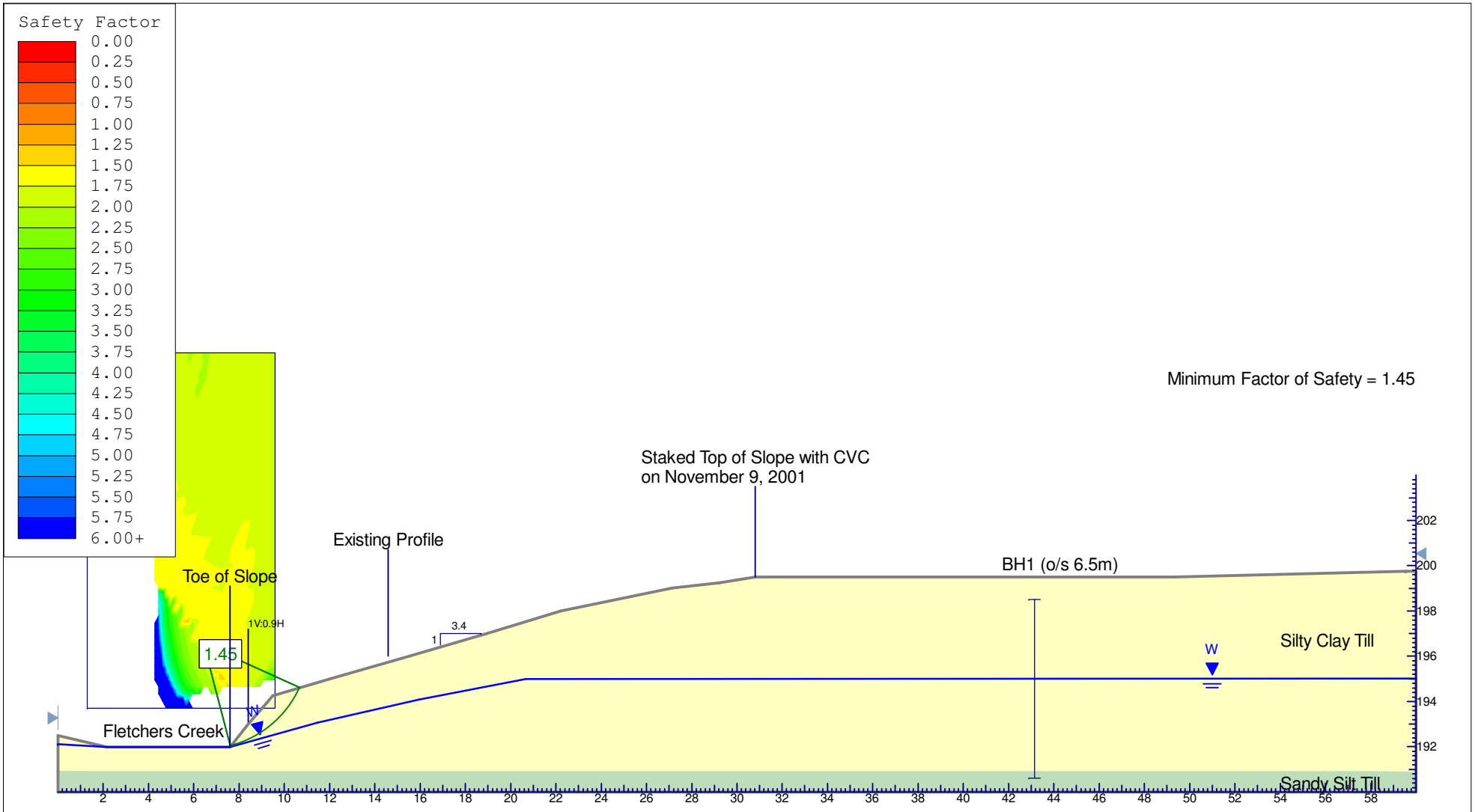
BOREHOLE & CROSS-SECTION LOCATION PLAN

SITE DEZEN INDUSTRIAL – PHASE 2
SW OF HIGHWAY 407 & HURONTARIO STREET, MISSISSAUGA

DESIGNED BY	CHECKED BY	DWG NO. 1	
SCALE 1:1000	REF. NO. 0803-S002	DATE JANUARY 2016	REV B



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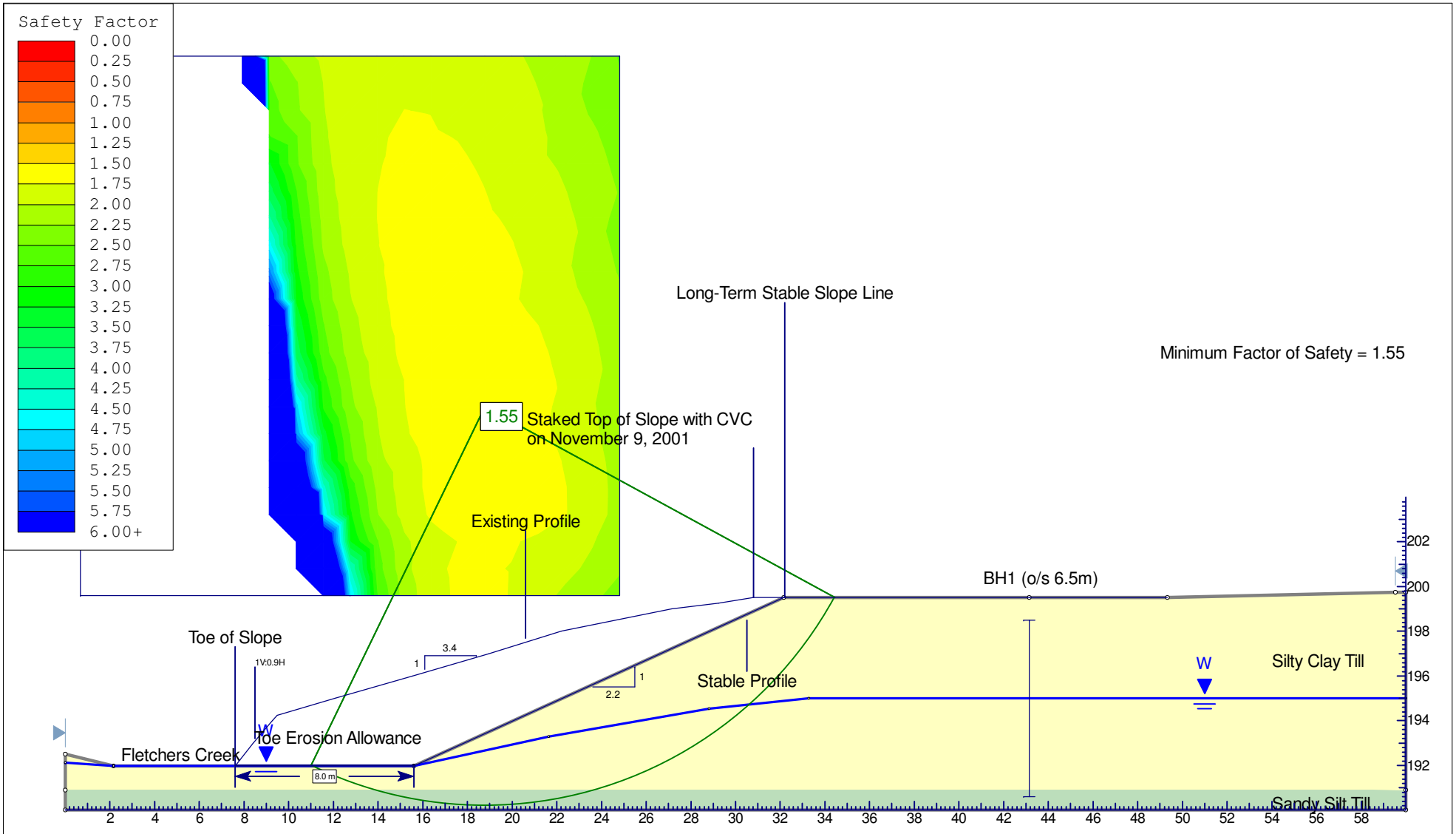
Project Title: Cross-Section A-A			Load Case: Existing Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: BL	Checked By:	Scale: 1:250	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 2



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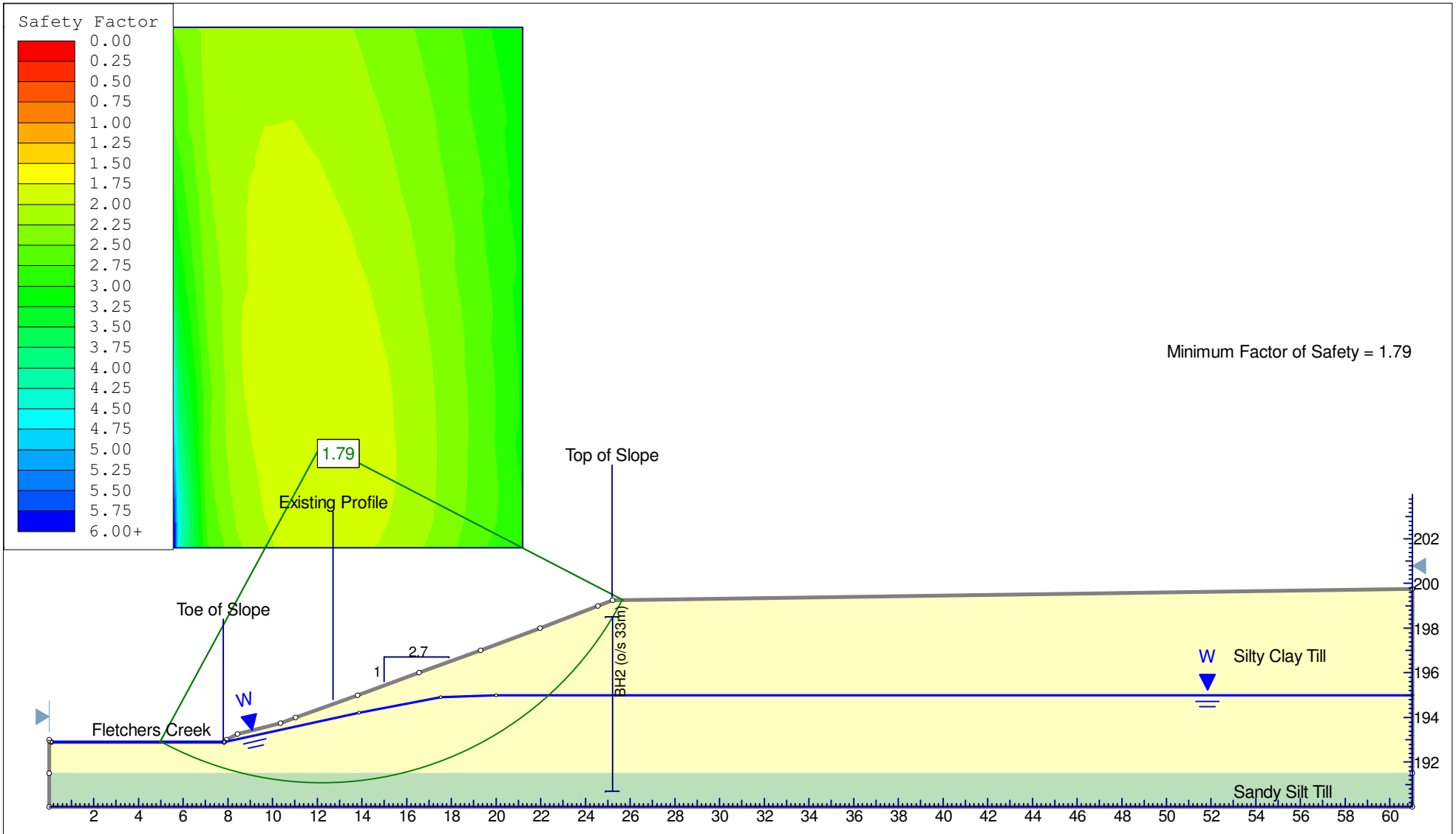
Project Title: Cross-Section A-A			Load Case: Stable Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: BL	Checked By:	Scale: 1:250	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 3



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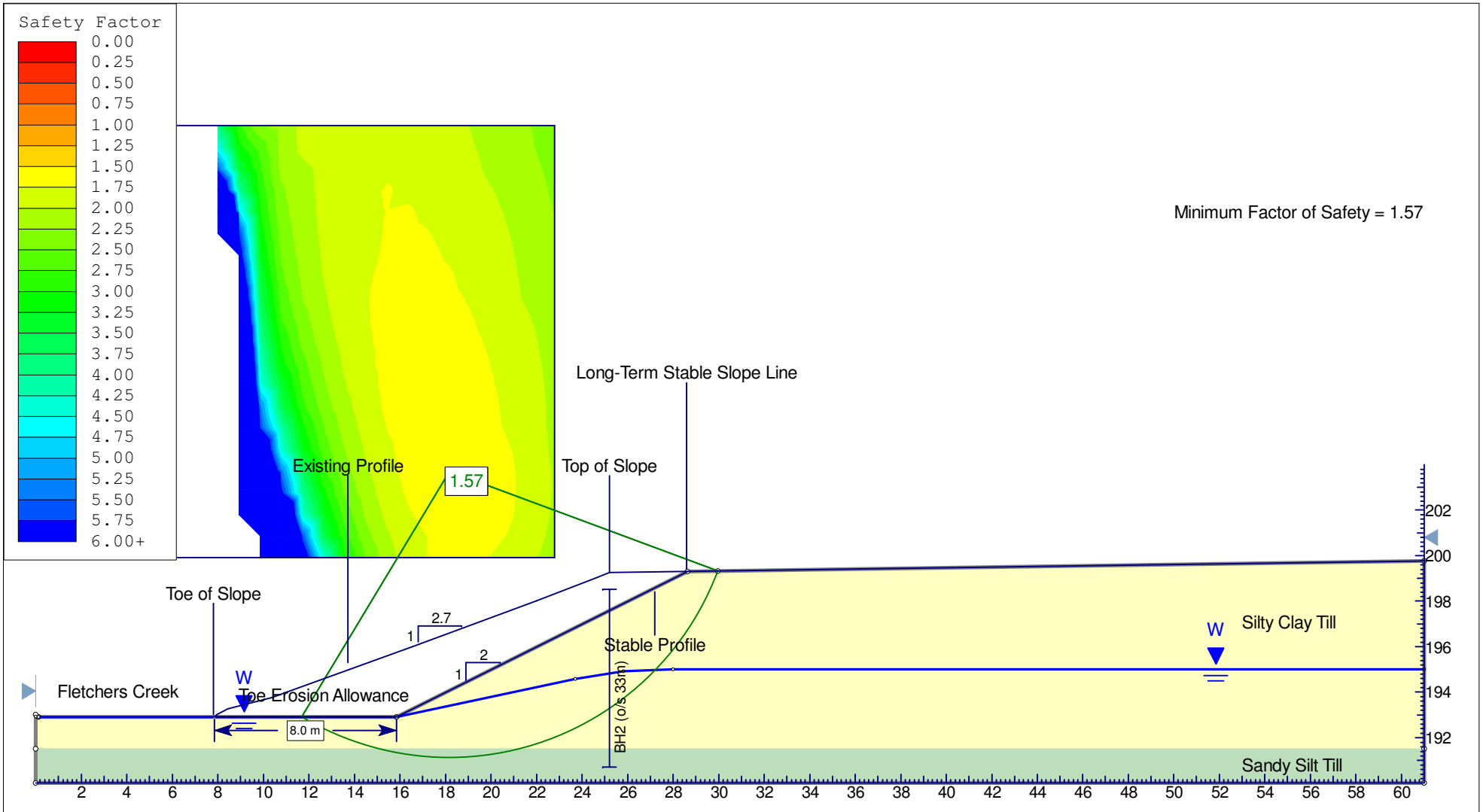
Project Title: Cross-Section B-B			Load Case: Existing Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: BL	Checked By:	Scale: 1:250	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 4



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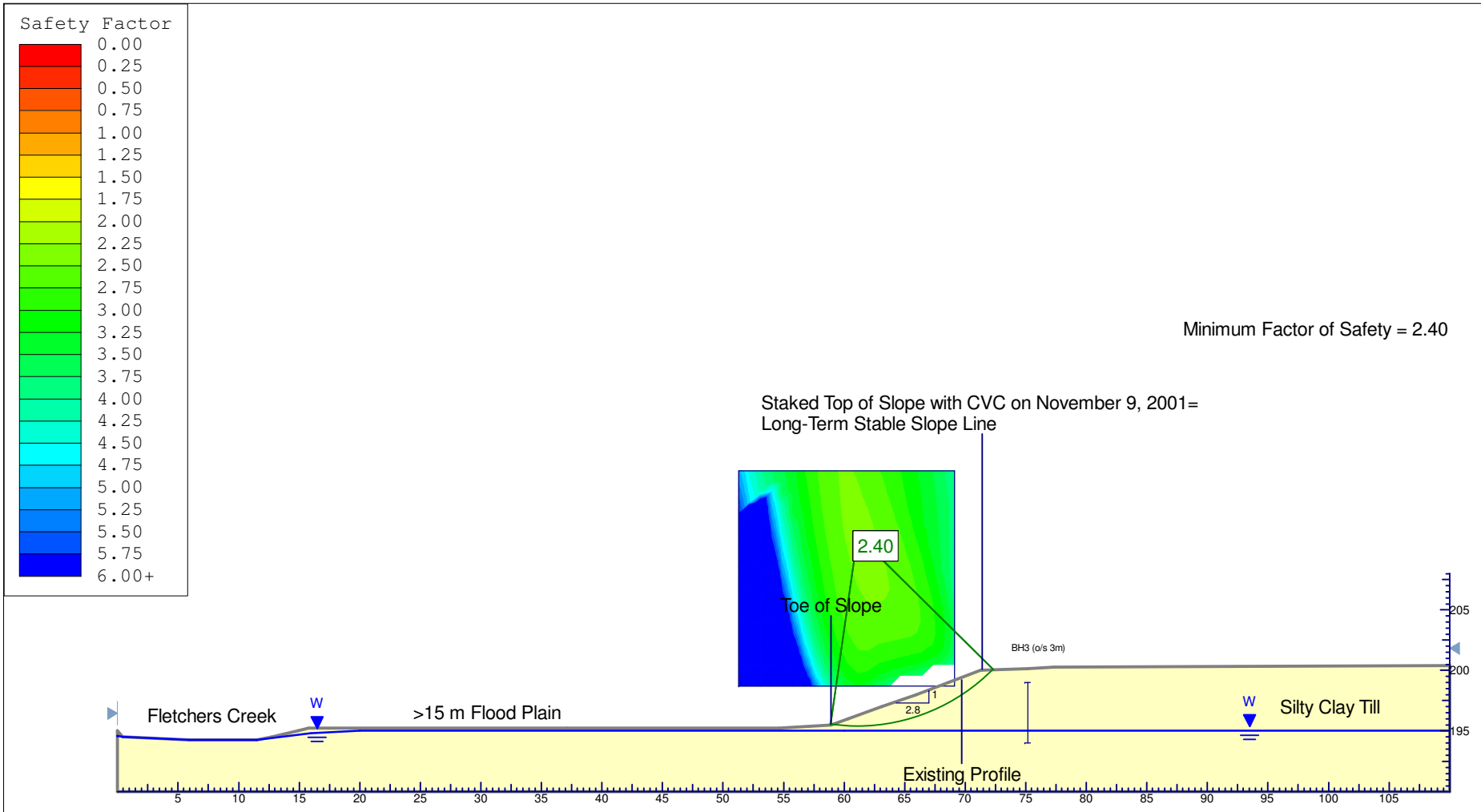
Project Title: Cross-Section B-B			Load Case: Stable Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: BL	Checked By:	Scale: 1:250	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 5



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	Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
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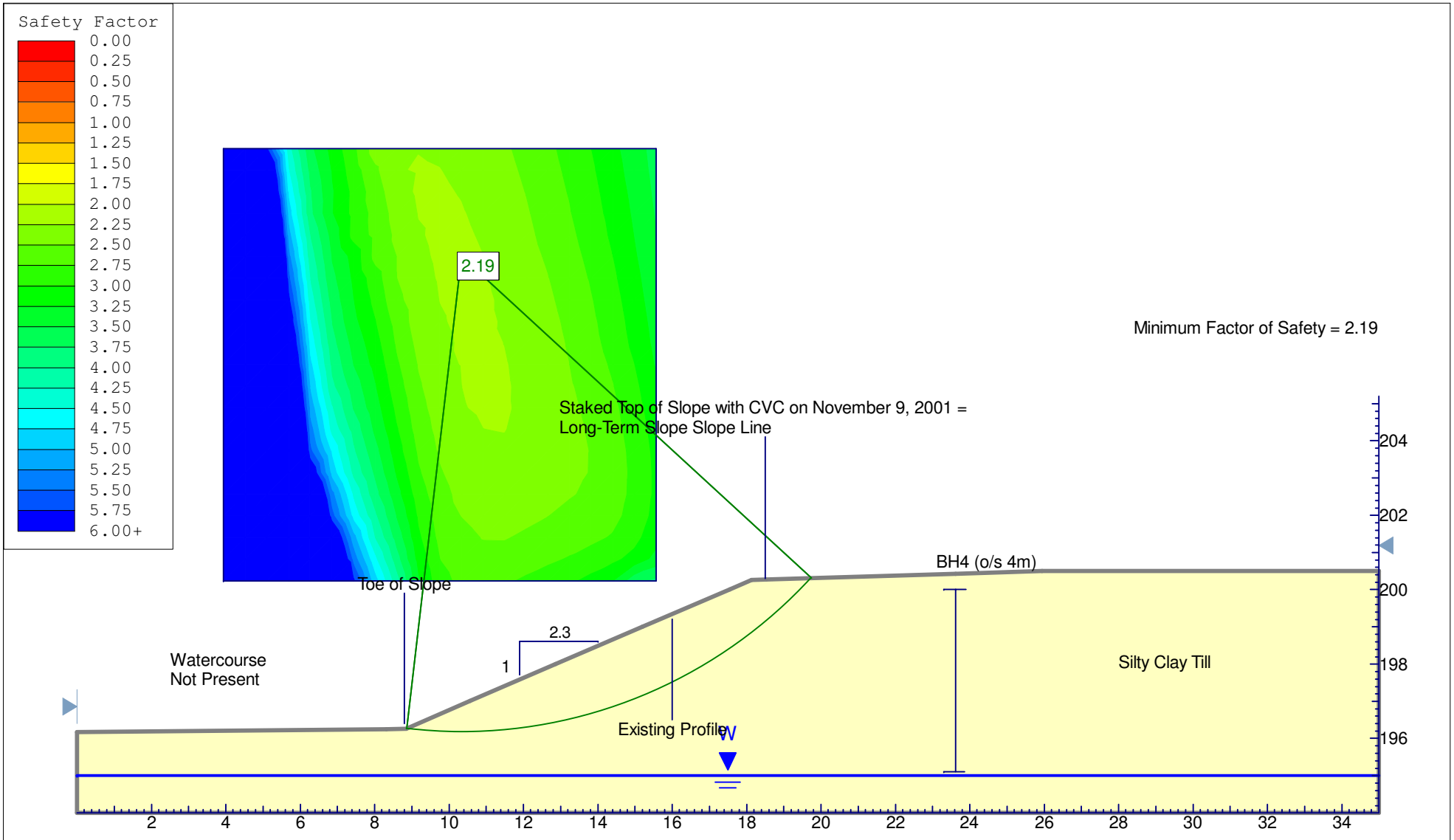
	Date: January 2016		Reference No.: 0803-S002	Drawing No.: 6



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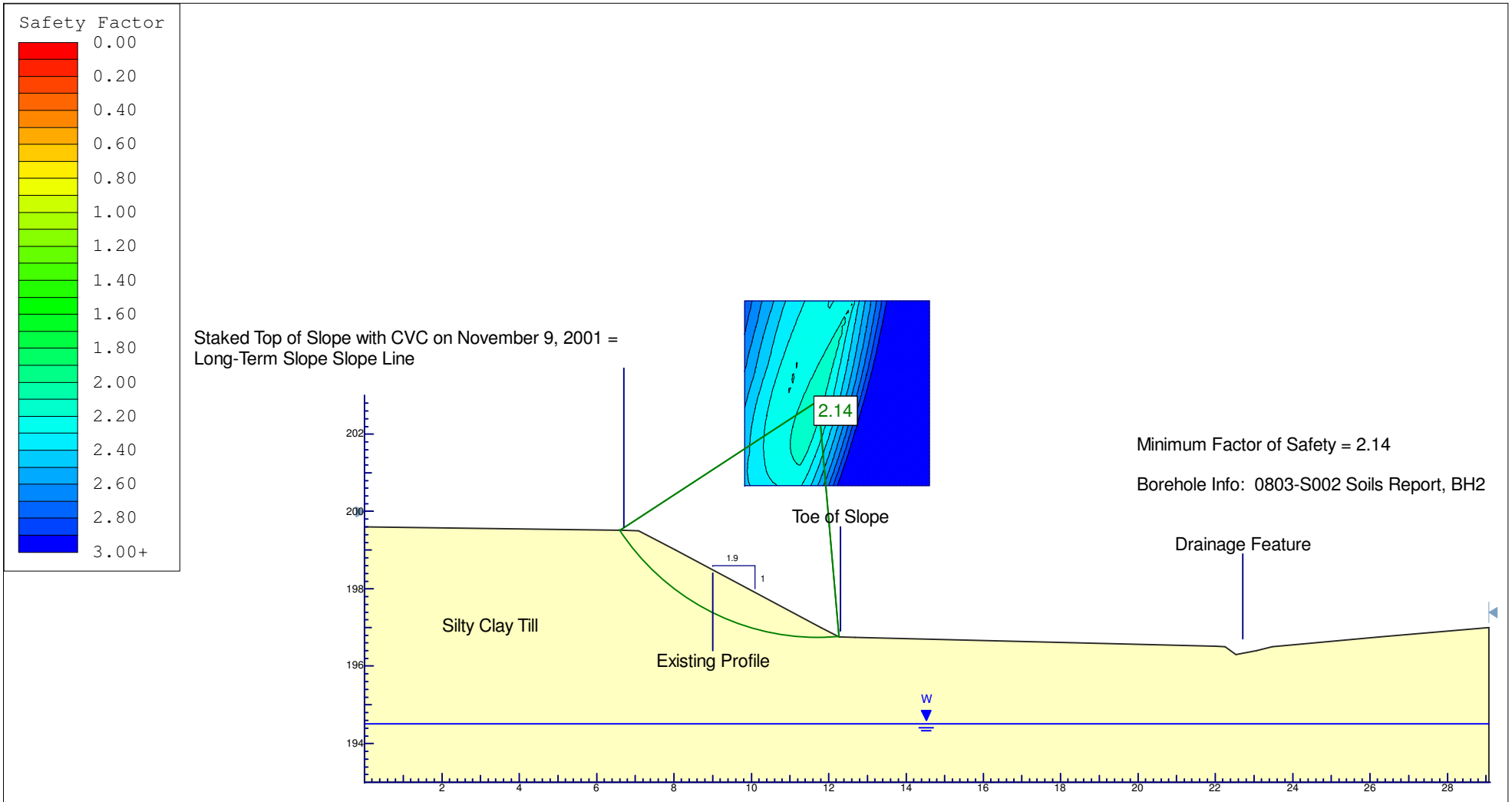
Project Title: Cross-Section D-D			Load Case: Existing Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: BL	Checked By:	Scale: 1:150	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 7



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Project Title: Cross-Section E-E			Load Case: Existing Condition
Location: Southwest Quadrant of Highway 407 and Hurontario Street, Mississauga			
Drawn By: HWL	Checked By:	Scale: 1:150	Revision: -
Date: January 2016		Reference No.: 0803-S002	Drawing No.: 8