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90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	HAMILTON
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January 25, 2021 Reference No. 2008-S135A

Shining Hill Estates Operator Inc.
2235 Sheppard Avenue East, Suite 903
Toronto, Ontario
M2J 5B5

Attention: Mr. Paul Bailey

Re: Additional Slope Stability Assessment Letter
Proposed Residential Development
Shining Hill Phase 3
162 St. John's Sideroad
Town of Aurora

Dear Sir:

In accordance with the request from Mr. Ben O'Neill of SCS Consulting Group Ltd. on January 11, 2021 and your email authorization dated January 12, 2021, an additional slope stability assessment was completed at the site. We herein present our results of the slope stability assessment.

A slope stability assessment has been carried out to determine the stability of the existing slope within the southwest portion of the site, on the south side of an existing driveway, and to establish the Long-Term Stable Top of Slope (LTSTOS) within this area. Visual inspection of the slope, carried out on January 14, 2021, revealed that the slope surface is vegetated with trees and other low growing vegetation. In places, loose branches were noticed lying on the ground along the slope. A tributary of the East Branch Holland River is located at or close to the bottom of the existing slope. In addition, no visible sign of active erosion was observed along the banks of the creek.

The existing slope has an overall height of approximately 3 to 5 m, taken from the edge of watercourse and/or bottom of slope to the top of slope. The slope within the steepest areas, located on the south side of the existing driveway and around the bend of the watercourse, has an average gradient ranging from 1.2 to 1.5 horizontal (H):1 vertical (V), and becomes gentler moving away from the bend. In addition, a retaining was located near the edge of the driveway

at the top of slope; from observation, the retaining appears to be upto 1 to 2 m in height in places.

Three (3) cross-sections, Cross-Sections H-H, I-I and J-J, were selected as representative of the steepest portions of the slope and areas having a greater impact on the LTSTOS; the location of these cross-sections is shown on the enclosed Cross-Section Location Plan, Drawing No. CS1. (It should be noted that Slope Stability Analysis was previously conducted within the west portion of the site, including analyses at Cross-Sections A-A to G-G, inclusive; the results of that analysis was presented within the Geotechnical Investigation and Slope Stability Assessment Report, Reference No. 2008-S135A dated January 2021.) The slope profiles at Cross-Sections H-H, I-I and J-J were interpreted from the provided Topography drawing, prepared by Lloyd & Purcell. In addition, although the elevation at the top of the retaining wall was provided on the survey the elevation at the bottom of the existing retaining wall was not. The bottom of wall elevation is estimated based on site observation and measurement.

The subsurface profile at each cross-section was interpreted from the log for Borehole 102; the log shows that beneath a layer of topsoil, the soils consist of loose to compact silt, loose to compact silty fine sand, and firm to stiff silty clay. The Borehole and Cross-Section Location Plan from the abovementioned report and the log for Borehole 102 have been included in the Appendix.

The groundwater level measured in the well at Borehole 102 on January 14, 2021 was recorded at El. 262.7 m. This water level has been modelled as a phreatic surface at all cross-sections, and has been assumed to taper towards the bottom of slope and existing watercourse. In addition, a surcharge of 12.0 kPa has been incorporated in the analysis where the driveway is present.

The slope stability at the cross-sections were analysed using the force-moment-equilibrium criteria of the Bishop Method with the soil strength parameters shown in the following table.

Soil Strength Parameters

Soil Type	Unit Weight γ (kN/m^3)	Cohesion c (kPa)	Internal Friction Angle ϕ
Earth Fill	20.5	0	26°
Retaining Wall*	20.0	200	45°
Silty Fine Sand	20.5	0	31°
Silty Clay	20.5	5	26°

* The existing retaining wall is modeled as a solid structure. Its integrity has not been reviewed and is beyond the scope of this study.

The results of the analysis are presented on Drawing Nos. CS2 to CS7, inclusive, and the resulting minimum Factors of Safety (FOS) are summarized in the following table.

Minimum Factors of Safety (FOS)

Cross-Section	FOS	Drawing No.
H-H (Existing Condition)	0.922 (Local) 1.072 (Global)	CS2
H-H (Stable Condition)	1.513	CS3
I-I (Existing Condition)	1.041	CS4
I-I (Stable Condition)	1.538	CS5
J-J (Existing Condition)	1.276	CS6
J-J (Stable Condition)	1.567	CS7

The results of the analyses at Cross-Sections H-H, I-I and J-J, under existing conditions, shows that the minimum FOS is calculated to be 0.922 to 1.276, which fails to meet the Ontario Ministry of Natural Resources (OMNR) guideline requirements for active land use (minimum FOS of 1.5); the results of the analyses are presented on Drawing Nos. CS2, CS4 and CS5 for Cross-Sections H-H, I-I and J-J, respectively.

The cross-sections were subsequently reanalysed to determine the stable gradient at the site in order to meet the OMNR requirements for a minimum FOS of 1.5. Based on the reanalysis, the stable gradient was determined to be 2 to 2.7H:1V, depending on location and height. In addition, due to the proximity of the watercourse to the bottom of slope, and considering that no visible sign of active erosion was observed along the bank of the watercourse, the reanalysis at the cross-sections were carried out to incorporate a 2.0 m toe erosion allowance based on the OMNR guidelines, where applicable. The results of the reanalyses at Cross-Sections H-H, I-I and J-J are presented on Drawing Nos. CS3, CS5 and CS7, respectively, and show that with the incorporation of the toe erosion allowance and stable gradients, the resulting minimum FOS were determined to be 1.513, 1.538 and 1.567, respectively; therefore, the incorporated stable gradient projected to the top of slope can be considered the stable top of slope.

The LTSTOS based on the slope stability analysis has been established on Drawing No. CS1, and shows that the LTSTOS lies generally beyond the physical top of slope, due to the steepness of the existing slope. Furthermore, a development setback for man-made and environmental degradation will be required from the LTSTOS. This is subject to the requirements of the Lake Simcoe Region Conservation Authority (LSRCA).

In order to prevent disturbance of the existing slope, the following geotechnical constraints should be stipulated:

1. The prevailing vegetative cover on the slope must be maintained, since its extraction would deprive the slope of the rooting system that is reinforcement against soil erosion by weathering. If, for any reason, the vegetative cover is stripped, it must be reinstated to its original, or better than its original, protective condition. Restoration with selected native plantings including deep rooting systems which would penetrate the original buried topsoil must be carried out after the development to ensure bank stability.
2. Any leafy topsoil cover on the slope face should not be disturbed, since this provides an insulation and screen against frost wedging and rainwash erosion, or the bare slope surface must be adequately sodded.
3. The loose branches and landscape debris should be cleaned up and exposed surfaces after the cleanup should be vegetated.
4. 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, such as infiltration trenches, as well as saturating the crown of the bank, must not be permitted.
5. Where development is carried out adjacent to the slope, there are other factors to be considered related to possible human environmental abuse. These include soil saturation from frequent watering to maintain landscaping features, stripping of topsoil or vegetation, dumping of loose fill, and material storage close to the top of slope; none of these should be permitted.

The above recommendations are subject to the approval and requirements of the LSRCA.

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.

Mumta Mistry, B.A.Sc.
MM/BL:dd

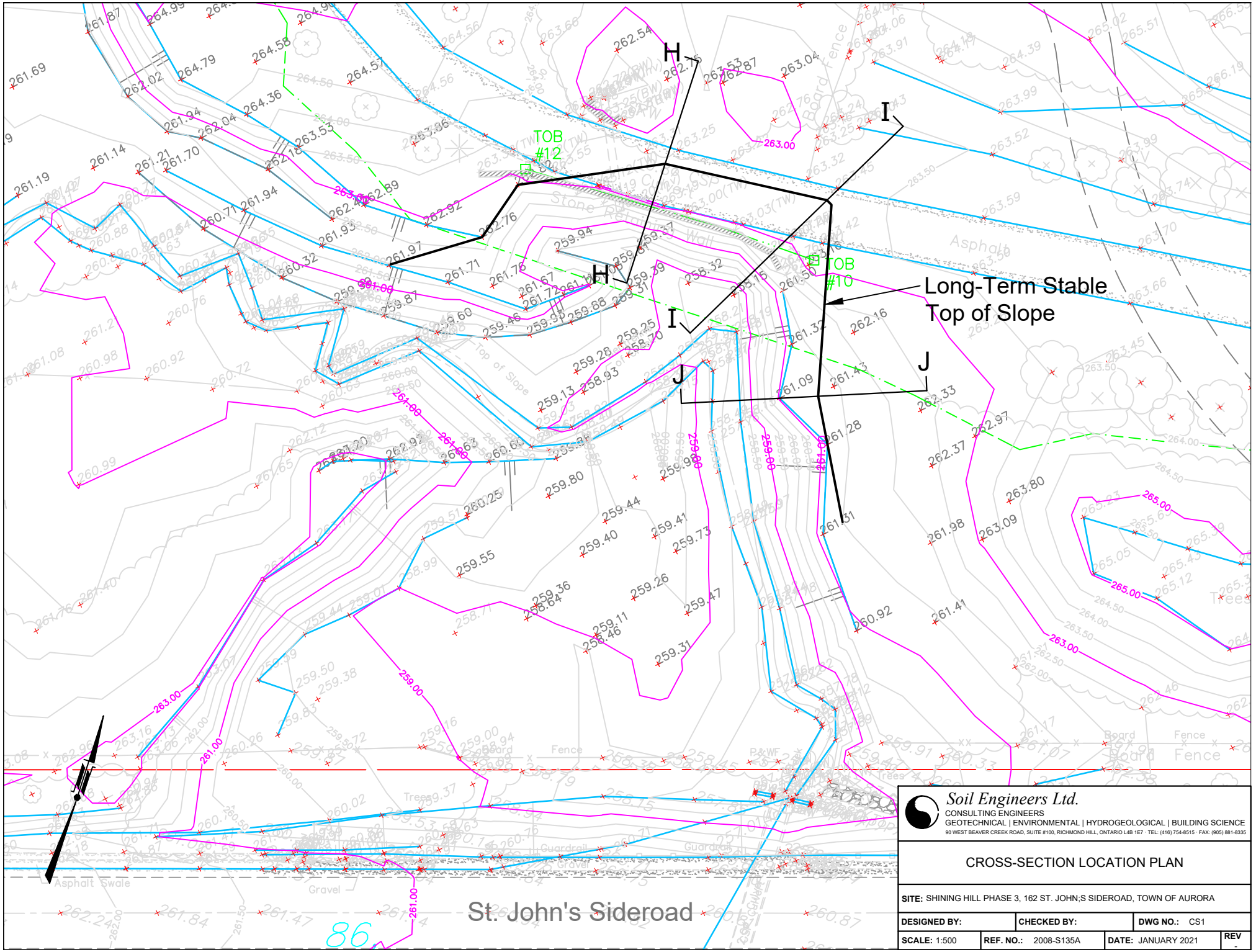
Bernard Lee, P.Eng.

ENCLOSURES

Cross-Section Location Plan..... Drawing No. CS1
Global Stability Analysis - Cross-Sections H-H, I-I and J-J ..... Drawing Nos. CS2 to CS7

c. SCS Consulting Group Ltd.
Attn: Mr. Ben O'Neill

Soil Engineers Ltd. (Newmarket)
Attn: Mr. Stephen Lee, Branch Manager



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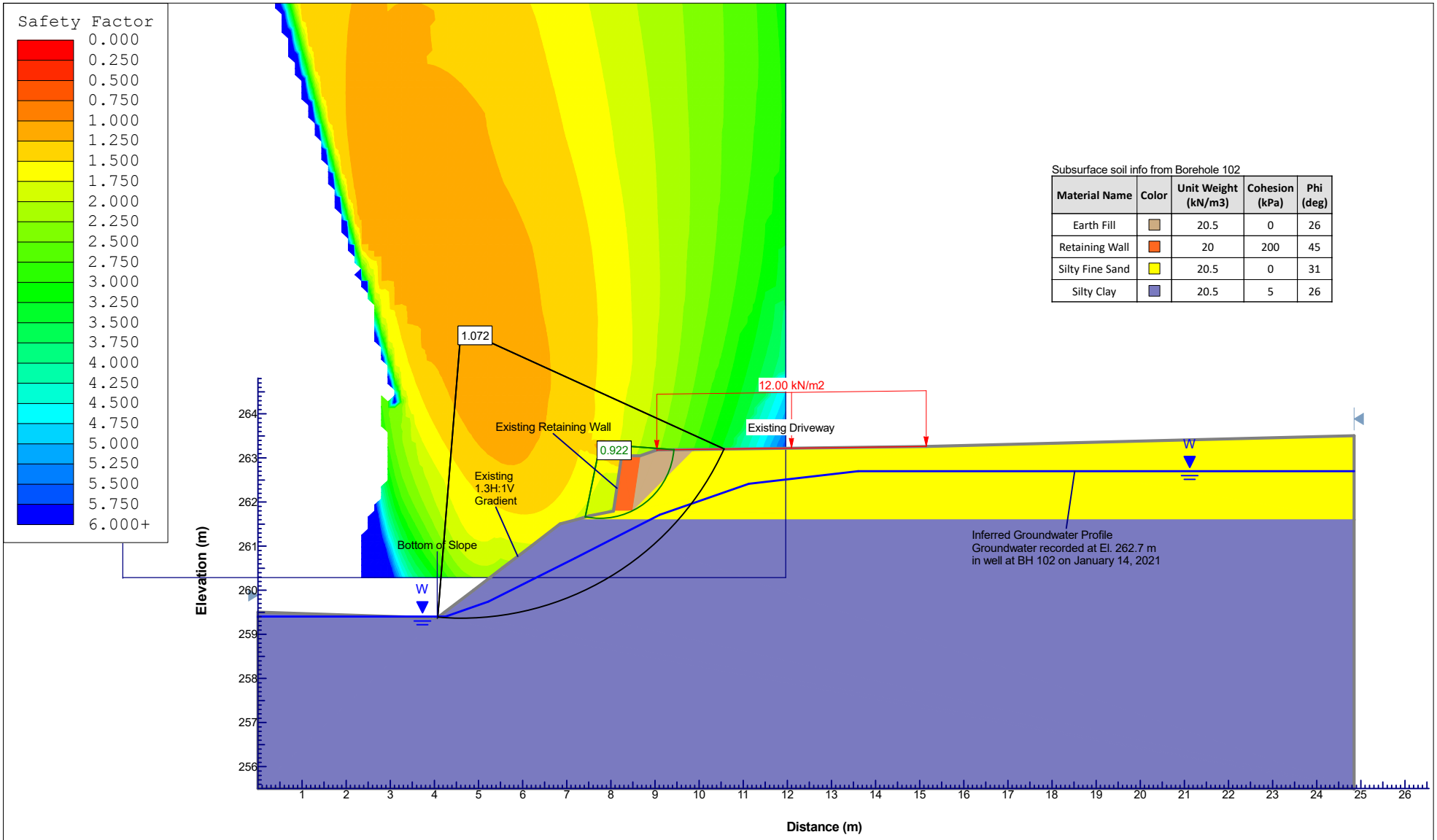
CROSS-SECTION LOCATION PLAN

SITE: SHINING HILL PHASE 3, 162 ST. JOHN;S SIDEROAD, TOWN OF AURORA

DESIGNED BY:	CHECKED BY:	DWG NO.: CS1	
SCALE: 1:500	REF. NO.: 2008-S135A	DATE: JANUARY 2021	REV -



Subsurface soil info from Borehole 102

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		20.5	0	26
Retaining Wall		20	200	45
Silty Fine Sand		20.5	0	31
Silty Clay		20.5	5	26

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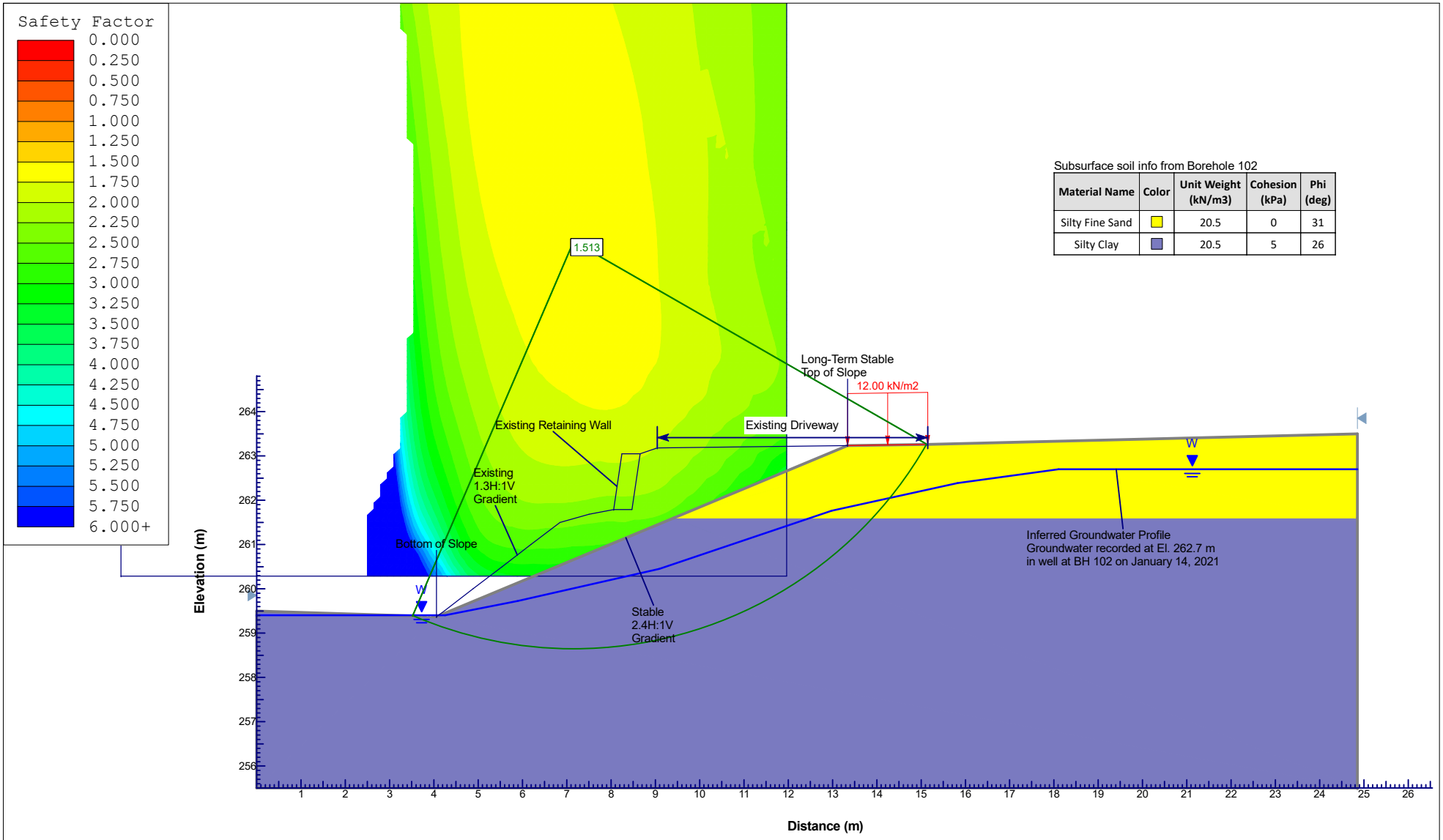
Project Title: Cross-Section H-H			Load Case: Existing Condition
Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
Drawn By: MM	Checked By: BL	Scale: 1:125	Revision:
Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS2



Subsurface soil info from Borehole 102

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Fine Sand		20.5	0	31
Silty Clay		20.5	5	26

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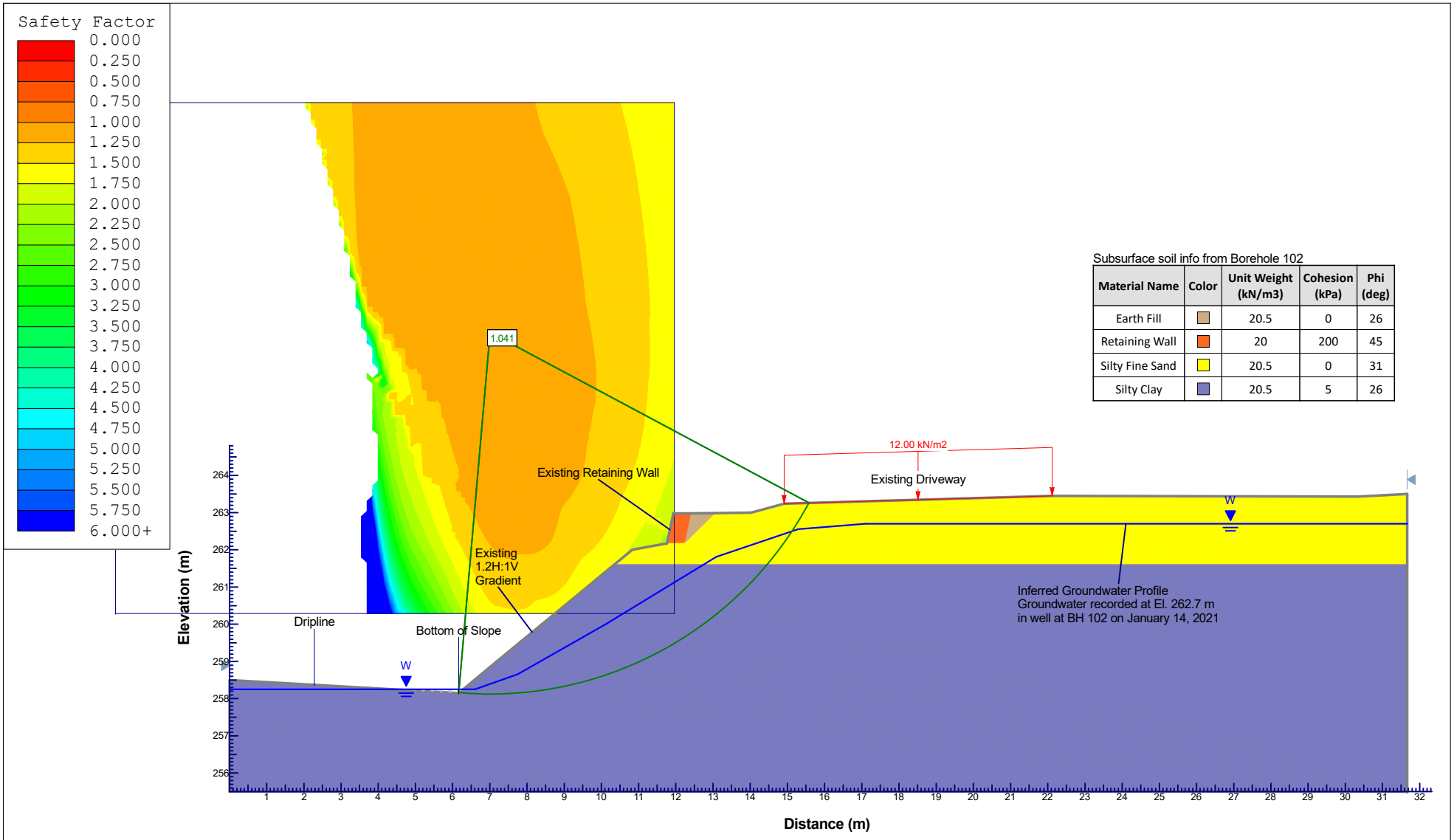
Project Title: Cross-Section H-H			Load Case: Stable Condition
Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
Drawn By: MM	Checked By: BL	Scale: 1:125	Revision:
Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS3



Subsurface soil info from Borehole 102

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		20.5	0	26
Retaining Wall		20	200	45
Silty Fine Sand		20.5	0	31
Silty Clay		20.5	5	26

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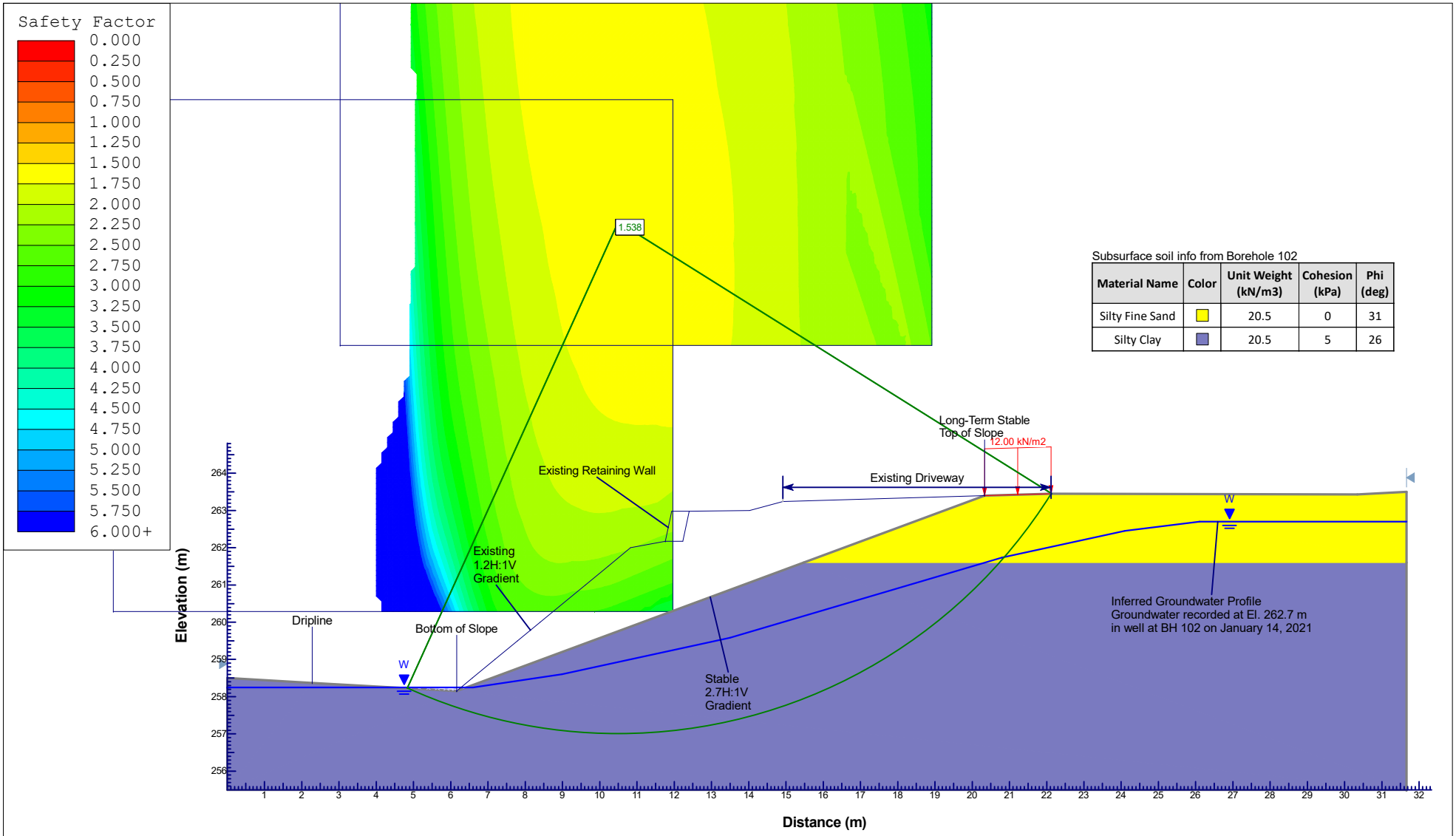
Project Title: Cross-Section I-I			Load Case: Existing Condition
Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
Drawn By: MM	Checked By: BL	Scale: 1:150	Revision:
Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS4



Subsurface soil info from Borehole 102

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Fine Sand		20.5	0	31
Silty Clay		20.5	5	26

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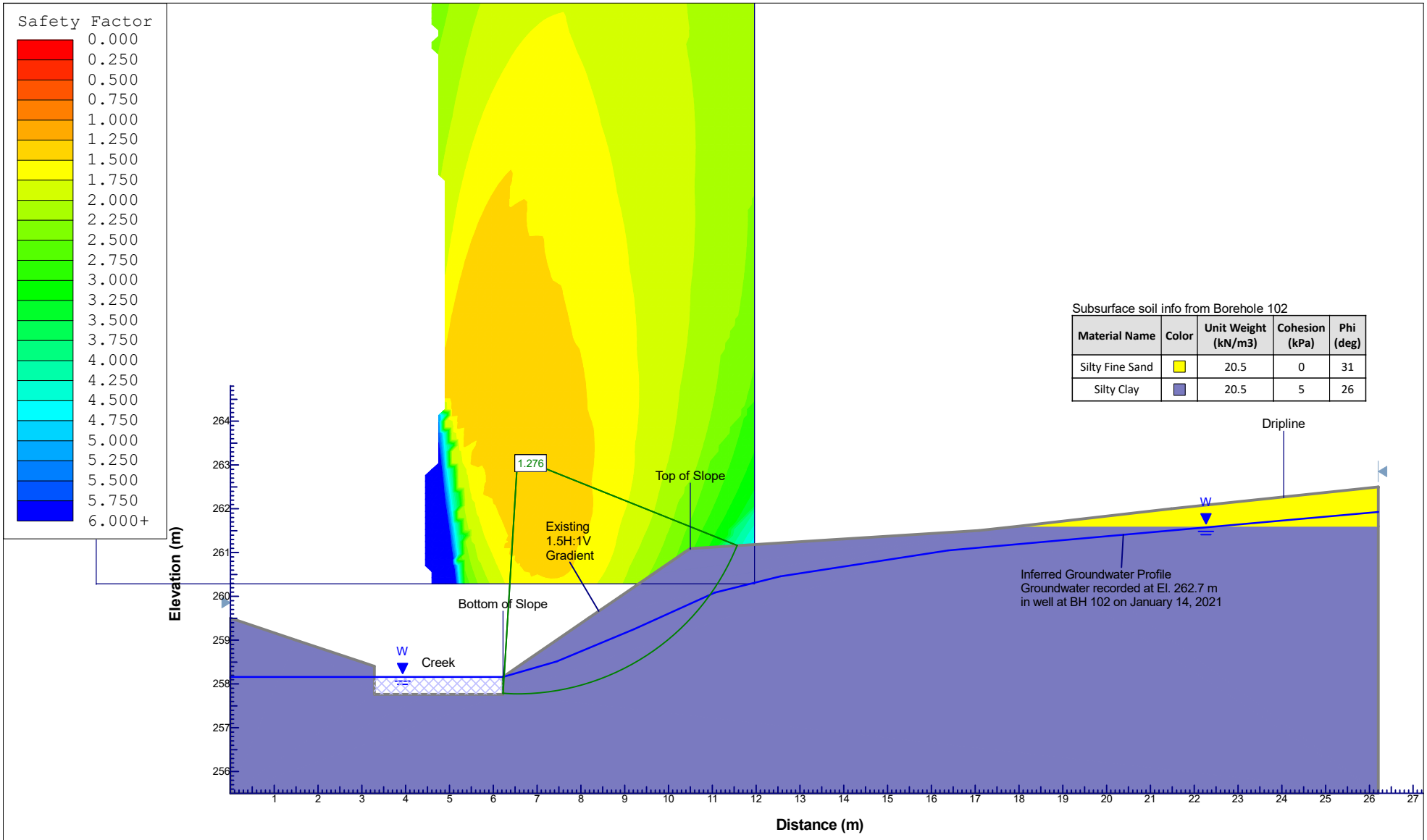
Project Title: Cross-Section I-I			Load Case: Stable Condition
Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
Drawn By: MM	Checked By: BL	Scale: 1:150	Revision:
Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS5



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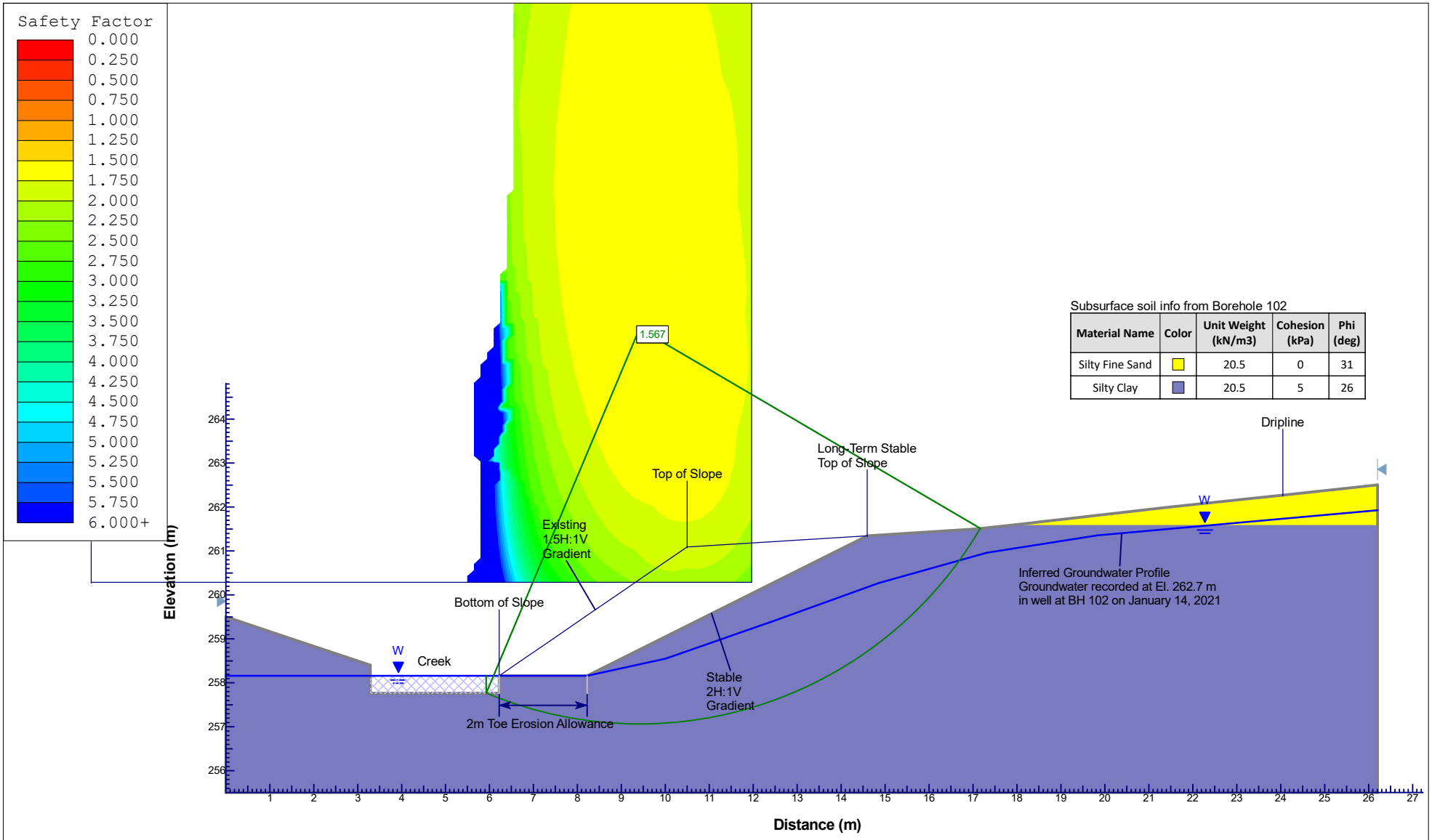
	Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
	Drawn By: MM	Checked By: BL	Scale: 1:125	Revision:
	Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS6



Subsurface soil info from Borehole 102

Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Silty Fine Sand		20.5	0	31
Silty Clay		20.5	5	26

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Project Title: Cross-Section J-J			Load Case: Stable Condition
Location: Shining Hill Phase 3, 162 St. John's Sideroad, Town of Aurora			
Drawn By: MM	Checked By: BL	Scale: 1:125	Revision:
Date: January 2021		Reference No.: 2008-S135A	Drawing No.: CS7

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APPENDIX

RELEVANT BOREHOLE LOG (BH 102) AND BOREHOLE AND CROSS-SECTION LOCATION PLAN

GEOTECHNICAL INVESTIGATION REPORT BY SOIL ENGINEERS LTD. REFERENCE NO. 2008-S135A DATED JANUARY 2021

REFERENCE NO. 2008-S135A

JOB NO.: 2008-S135A

LOG OF BOREHOLE NO.: 102

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: Shining Hill Phase 3
162 St. John's Sideroad
Town of Aurora

DRILLING DATE: September 16, 2020

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
264.9	Ground Surface							
0.0	**18 cm TOPSOIL**	1A			0			
	Brown, loose to compact, weathered **SILT** a trace of clay a trace to some sand	1B	DO	8			17	
263.8		2A	DO	11	1		17	
1.1	Brown, loose to compact	2B					16	
	SILTY FINE SAND — — weathered	3	DO	12			17	
	a trace of clay occ. gravel				2			
		4	DO	10			17	
261.6		5	AS	16	3		20	
3.3	Grey, firm to stiff **SILTY CLAY** a trace of sand	6	DO	13	4		23	
		7	DO	13	5		22	
		8	DO	7	6		27	
258.3								
6.6	**END OF BOREHOLE**				7			
	Installed 50 mm Ø PVC monitoring well to 6.1 m (1.5 m screen) Sand backfill from 4.0 m to 6.1 m Bentonite holeplug from 0 m to 4.0 m Provided with a 4x4 steel monument casing with top and bottom caps, and lock				8			
					9			
					10			

W.L. @ El. 262.1 m in well on September 29, 2020

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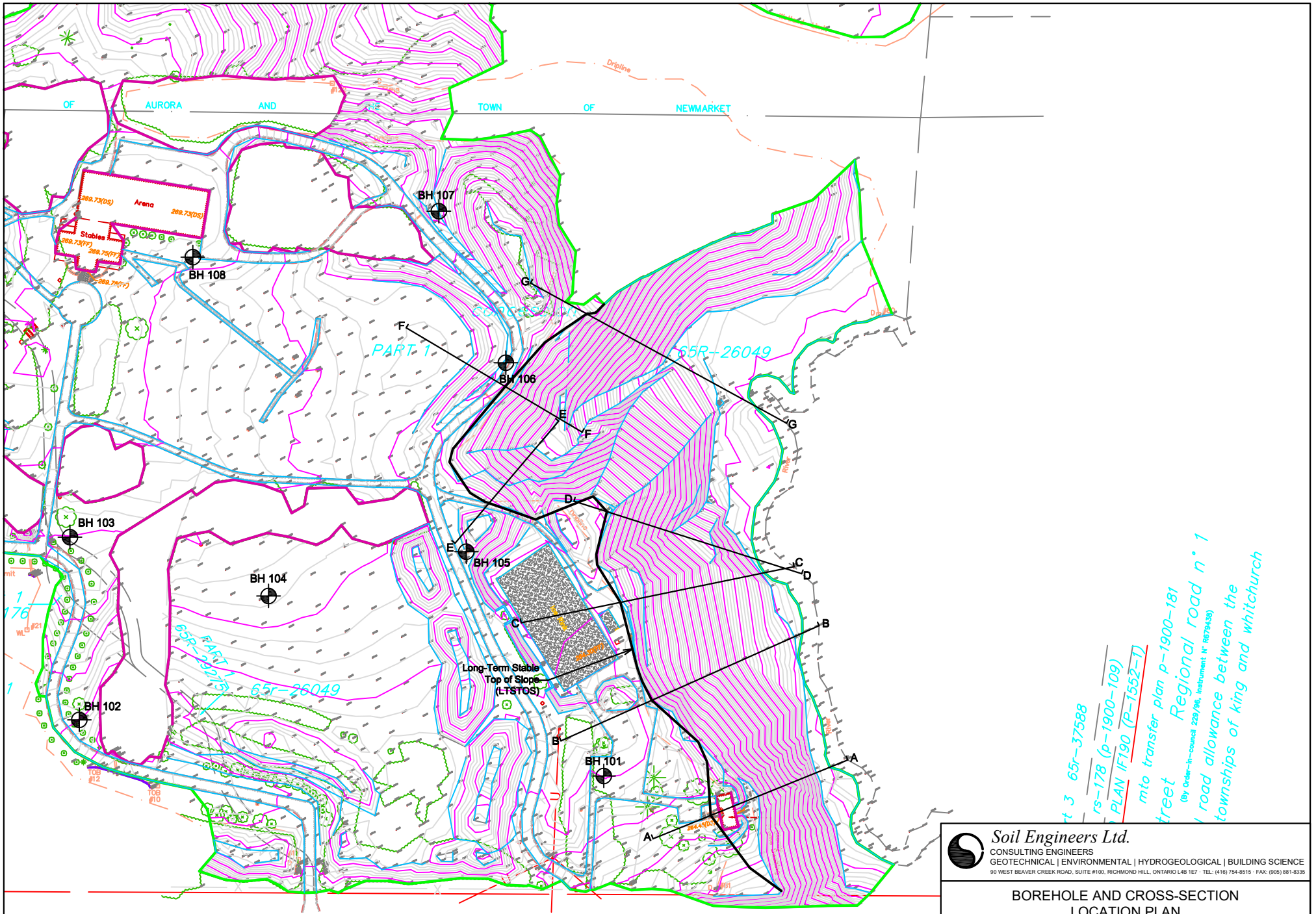

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BOREHOLE AND CROSS-SECTION LOCATION PLAN

SITE: SHINING HILL PHASE 3, 162 ST. JOHN'S SIDEROAD, TOWN OF AURORA

DESIGNED BY:	CHECKED BY:	DWG NO.: 1	
SCALE: 1:2500	REF. NO.: 2008-S135A	DATE: JANUARY 2021	REV -