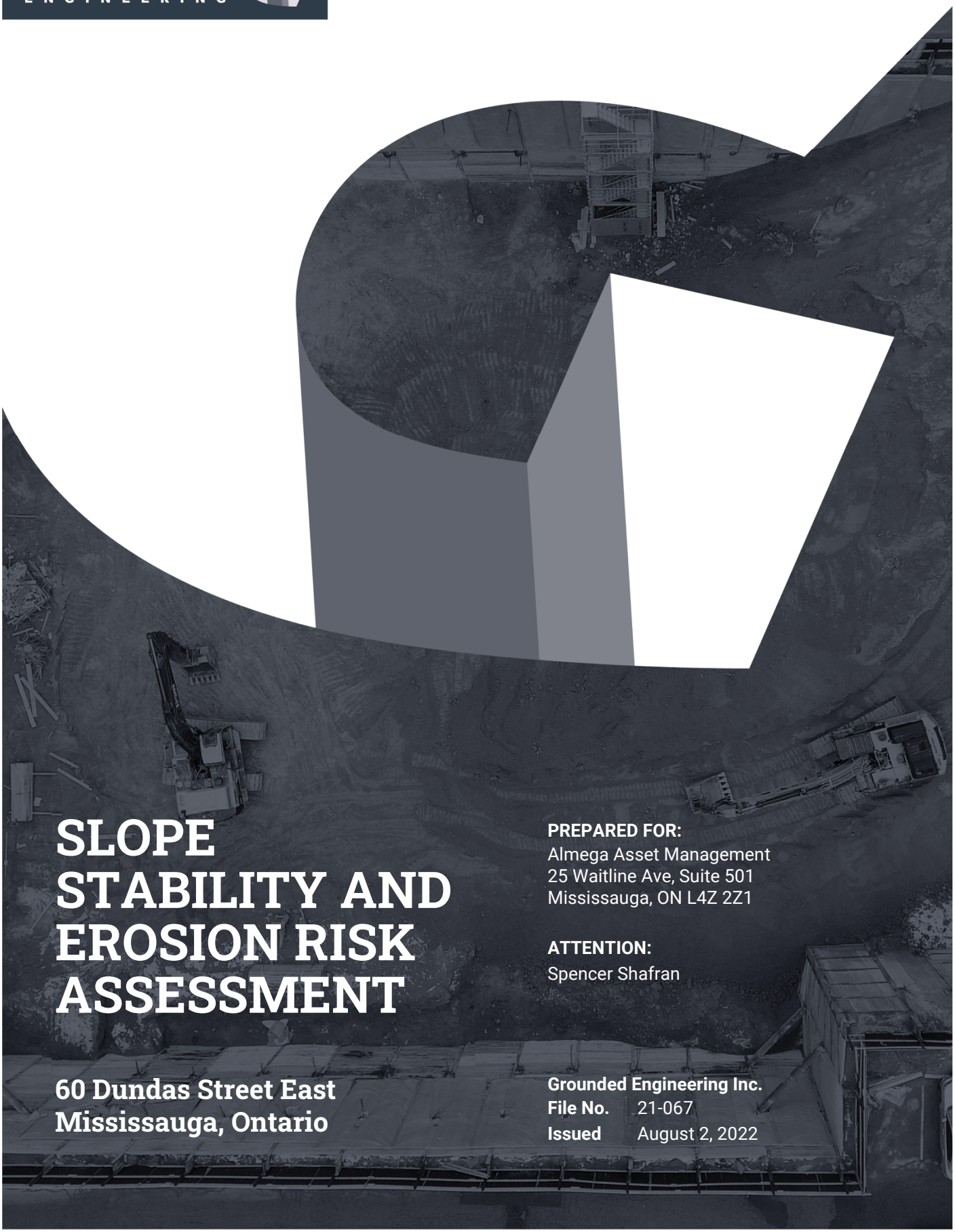

SLOPE STABILITY AND EROSION RISK ASSESSMENT

PREPARED FOR:
Almega Asset Management
25 Waitline Ave, Suite 501
Mississauga, ON L4Z 2Z1

ATTENTION:
Spencer Shafran

60 Dundas Street East
Mississauga, Ontario

Grounded Engineering Inc.
File No. 21-067
Issued August 2, 2022

1 Banigan Drive, Toronto ON M4H 1G3 | (647) 264-7909 | groundedeng.ca | Grounded Engineering

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FIGURES

APPENDICES

1 Introduction

Almega Asset Management has retained Grounded Engineering Inc. (“Grounded”) to provide geotechnical engineering design advice for their proposed development at 60 Dundas Street East, in Mississauga, Ontario.

The subject site is currently a commercial plaza with existing parking lots. Almega Asset Management proposes to construct 3 new towers, with a common P5 underground parking structure beneath the entire site. Assuming a ground floor elevation of 111± m, a proposed P5 level is assumed to have a Finished Floor Elevation (FFE) at around Elev. 94± m.

Cooksville Creek is east of the subject site on public property. The creek is at a lower elevation compared to the subject site. The sides of the creek are retained by concrete or armourstone retaining walls ranging in height from approximately 5.4± m (at the north end of the slide) to 3.0± m (at the south end of the site). The retaining walls are located on public property. The Cooksville Creek watershed is regulated by Credit Valley Conservation (CVC).

Grounded has been provided with the following reports and drawings to assist in our geotechnical scope of work:

- Site survey, prepared by Aksan Piller Corporation Ltd. (April 5, 2021).

Grounded’s subsurface investigation of the site to date includes multiple boreholes. Four (4) boreholes (Boreholes 102, 202, 205, and 207) which were advanced in close proximity to Cooksville Creek and are referenced for the slope stability and erosion risk assessment.

Grounded also completed a geotechnical engineering report for this site (File No. 21-067, Issued April 26, 2022).

There is no slope on the subject property. The west side of Cooksville Creek is protected with publicly owned concrete and armourstone retaining walls. The requirements for the determination of the limits of the development next to Cooksville Creek and associated retaining walls must be confirmed by the CVC. To facilitate CVC permitting of development adjacent to a slope, the Long-term Stable Slope Crest (LTSSC) position is discussed.

This geotechnical investigation report provides a study of the prevailing subsurface soil and groundwater conditions (as determined by factual data procured at the site), a visual slope inspection to review the existing slope conditions, and a detailed slope stability analysis of the site. The LTSSC position is provided, and the stability setbacks and erosion risks for the subject slope are discussed.

2 Ground Conditions

The borehole results are detailed on the attached borehole logs. Our assessment of the relevant stratigraphic units is intended to highlight the strata as they relate to geotechnical engineering. The ground conditions reported here will vary between and beyond the borehole locations.

The stratigraphic boundary lines shown on the borehole logs are assessed from non-continuous samples supplemented by drilling observations. These stratigraphic boundary lines represent transitions between soil types and should be regarded as approximate and gradual. They are not exact points of stratigraphic change.

Elevations are measured relative to geodetic datum (CGD28). The horizontal coordinates are provided relative to the Universal Transverse Mercator (UTM) geographic coordinate system.

Asphalt and granular thicknesses reported here are observed in individual borehole locations through the top of the open borehole. Thicknesses may vary between and beyond the boreholes.

2.1 Soil Stratigraphy

The following soil stratigraphy summary is based on the borehole results and the geotechnical laboratory testing.

A subsurface profile showing stratigraphy and engineering units is appended.

2.1.1 Surficial and Earth Fill

Borehole 102 encountered 100 mm of topsoil. Boreholes 202, 205, and 207 encountered a pavement structure consisting of 50 mm of asphalt overlying 100 mm of aggregate.

Underlying the surficial materials, the boreholes observed a layer of earth fill that extends to depths of 2.3 to 4.0 metres below grade (Elev. 106.0 to 106.5 metres). The earth fill varies in composition but generally consists of sand to silt, with trace to some clay and gravel. It contains rootlets, organics, cinders, and construction debris. The earth fill is light brown to dark brown to black, and moist to wet. Due to inconsistent placement and the inherent heterogeneity of earth fill materials, the relative density of the earth fill varies but is on average loose.

2.1.2 Clayey Silt Glacial Till

Underlying the fill materials, the boreholes encountered glacial till at 2.3 to 4.0 m depth below grade (Elev. 106.0 to 106.5 m) and extends down to depths of 5.6 to 6.8 m (Elev. 102.7 to 103.9). The glacial till comprises clayey silt with some sand to sandy and trace to some gravel. There are also trace rock, shale and limestone fragments. The glacial till is grey and moist. Standard Penetration Test (SPT) results (N-Values) measured in the glacial till range from 28 to greater than 30 blows per 300 mm of penetration (“bpf”), indicating a hard consistency.

2.1.3 Bedrock

Inferred bedrock was encountered in all boreholes underlying the glacial till at depths of 5.6 to 6.8 m (Elev. 102.7 to 103.9). Bedrock was confirmed by rock cores recovered in Borehole 205. The bedrock extends past the depth of the investigation (Elev. 86.6 m).

Boreholes 102, 202 and 207 indirectly inferred the top of weathered bedrock through auger cuttings, split spoon samples, and auger grinding/resistance observations. Each of these boreholes was terminated due to auger and sampler refusal (at target investigation depth) at elevations ranging from Elev. 102.4 to 103.8 m.

Detailed core logs, photographs, and discussion on the rock core is provided in the detailed geotechnical engineering report for this site (File No. 21-067, Issued April 26, 2022).

2.2 Groundwater

On completion of drilling, the boreholes were filled with drill fluid and measuring the unstabilized groundwater level after drilling was not practical. Monitoring wells were installed in each of the boreholes, and stabilized groundwater levels were measured in each of the monitoring wells one week after the completion of drilling.

The groundwater observations are shown on the Borehole Logs and are summarized as follows.

Borehole No.	Borehole depth (m)	Strata Screened	Water Level in Well, Depth/Elev. (m)			
			Highest	Date	Most Recent	Date
102	6.3	Glacial Till	3.8 / 106.2	May 21, 2021	4.9 / 105.1	April 17, 2022
202	5.6	Earth Fill and Glacial Till	3.1 / 106.3	April 17, 2022	3.1 / 106.3	April 17, 2022
205	23.2	Bedrock	6.7 / 103.1	April 17, 2022	6.7 / 103.1	April 17, 2022
207	6.4	Glacial Till	3.9 / 104.9	March 21, 2022	4.0 / 104.8	April 17, 2022

There is perched water in the earth fill at Elev. 107.0 to 107.7 m, which is the design groundwater table for slope stability purposes. The groundwater table in the bedrock is around Elev. 103.1 m.

Groundwater levels fluctuate with time depending on the amount of precipitation and surface runoff and may be influenced by known or unknown dewatering activities at nearby sites.

3 Visual Slope Inspection

A visual slope inspection was conducted at the property on May 17th, 2022 by Jory Hunter of Grounded Engineering. Photographs of the slope are appended, with photo locations shown on Figure 3. An MNR slope rating chart was completed for the subject slope. Based on the slope rating chart, the slope has a rating of 19 to 26, which indicates a low to slight potential for instability.

For the purposes of this discussion, Dundas Street East runs in the west to east direction. The subject site is present west of Cooksville Creek and the associated retaining walls, which are on public property. The subject site is occupied by an asphalt parking lot and a low rise commercial building.

On public property, the tableland is occupied by a sidewalk and a vegetated area. On private property, the tableland is occupied by asphalt. No erosion features were observed in the tableland.

Cooksville Creek is present at the toe of the retaining wall flowing from the north to the south in a meandering fashion. On the west side of Cooksville Creek (subject site) there is a concrete retaining wall at the north end of the site and an armourstone block retaining wall at the south end of site. The retaining walls are approximately 5.4 to 3.0 m in height. The retaining walls appear to be in a good state of maintenance. Beneath the highest section of the armourstone wall there appears to be a concrete ledge. The ledge appears to be undercut.

The east side of Cooksville Creek is protected with gabion stone baskets. The gabion stone baskets have been undercut and are deformed, bulging, leaning. The retained soil behind the gabion stone is subsiding.

The detailed visual slope inspection is appended, and summarized in the following table:

	Visual Observations within Study Area
Structures at Risk?	No
Slope Height	5.4 to 3.0 m
Slope Inclination	N/A - Near-vertical at retaining walls present along entire study area
Distance, structure to slope	Retaining walls are present along the edge of the creek
Seepage or wet ground?	None observed
Watercourse within 15 m?	Yes, Cooksville Creek
Fallen/leaning trees?	None observed
Surficial erosion features	None observed
Slide features	None observed
Downspouts?	Outlets observed through the retaining wall face
Retaining Walls or Structures?	Concrete retaining wall (5.0± m) at the north end of site Armourstone Block retaining wall (5.4 - 3.0± m) at the south end of site

	Visual Observations within Study Area
Decks, Stairs?	None observed
Sheds?	None observed
Pools or Tubs?	None observed
Storm Water Outfalls?	None Observed
MNR Slope Rating	19-26 (i.e. low to slight potential)

4 Stability Analysis

The stability analysis was completed with 2D limit equilibrium analysis software (Slide2 v9.016, by Rocscience, released May 7, 2021) using the standard Morgenstern/Price and Spencer methods. The software evaluates the factor of safety of a mass of soil by determining theoretical circular or non-circular slip surfaces through the slope. The sliding mass of soil is divided into slices, with the normal and shear forces calculated on each slice. It is an iterative process that converges on a solution. An example analysis is appended.

The factor of safety is a ratio defined for each slip surface by calculating the available soil strength resisting movement and dividing it by the gravitational forces tending to cause movement. When the factor of safety is 1.0, the forces resisting movement are approximately equal to the forces causing movement and the slope is in a condition where failure may occur. This is called the “limiting equilibrium”. A slope is unstable when the factor of safety is less than 1.0 and marginally stable when the factor of safety is 1.0. The MNR Policy Guidelines dictate that a minimum factor of safety of 1.3 to 1.5 is required for active land use.

The stability model was built using the topographic information and the factual subsurface condition information. The model was analyzed using both circular and non-circular slip surfaces. It was determined that non-circular surface govern the minimum factor of safety for global stability.

4.1 Existing Conditions

The stability analysis was conducted at three section locations (Section A, B, C, D) using the elevation data from the survey completed by Aksan Piller Corporation Ltd.

The stability was analyzed using the geotechnical properties assumed from the factual borehole information. The soil properties used in the analysis are outlined in the table below. The soil parameters used in the effective stress analysis for long-term stability are conservatively low; the real soils are likely stronger.

Table 4.1 – Soil properties in stability analysis

Material	Unit Weight (kN/m^3)	Cohesion (kPa)	Phi (deg)
Earth Fill	19	0	28
Clayey Silt Till	22	6	32
Bedrock	26	500	28
Concrete / Armourstone Walls	20	Impenetrable	

A conservative perched groundwater table at Elev. 107.0 to 107.7 m was used for the stability analysis based on observations of water in the earth fill and noted on the borehole logs. The groundwater table in the bedrock is at Elev. 103.1 m.

There are retaining walls along the edge of Cooksville Creek. We have assumed a depth of embedment of 0.9 m and a thickness of 1.2 m for the armourstone retaining walls. For the concrete retaining wall, we have assumed that it is a reinforced concrete cantilever wall with a 1 m toe, 4 m heel, and 1 m embedment below the creek. We have no information on the construction of the retaining walls and have assessed them on the basis of global stability only. We have not assessed the internal stability of the retaining walls.

The results of the analysis of the existing conditions are summarized in the table below.

Section	Slope Inclinations	Overall Height (±m)	Minimum Factor of Safety	Description of critical slip surfaces
A	n/a[1]	4.9	>10	Slip surfaces pass under the concrete retaining wall through the bedrock.
B	n/a[1]	4.1	>10	Slip surfaces pass under the concrete retaining wall through the bedrock.
C	n/a[1]	5.1	9.6	Slip surfaces pass under the concrete retaining wall through the bedrock.
D	n/a[1]	3.4	1.6	Slip surfaces pass under the retaining wall through the glacial till.

n/a[1] = no slope present, there is a retaining wall along the creek's edge.

The global stability around the retaining walls is considered stable, with minimum factors of safety of 1.6. Based on this information, the subject slope is considered to have a low risk of global instability under the present conditions.

4.2 Long Term Table Slope Crest Position

There is no slope on the subject property. East of the subject property on public land, there are retaining walls (concrete and armourstone) along Cooksville Creek. The requirements for the determination of the limits of the development next to Cooksville Creek and associated retaining walls must be confirmed by the CVC.

There are two components of the LTSSC position, including the toe erosion allowance and the stable slope inclination. The toe erosion allowance is outlined by MNR Guidelines for rivers within 15 m of the toe of slope. The stable slope inclination is determined through a stability analysis conducted to determine the inclination(s) at which the slope profile is stable to a minimum factor of safety of 1.5. A guide depicting the components of the LTSSC position is appended.

4.2.1 Toe Erosion Allowance

An outline of the MNR Guideline for determining the toe erosion allowance is summarized in the table below.

Soil Type	Evidence of Active Erosion[2] OR Bankfull Flow Velocity > Competent Flow Velocity[3]	No evidence of Active Erosion[2] OR Bankfull Flow Velocity << Competent Flow Velocity[3]		
		Bankfull Width < 5 m	Bankfull Width 5 – 30 m	Bankfull Width > 30 m
Hard Rock (e.g. granite)	0 – 2 m	0 m	0 m	1 m
Soft Rock (e.g. shale, limestone) Cobbles, Boulders	2 – 5 m	0 m	1 m	2 m
Stiff/Hard Cohesive Soils (e.g. clays, clayey silt) Coarse Granular (e.g. gravels) Glacial Tills	5 – 8 m	1 m	2 m	4 m
Soft/Firm Cohesive Soil Fine Granular (e.g. sand, silt) Fill	8 – 15 m	1 – 2 m	5 m	7 m

1. If a valley floor is > 15 m in width, still may require study or inclusion of a toe erosion allowance
2. Action Erosion is defined as: bank material is bare and exposed directly to stream flow under normal or flood flow conditions and, where undercutting, over-steepening, slumping of a bank or high downstream sediment loading is occurring. An area may be exposed to river flow but may not display "active erosion" (i.e. is not bare or undercut) either as a result of shifting of the channel or because flows are relatively low velocity. The toe erosion allowances presented in the right half of the table are suggested for sites with this condition.
3. Competent Flow Velocity is defined as: the flow velocity that the bed material in the stream can support without resulting in erosion or scour.

Source: Ontario Ministry of Natural Resources, "Technical Guide River & Stream Systems: Erosion Hazard Limit", dated 2002, page 38.

Cooksville Creek is present at the toe of the retaining walls. The bankfull width of Cooksville Creek is approximately 7 to 13 m. Active erosion was observed along the creek's edge. The primary soil type at the edge of the Creek are hard retaining walls (cast in place concrete wall, or armourstone

wall) and behind the retaining walls there is glacial till or bedrock. Based on this information, the following toe erosion allowances may be applicable:

- 0 m toe erosion allowance: if the retaining walls along Cooksville Creek are municipally maintained and the CVC agrees to a 0 m toe erosion allowance.
- 5 m toe erosion allowance: where there is till present at the Creek's edge.

We have assumed a 0 m toe erosion allowance for this analysis. The applicable toe erosion allowance must be confirmed by the CVC.

4.2.2 Stable Slope Inclination

The requirements for the determination of the limits of the development next to Cooksville Creek and associated retaining walls must be confirmed by the CVC. There are retaining walls along the edge of Cooksville Creek that are publicly owned and maintained. We have not assessed the internal stability of the retaining walls.

For the purposes of this report, we have made the following assumptions:

- The concrete retaining wall:
    - is a structurally reinforced concrete cantilever wall (with toe and heel projections)
    - is founded on bedrock
    - has adequate drainage provisions (free-draining backfill with outlets)
    - has adequate internal and external stability factors of safety (e.g. sliding, overturning, bearing, etc.) as per the original design which was designed by a professional engineer. Grounded must be provided with these drawings to verify these assumptions.
- The armourstone retaining wall:
    - is embedded a minimum of 0.9 m below the water level on hard till or bedrock as per the cross sections
    - has geogrid reinforced backfill holding reinforced backfill together with the armourstone facing
    - the geogrid has a length of at least 0.7 times the height of the structure
    - is founded within hard glacial till or bedrock
    - has adequate drainage provisions (free-draining backfill with outlets)
    - has adequate internal and external stability factors of safety (e.g. overall sliding, overturning, bearing, inter-block sliding, pullout, tensile rupture, etc.) as per the original design which was designed by a professional engineer. Grounded must be provided with these drawings to verify these assumptions.

Grounded must review any design drawings for both retaining walls or alternatively investigations of the as-built conditions of the structures, to verify these assumptions.

A global stability analysis was conducted on all sections to determine the stabilized slope profile to a minimum factor of safety for global stability of 1.5, assuming there are no retaining walls

present. Multiple inclinations were tested under both normal groundwater conditions and temporary high groundwater conditions. Under temporary high groundwater conditions, a reduced minimum factor of safety of 1.3 is acceptable. The stabilized slope profiles are appended.

Based on the analyses of existing conditions, all four cross sections indicate a minimum factor of safety greater than 1.5. Therefore, given our assumptions and pending the required verifications, there is no requirement for a long-term stable inclination setback.

If for any reason, a stable slope inclination is required, then the stable slope inclinations for all sections is 2.5 H : 1 V (as per the models in the appendix).

4.2.3 Long Term Slope Crest Position

The LTSSC position is outlined in plan on Figure 5, where the toe erosion allowance and stable slope inclination in section intersects the tableland. The LTSSC was determined assuming that the retaining walls are present along the creek and meet minimum internal and external factors of safety (as discussed above) and will be maintained by the owner over the 100 year planning horizon, using a minimum factor of safety of 1.5 under normal groundwater conditions and 1.3 for temporary elevated groundwater conditions.

Based on the applicable toe erosion allowance (0 m) and analysis of the stable slope inclination, and assuming that our assumptions regarding the retaining walls will be verified, the LTSSC position is located at the existing slope crest position.

The MNR and CVC guidelines generally require an additional setback (“erosion access allowance”) for developments, in addition to the LTSSC. The applicable setback for the development must be confirmed by the CVC.

5 Limitations and Restrictions

Grounded should be retained to review the structural engineering drawings prior to issue or construction to ensure that the recommendations in this report have been appropriately implemented.

To protect the slope, site development and construction activities should be designed in a manner that does not erode the surface slope. Of particular importance, site drainage and grading must not produce concentrated overland flow directed towards the slope crest or face. Although concentrated overland flow must not be allowed to flow over the slope, a minor sheet flow may be acceptable. A healthy vegetative cover should be created and maintained on the slope.

The survey data is relied on as factual data for present purposes. The slope stability cross-sections presented in this report are derived from the survey data provided as well as estimated heights and embedment of the retaining walls. The existing slope crest and toe were not

delineated by the CVC and are established by Grounded based on contour details from the survey data as well as visual observations at the site.

As discussed with the client, Grounded has made several assumptions about the design and construction of the existing concrete and armourstone retaining walls. Grounded assumes no responsibility for the internal and external stability of these structures. Grounded has only completed global stability assessments based on our assumptions. Grounded must review the design drawings for both retaining walls and/or alternatively investigations of the as-built conditions of the structures, to verify these assumptions. If these verifications are not provided, then a stable inclination of 2.5H:1V will apply and the LTSSC must be modified.

5.1 Investigation Procedures

The geotechnical engineering analysis and advice provided are based on the factual borehole information observed and recorded by Grounded. The investigation methodology and engineering analysis methods used to carry out this scope of work are consistent with conventional standard practice by Grounded as well as other geotechnical consultants, working under similar conditions and constraints (time, financial and physical).

Borehole drilling services were provided to Grounded by a specialist professional contractor. The drilling was observed and recorded by Grounded's field supervisor on a full-time basis. Drilling was conducted using conventional drilling rigs equipped with hollow stem augers. Rock coring will be carried out with HQ size diamond bit core drilling barrels. As drilling proceeded, groundwater observations were made in the boreholes. Based on examination of recovered borehole samples, our field supervisor made a record of borehole and drilling observations. The field samples were secured in air-tight clean jars and bags and taken to the Grounded soil laboratory where they were each logged and reviewed by the geotechnical engineering team and the senior reviewer.

The Split-Barrel Method technique (ASTM D1586) was used to obtain the soils samples. The sampling was conducted at conventional intervals and not continuously. As such, stratigraphic interpolation between samples is required and stratigraphic boundary lines do not represent exact depths of geological change. They should be taken as gradual transition zones between soil or rock types.

A carefully conducted, fully comprehensive investigation and sampling scope of work carried out under the most stringent level of oversight may still fail to detect certain ground conditions. As such, users of this report must be aware of the risks inherent in using engineered field investigations to observe and record subsurface conditions. As a necessary requirement of working with discrete test locations, Grounded has assumed that the conditions between test locations are the same as the test locations themselves, for the purposes of providing geotechnical engineering advice.

It is not possible to design a field investigation with enough test locations that would provide complete subsurface information, nor is it possible to provide geotechnical engineering advice

that completely identifies or quantifies every element that could affect construction, scheduling, or tendering. Contractors undertaking work based on this report (in whole or in part) must make their own determination of how they may be affected by the subsurface conditions, based on their own analysis of the factual information provided and based on their own means and methods. Contractors using this report must be aware of the risks implicit in using factual information at discrete test locations to infer subsurface conditions across the site and are directed to conduct their own investigations as needed.

5.2 Site and Scope Changes

Natural occurrences, the passage of time, local construction, and other human activity all have the potential to directly or indirectly alter the subsurface conditions at or near the project site. Contractual obligations related to groundwater or stormwater control, disturbed soils, frost protection, etc. must be considered with attention and care as they relate this potential site alteration.

The geotechnical engineering advice provided in this report is based on the factual observations made from the site investigations as reported. It is intended for use by the owner and their retained design team. If there are changes to the features of the development or to the scope, the interpreted subsurface information, geotechnical engineering design parameters, advice, and discussion on construction considerations may not be relevant or complete for the project. Grounded should be retained to review the implications of such changes with respect to the contents of this report.

5.3 Report Use

The authorized users of this report are Almega Asset Management and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc.

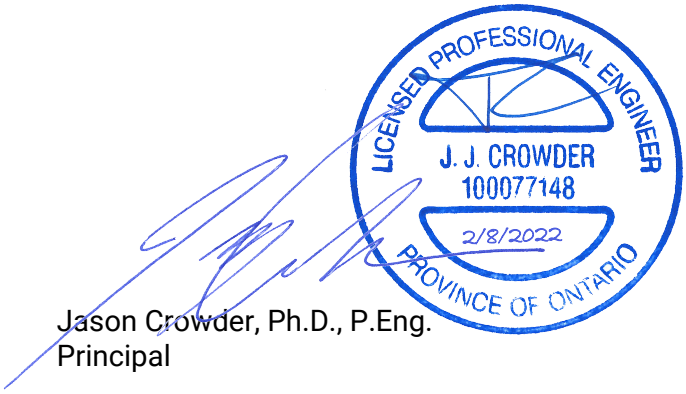
The City of Mississauga and CVC may also make use of and rely upon this report, subject to the limitations as stated.

6 Closure

If the design team has any questions regarding the discussion and advice provided, please do not hesitate to have them contact our office. We trust that this report meets your requirements at present.

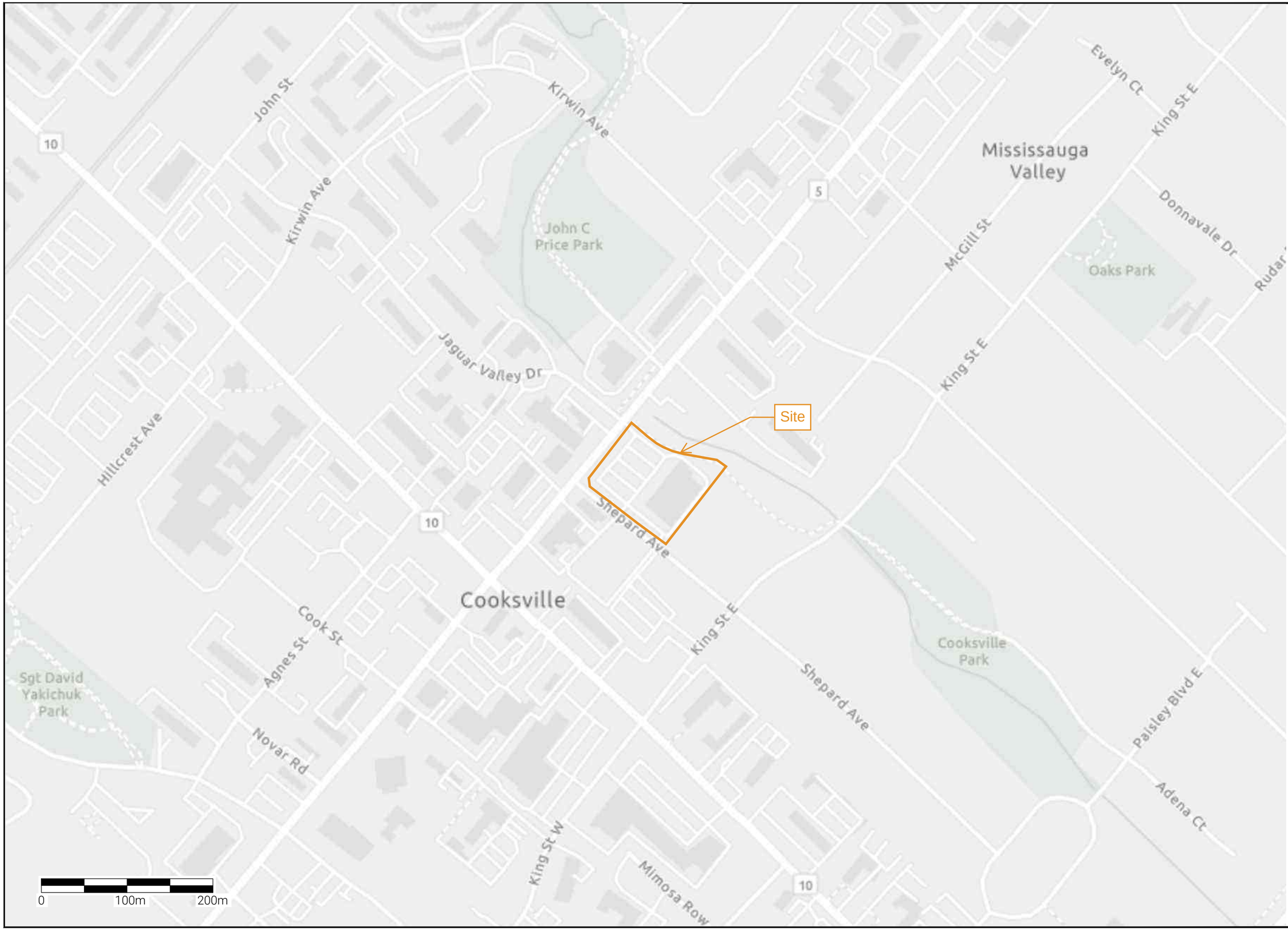
For and on behalf of our team,

GROUNDED ENGINEERING



Jason Crowder, Ph.D., P.Eng.
Principal

FIGURES



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LEGEND

APROXIMATE PROPERTY BOUNDARY

Note

Reference

ArcGIS Map 2021

Project

60 DUNDAS STREET EAST, MISSISSAUGA, ON

Figure Title

SITE LOCATION PLAN

North

TRUE
PROJECT

Date

APRIL, 2022

Scale

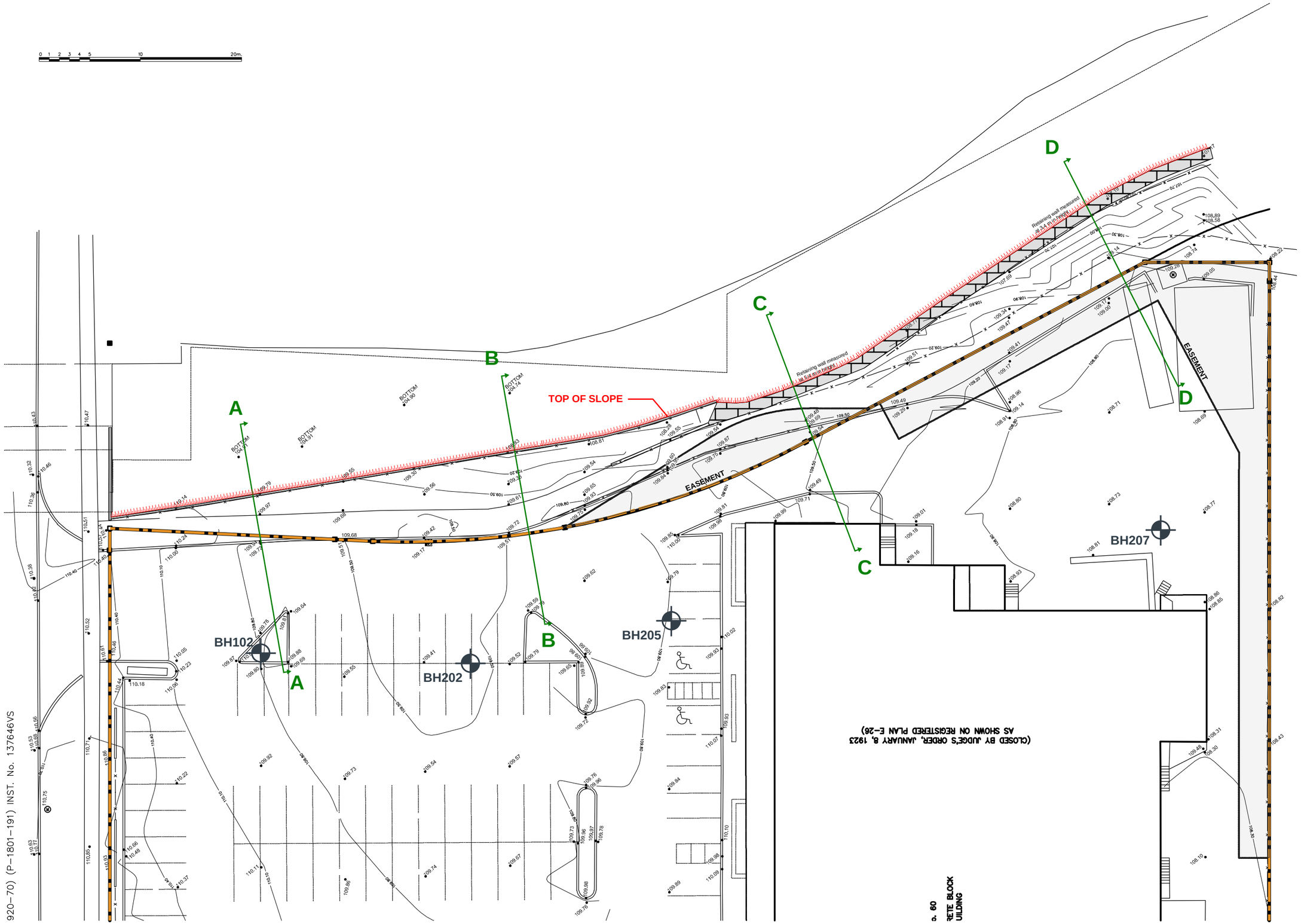
AS INDICATED

Job No

21-067

Figure No

FIGURE 1



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LEGEND

- SITE BOUNDARY
- TOP OF SLOPE
- SECTION LOCATIONS
- BOREHOLE LOCATIONS
- EASEMENT

Note

Reference

Survey Drawing
Reference no. 20-21-14108-00.
Certificate date:April 5, 2021. Prepared by Aksan Piller Corporation Ltd.

Project

60 DUNDAS STREET E MISSISSAUGA, ONTARIO

Figure Title

SECTION LOCATION PLAN

North

TRUE
PROJECT

Date

APRIL 2022

Scale

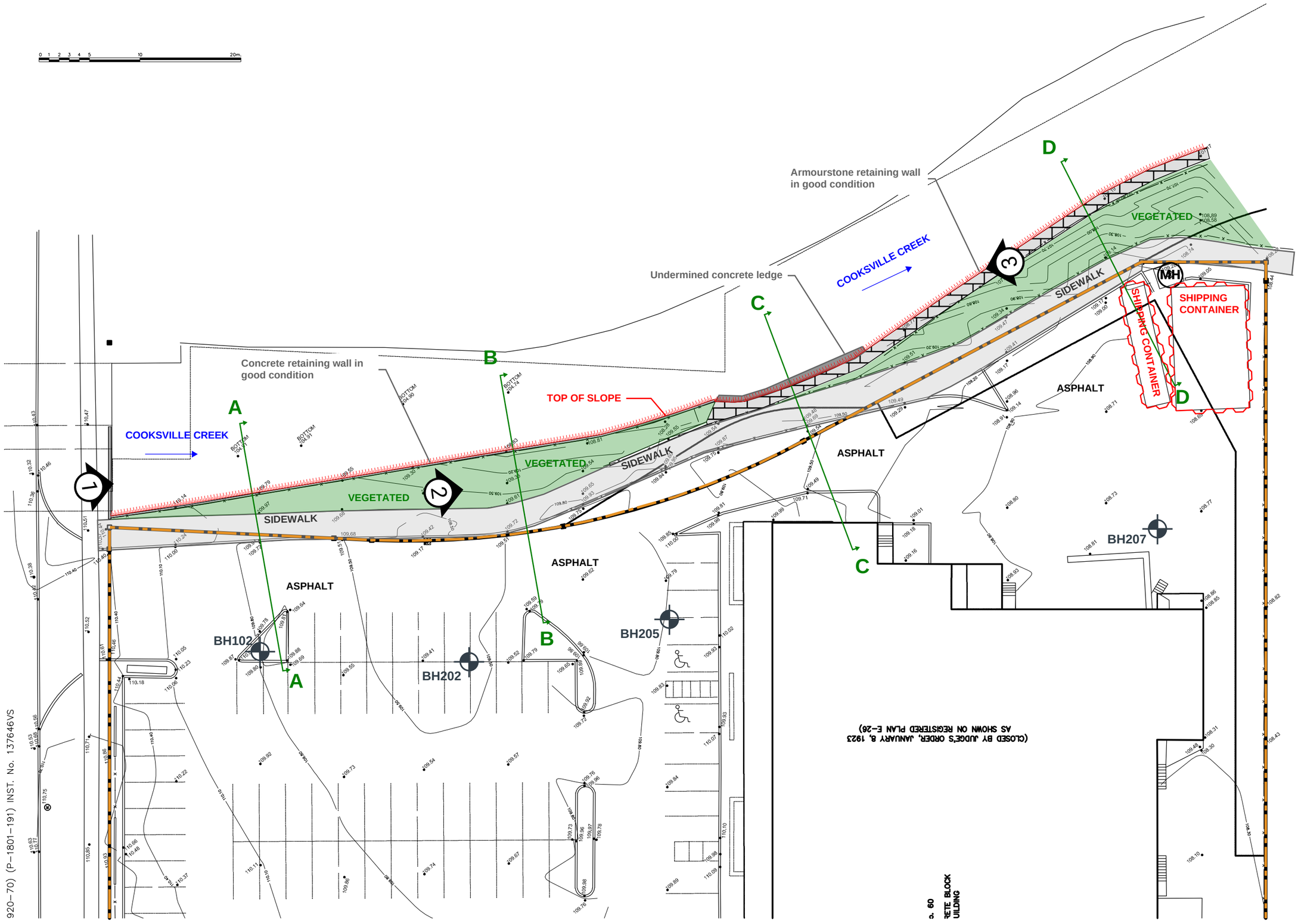
AS INDICATED

Job No

21-067

Figure No

FIGURE 2



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LEGEND

- SITE BOUNDARY
- TOP OF SLOPE
- SECTION LOCATIONS
- BOREHOLE LOCATIONS
- PHOTOGRAPH LOCATIONS

Note

Reference

Survey Drawing
Reference no. 20-21-14108-00.
Certificate date:April 5, 2021. Prepared by Aksan Piller Corporation Ltd.

Project

60 DUNDAS STREET E MISSISSAUGA, ONTARIO

Figure Title

PHOTOGRAPH AND SITE FEATURES PLAN

North

TRUE PROJECT

Date

APRIL 2022

Scale

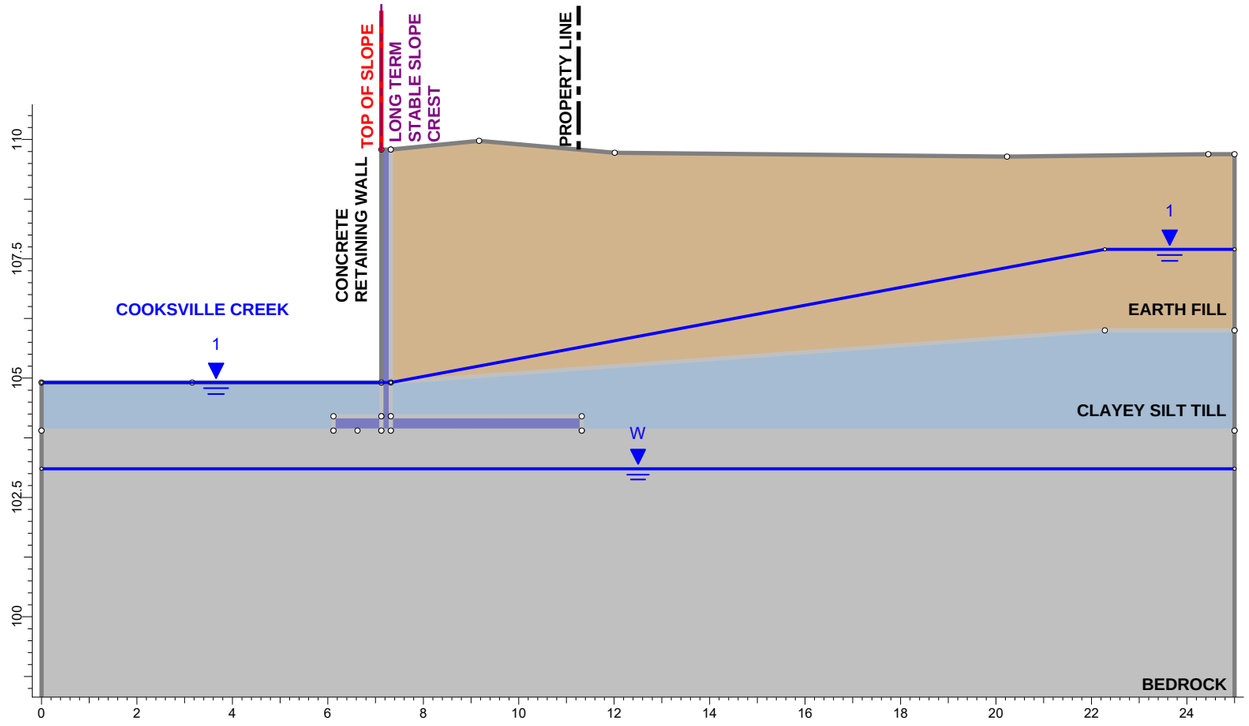
AS INDICATED

Job No

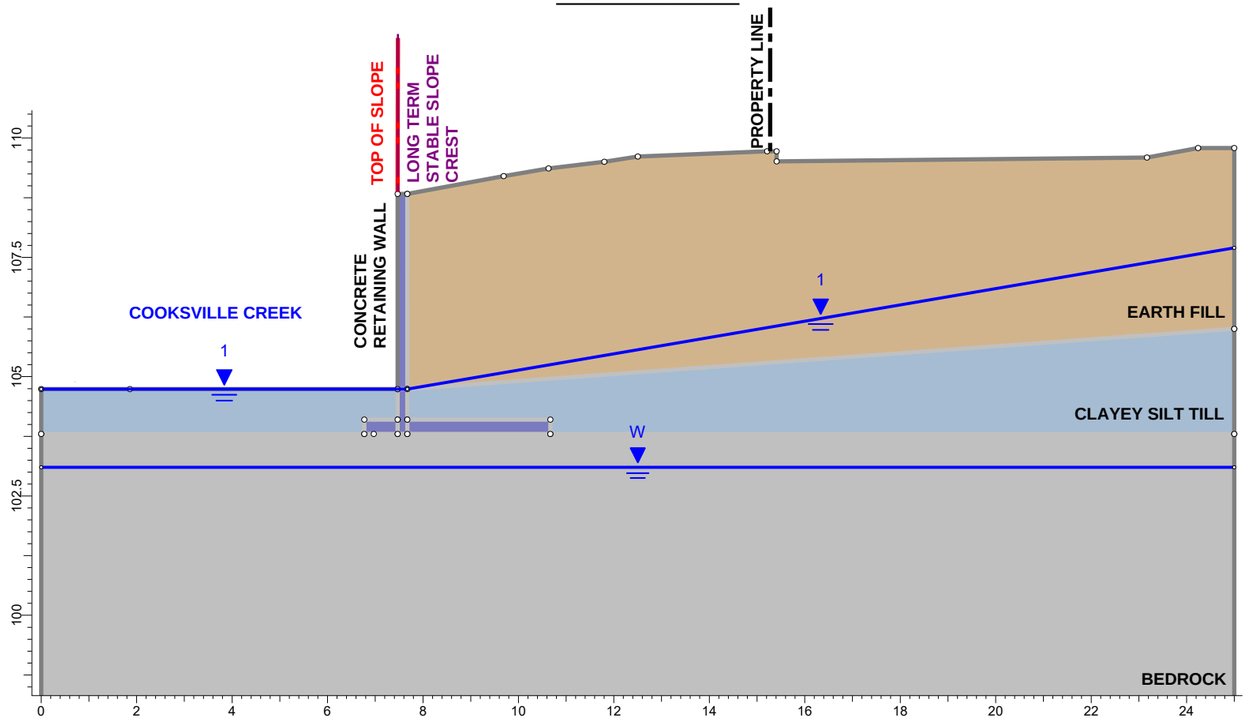
21-067

Figure No

FIGURE 3



SECTION A



SECTION B

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LEGEND

Note

Reference

Project

60 DUNDAS ST E MISSISSAUGA, ONTARIO

Figure Title

DETAILED CROSS SECTIONS

North

Date

MAY 2022

Scale

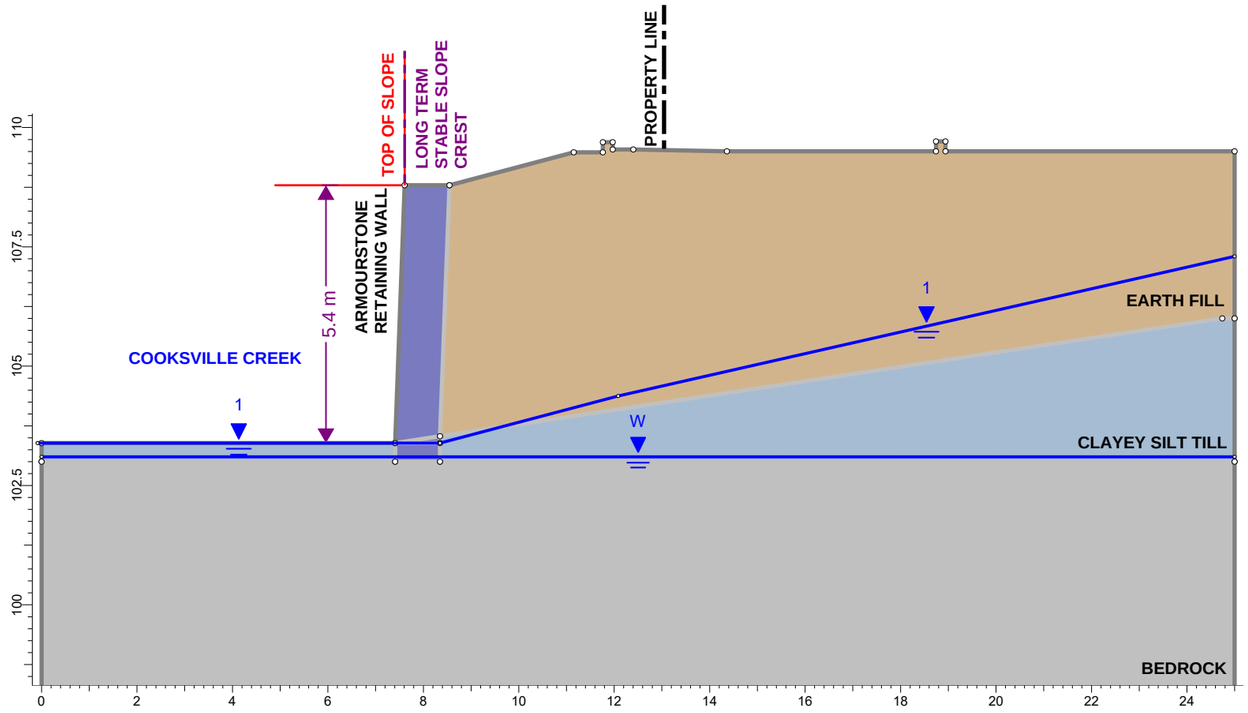
AS INDICATED

Job No

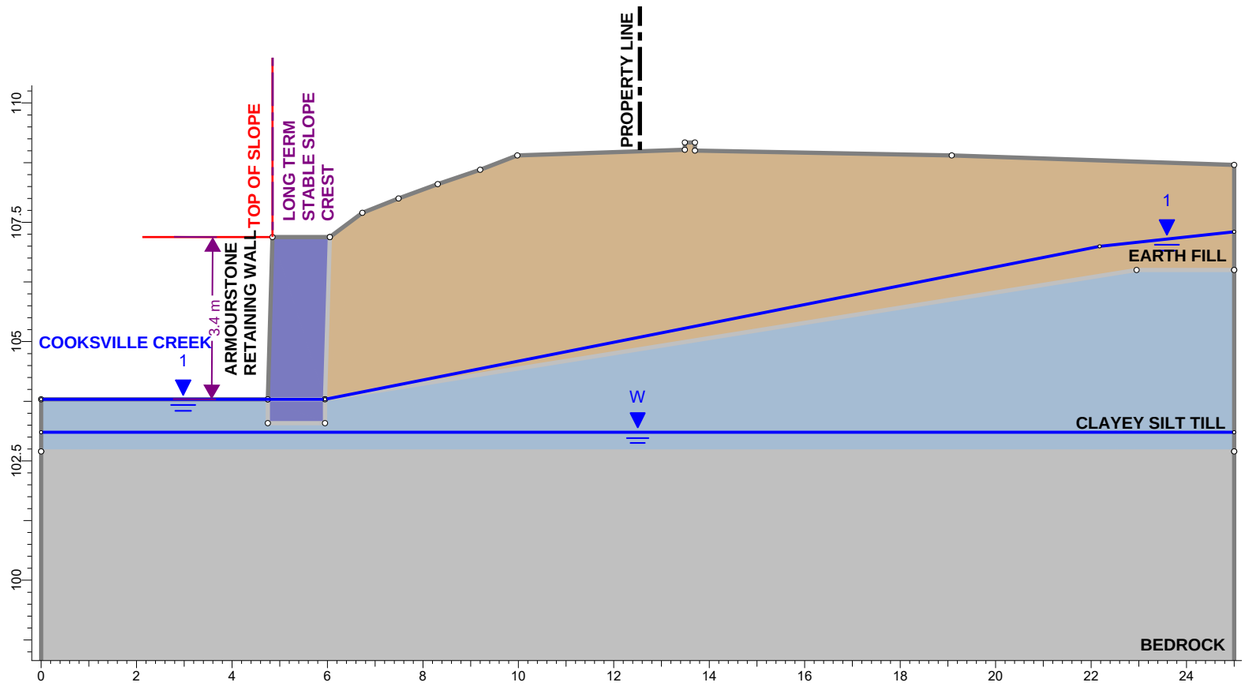
21-067

Figure No

FIGURE 4A



SECTION C



SECTION D

GROUNDED ENGINEERING
1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3
www.groundedeng.ca

LEGEND

Note

Reference

Project

60 DUNDAS ST E MISSISSAUGA, ONTARIO

Figure Title

DETAILED CROSS SECTIONS

North

Date

MAY 2022

Scale

AS INDICATED

Job No

21-067

Figure No

FIGURE 4B

0 1 2 3 4 5 10 20m.

LONG TERM STABLE SLOPE CREST

TOP OF SLOPE

LONG TERM STABLE SLOPE CREST

A

B

C

D

BH102

BH202

BH205

BH207

EASEMENT

EASEMENT

Retaining wall measured as 3.4 m(+) height

Retaining wall measured as 3.6m(+) height

(CLOSED BY JUDGE'S ORDER, JANUARY 8, 1923 AS SHOWN ON REGISTERED PLAN E-26)

920-70) (P-1801-191) INST. No. 137646VS

GROUNDED ENGINEERING

1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3
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LEGEND

- SITE BOUNDARY
- TOP OF SLOPE
- SECTION LOCATIONS
- BOREHOLE LOCATIONS
- LONG TERM STABLE SLOPE CREST

Note

LTSSC position assumes a 0m toe erosion allowance, and that existing retaining walls are designed by a P.Eng. and will be maintained in the long term by the owner. See list of assumptions in Sec. 4.2.2 of report.

Reference

Survey Drawing
Reference no. 20-21-14108-00.
Certificate date:April 5, 2021. Prepared by Aksan Piller Corporation Ltd.

Project

60 DUNDAS STREET E MISSISSAUGA, ONTARIO

Figure Title

LONG TERM STABLE SLOPE CREST PLAN

North

TRUE

PROJECT

Date

APRIL 2022

Scale

AS INDICATED

Job No

21-067

Figure No

FIGURE 5

APPENDIX A

BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

NP: non-plastic

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

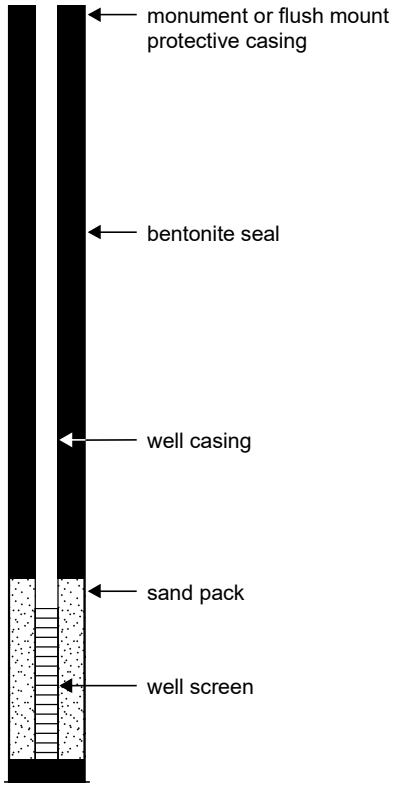
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



ROCK CORE TERMINOLOGY (MTO SHALE)

TCR **Total Core Recovery** the total length of recovery (soil or rock) per run, as a percentage of the drilled length
SCR **Solid Core Recovery** the total length of sound full-diameter rock core pieces per run, as a percentage of the drilled length
RQD **Rock Quality Designation** the sum of all pieces of sound rock core in a run which are 10 cm or greater in length, as a percentage of the drilled length

Natural Fracture Frequency (typically per 0.3 m) The number of natural discontinuities (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

LOGGING DISCONTINUITIES

Discontinuity Type

BP bedding parting
CL cleavage
CS crushed seam
FZ fracture zone
MB mechanical break
IS infilled seam
JT Joint
SS shear surface
SZ shear zone
VN vein
VO void

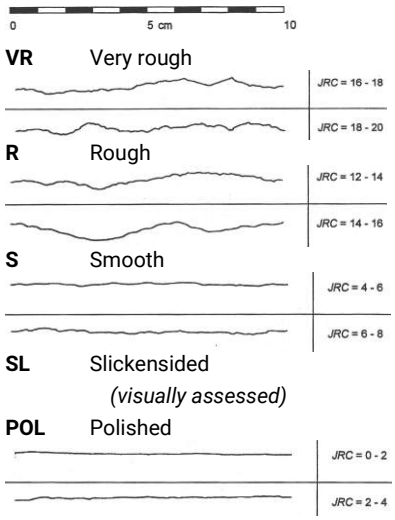
Coating

CN Clean
SN Stained
OX Oxidized
VN Veneer
CT Coating (>1 mm)

Dip Inclination

H	horizontal/flat	0 - 20°
D	dipping	20 - 50°
SV	sub-vertical	50 - 90°
V	vertical	90±°

Roughness (Barton et al.)



Spacing in Discontinuity Sets (*ISRM 1981*)

VC	very close	< 60 mm
C	close	60 – 200 mm
M	mod. close	0.2 to 0.6 m
W	wide	0.6 to 2 m
VW	very wide	> 2 m

Aperture Size

T	closed / tight	< 0.5 mm
GA	gapped	0.5 to 10 mm
OP	open	> 10 mm

Planarity

PR	Planar
UN	Undulating
ST	Stepped
IR	Irregular
DIS	Discontinuous
CU	Curved

GENERAL

Degree of Weathering (*after MTO, RR229 Evaluation of Shales for Construction Projects*)

Zone	Degree	Description
Z1	unweathered	shale, regular jointing
Z2	partially weathered	angular blocks of unweathered shale, no matrix, with chemically weathered but intact shale
Z3		soil-like matrix with frequent angular shale fragments < 25mm diameter
Z4a		soil-like matrix with occasional shale fragments < 3mm diameter
Z4b	fully weathered	soil-like matrix only

Strength classification (*after Marinos and Hoek, 2001; ISRM 1981b*)

Grade		UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Q. J. Eng. Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m
Thickly bedded	0.6 – 2m
Medium bedded	200 – 600mm
Thinly bedded	60 – 200mm
Very thinly bedded	20 – 60mm
Laminated	6 – 20mm
Thinly Laminated	< 6mm

GROUNDED ENGINEERING

Date Started : May 3, 2021
Position : E: 611879, N: 4826347 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 102

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : Almega Asset Management

drill method : *Truck-mounted rig*

solid stem augers OD=150 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
110.0	**GROUND SURFACE**				
	100mm **TOPSOIL**				
	FILL, sand, some silt, trace clay, trace gravel, trace rootlets, trace organics, organic odour, loose to very loose, dark brown, moist		1	SS	6
	...at 0.8 m, trace cinders		2	SS	4
			3	SS	2
	...at 2.3 m, silty		4	SS	7
	...at 3.0 m, dark grey and black		5	SS	4
106.0			6A	SS	
4.0	**CLAYEY SILT**, sandy, some gravel, very stiff to hard, grey, moist (GLACIAL TILL)		6B	SS	28
			7	SS	64
103.9					
103.7	**INFERRED BEDROCK**, shale and limestone fragments, grey		8	SS	50 / 125mm
6.3			9	SS	50 / 50mm

depth scale (m) | well details | elevation (m)

0 — 109 — 108 — 107 — 106 — 105 — 104

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS3: H-Ms, Metals, ORPs

SS5: PAHs

SS6B: BTEX, PCBs, PHCs

SS7: BTEX, VOCs

6.1m: Auger grinding for 10 mins; auger refusal

END OF BOREHOLE
Auger refusal on inferred bedrock

Dry and open upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
May 4, 2021	4.7	105.3
May 6, 2021	4.0	106.0
May 10, 2021	3.8	106.2
May 21, 2021	3.8	106.2
Apr 17, 2022	4.9	105.1

file: 21-067.gpj

Tech : OM | **PM** : DK / JH | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 18, 2022
Position : E: 611894, N: 4826333 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 202

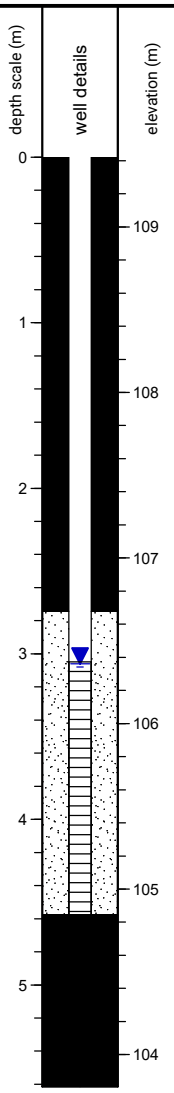
File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : Almega Asset Management

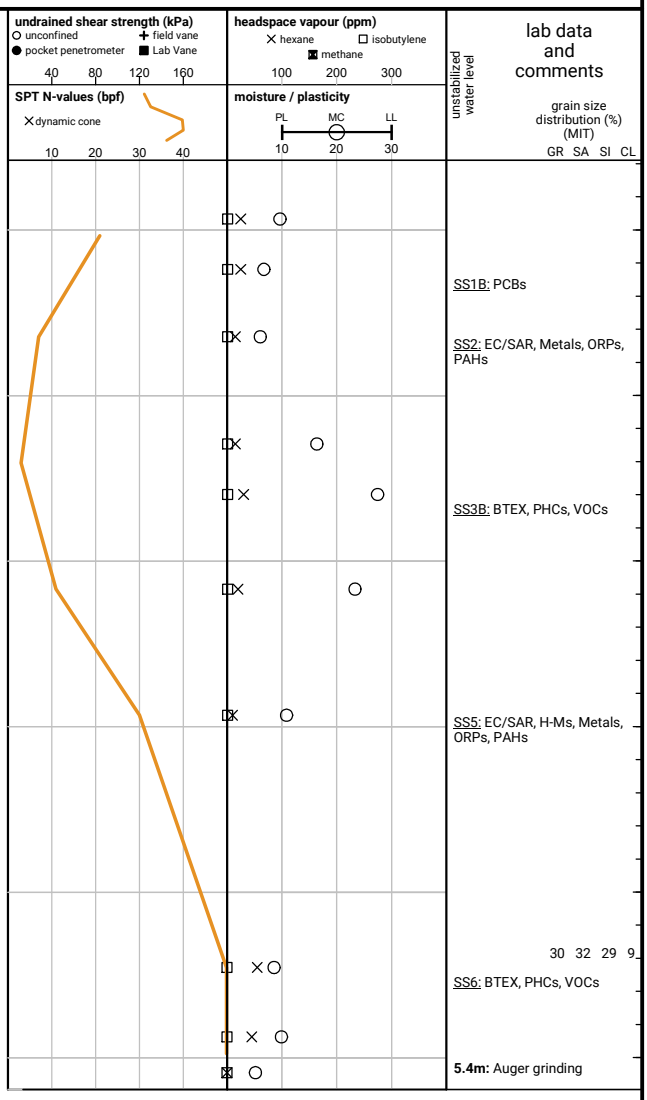
drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	samples: number	type	SPT N-value
109.4	**GROUND SURFACE**				
109.2 / 0.2	50mm **ASPHALT**				
	100mm **AGGREGATE**		1A	SS	21
	FILL, sand, some silt, trace clay, trace gravel, trace construction debris, compact, light brown to dark brown, moist		1B	SS	
	...at 0.8 m, some clay, loose to very loose		2	SS	7
	...at 1.5 m, inferred cobble, wet		3A	SS	3
			3B	SS	
107.1 / 2.3	**FILL**, silt, some clay, some gravel, trace sand, trace construction debris, compact, brown to grey, wet		4	SS	11
106.4 / 3.0	**CLAYEY SILT**, some sand, trace gravel, trace rock fragments, hard, grey, moist (GLACIAL TILL)		5	SS	30
	...at 4.6 m, gravelly sand, silty, trace clay, trace shale and limestone fragments		6	SS	51
	...at 5.4 m, shale and limestone fragments		7A	SS	79 / 275mm
103.8 / 5.6			7B		

depth scale (m) / well details / elevation (m)





unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1B: PCBs

SS2: EC/SAR, Metals, ORPs, PAHs

SS3B: BTEX, PHCs, VOCs

SS5: EC/SAR, H-Ms, Metals, ORPs, PAHs

30 32 29 9

SS6: BTEX, PHCs, VOCs

5.4m: Auger grinding

END OF BOREHOLE
Auger refusal on inferred bedrock

Water level and cave not measured upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 21, 2022	4.3	105.1
Apr 17, 2022	3.1	106.3

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 10, 2022
Position : E: 611913, N: 4826325 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 205

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : Almega Asset Management

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
109.8	**GROUND SURFACE**				
109.6 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**		1	SS	18
	FILL, silty sand, some gravel, some clay, cobbles (inferred), trace construction debris, compact, dark brown to light brown, moist ...at 0.8 m, trace silt, loose		2	SS	8
	...at 1.5 m, clayey silt seam		3	SS	6
	...at 2.3 m, wet, compact		4	SS	13
			5	SS	14
106.0 / 3.8	**CLAYEY SILT**, some sand, trace gravel, hard, grey, moist (GLACIAL TILL) ...at 4.4 m, trace shale fragments		6A	SS	42
			6B		
			7	SS	79
			8	SS	73
103.0 / 6.8	**GEORGIAN BAY FORMATION** (See rock core log for details)		1	RUN	
			2	RUN	
			3	RUN	
			4	RUN	
			5	RUN	
			6	RUN	

depth scale (m) 0–13

well details

elevation (m) 109–96

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
⊠ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

16 51 22 11

SS2: EC/SAR, H-Ms, Metals, ORPs, PAHs, PCBs

SS3: BTEX, PHCs, VOCs

6A: BTEX, PHCs, VOCs

SS7: EC/SAR, H-Ms, Metals, ORPs, PAHs

...at 10.1 m, top of sound bedrock

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

(continued next page)

GROUNDED ENGINEERING

Date Started : Mar 10, 2022
Position : E: 611913, N: 4826325 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 205

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : Almega Asset Management

drill method : *Truck-mounted rig*

Rock coring (HQ) OD=96 mm

elev depth (m)	description (*continued*)	graphic log	number	type	SPT N-value
	GEORGIAN BAY FORMATION (See rock core log for details) *(continued)*		6	RUN	
			7	RUN	
			8	RUN	
			9	RUN	
			10	RUN	
			11	RUN	
			12	RUN	
86.6 23.2					

depth scale (m): 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

well details

elevation (m): 95, 94, 93, 92, 91, 90, 89, 88, 87

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT): GR SA SI CL

END OF BOREHOLE

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Apr 17, 2022	6.7	103.1

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Mar 14, 2022
Position : E: 611956, N: 4826302 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 207

File No. : 21-067 **Project** : 60 Dundas Street East, Mississauga, ON **Client** : Almega Asset Management

drill method : *Truck-mounted rig*

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
108.8	**GROUND SURFACE**				
108.6 / 0.2	50mm **ASPHALT** 100mm **AGGREGATE**				
	FILL, sand, some silt, trace gravel, compact, light grey, dry		1	SS	15
	...at 0.8 m, moist, grey to brown		2	SS	10
	...at 1.5 m, loose		3	SS	5
106.5 / 2.3	**CLAYEY SILT**, some sand, some gravel, trace rock fragments, hard, brown with orange, moist (GLACIAL TILL)		4	SS	33
	...at 3.0 m, grey		5	SS	50
	...at 4.6 m, trace shale fragments		6A 6B	SS	50 / 75mm
			7	SS	66
102.7 / 6.1	**INFERRED BEDROCK**, trace shale and limestone fragments, grey		8	SS	50 / 50mm
102.4 / 6.4			9	SS	50 / 75mm

depth scale (m): 0, 1, 2, 3, 4, 5, 6

elevation (m): 108, 107, 106, 105, 104, 103

well details

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40, 80, 120, 160

SPT N-values (bpf): dynamic cone; 10, 20, 30, 40

headspace vapour (ppm): hexane, isobutylene, methane; 100, 200, 300

moisture / plasticity: PL, MC, LL; 10, 20, 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)

GR SA SI CL

SS1: PCBs

SS2: BTEX, PHCs, VOCs

SS3: EC/SAR, H-Ms, Metals, ORPs, PAHs

13 19 44 24

SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs

SS7: BTEX, PHCs, VOCs

END OF BOREHOLE

Water level and cave not measured upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

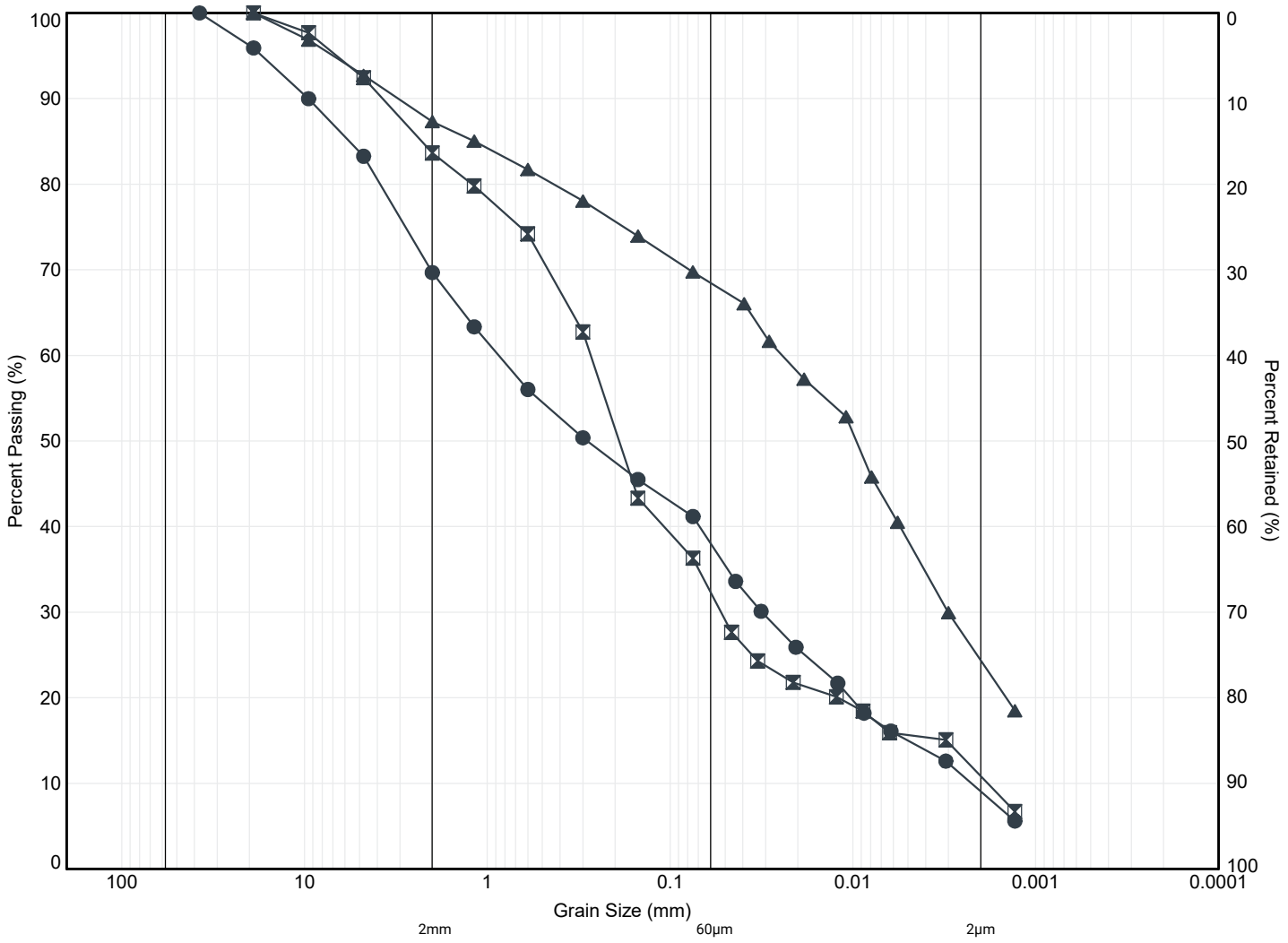
GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Mar 21, 2022	3.9	104.9
Mar 22, 2022	4.3	104.5
Apr 17, 2022	4.0	104.8

file: 21-067.gpj

Tech : AJ | **PM** : NP | **Rev** : MD

APPENDIX B



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**202**	SS6	4.9	104.5	30	32	29	9
⊠	**205**	SS2	1.1	108.8	16	51	22	11
▲	**207**	SS4	2.6	106.2	13	19	44	24

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION**

File No.: **21-067**

file: 21-067.gpj

APPENDIX C

Photograph 1

Position:	Tableland, north east of site
Direction/Object:	South, down Cooksville Creek
Description:	Cooksville Creek is present east of the subject site on private property. The sides of the creek are retained by a concrete retaining wall at the north end of the site and a block retaining wall at the south end of the site (west side of the river). The wall ranges from approximately 5.4 to 3.0 m in height.

Photograph 2

Position:	Tableland, east of site
Direction/Object:	South, along crest
Description:	There is a chain link fence along the top of the retaining walls. The tableland is slightly sloping towards the retaining walls. The tableland is vegetated with grass and young trees.

Photograph 3

Position:	Valleyland, south east of site
Direction/Object:	North, along toe
Description:	At the south end of site there is a block retaining wall that decreases in height. The retaining walls appear to be in a good state of maintenance. There is a concrete ledge beneath the tallest portion of the armourstone wall. The concrete ledge appears to be undermined.

APPENDIX D

SLOPE INSPECTION FORM

GROUNDED ENGINEERING

1. INSPECTION DATE (DD-MM-YYYY): 17-05-2021

FILE NO. 21-067

WEATHER (circle):

- [x] sunny
- ☐ partly cloudy
- ☐ cloudy
- ☐ clear
- ☐ fog
- ☐ rain
- ☐ snow
- ☐ calm
- ☐ breeze
- ☐ windy
- ☐ cold
- ☐ cool
- [x] warm
- ☐ hot

INSPECTED BY (name): J. Hunter

2. SITE LOCATION / DIRECTIONS (describe main roads, features)

60 Dundas St E

SKETCH

3. WATERSHED

Cooksville Creek at toe of slope

4. PROPERTY OWNERSHIP (name, address, phone):

TBD

LEGAL DESCRIPTION

Lot | Concession

Township | County

CURRENT LAND USE (circle and describe)

- ☐ **vacant** - field, bush, woods, forest, wilderness, tundra,
- ☐ **passive** - recreational parks, golf courses, non-habitable structures, buried utilities, swimming pools,
- [x] **active** - habitable structures, residential, commercial, industrial, warehousing and storage,
- ☐ **infra-structure or public use** - stadiums, hospitals, schools, bridges, high voltage power lines, waste management sites,

SLOPE INSPECTION FORM

GROUNDED ENGINEERING

5. SLOPE DATA

HEIGHT ☒ 3 - 6 m ☐ 6 - 10 m ☐ 10 - 15 m ☐ 15 - 20 m ☐ 20 - 25 m ☐ 25 - 30 m ☐ > 30 m

estimated height (m): **3 to 5.4 m**

INCLINATION AND SHAPE

☒ 4:1 or flatter 25 % 14 deg. ☐ up to 3:1 33 % 18½ deg. ☐ up to 2:1 50 % 26½ deg.

☐ up to 1:1 100 % 45 deg. ☐ up to ½:1 200 % 63½ deg. ☐ steeper than > 63½ deg.

6. SLOPE DRAINAGE (describe)

TOP **No concentrated flow of water observed over slope face**

FACE **Drainage pipe outlets out of retaining wall faces**

BOTTOM **Cooksville Creek, active erosion and failure of gabion stone walls on the east side of the creek. On the west side of the creek (subject property) there does not appear to be active erosion. There is a concrete ledge beneath the tallest part of the armourstone wall that appears to be undermined.**

7. SLOPE SOIL STRATIGRAPHY (describe, positions, thicknesses, types)

TOP **earth fill - based on boreholes advanced on the site, earth fill appears to be present for the full height of the retaining walls along Cooksville Creek**

FACE **earth fill - based on boreholes advanced on the site, earth fill appears to be present for the full height of the retaining walls along Cooksville Creek**

BOTTOM **cohesive glacial till is present underlying the earth fill underlying the cohesive glacial till, there is shale bedrock**

8. WATER COURSE FEATURES (circle and describe)

SWALE, CHANNEL

GULLY

STREAM, CREEK, RIVER **Cooksville Creek at toe of slope**

POND, BAY, LAKE

SPRINGS

MARSHY GROUND

9. VEGETATION COVER (grasses, weeds, shrubs, saplings, trees)

TOP

The tableland is vegetated with landscaped grass
There are some small shrubs and young trees

FACE

Retaining wall, no vegetation

BOTTOM

Retaining wall, no vegetation
No vegetation in the Creek

10. STRUCTURES (buildings, walls, fences, sewers, roads, stairs, decks)

TOP

Adjacent to the slope crest is public property with a sidewalk
The tableland is occupied by an asphalt parking lot

FACE

There is a concrete retaining wall at the north end of Cooksville Creek and a block retaining wall at the south end of site. The retaining wall ranges from 5.4 to 3 m in height and appear to be in good condition.

BOTTOM

No structures were observed in the valleyland

11. EROSION FEATURES (scour, undercutting, bare areas, piping, rills, gully)

TOP

No erosion observed in the tableland

FACE

No erosion observed at the slope face

BOTTOM

Active erosion observed on the east side of the creek only, where the shoreline protection consists of gabion stone walls. On the west side of the creek (subject site) there is a concrete ledge beneath the tallest part of the armourstone wall. The concrete ledge appears to be undermined.

12. SLOPE SLIDE FEATURES (tension cracks, scarps, slumps, bulges, grabens, ridges, bent trees)

TOP

No slope slide features observed in the tableland

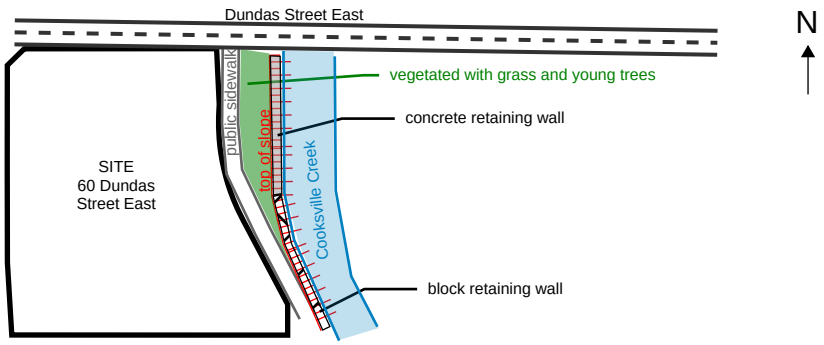
FACE

No slope slide features observed at the slope face

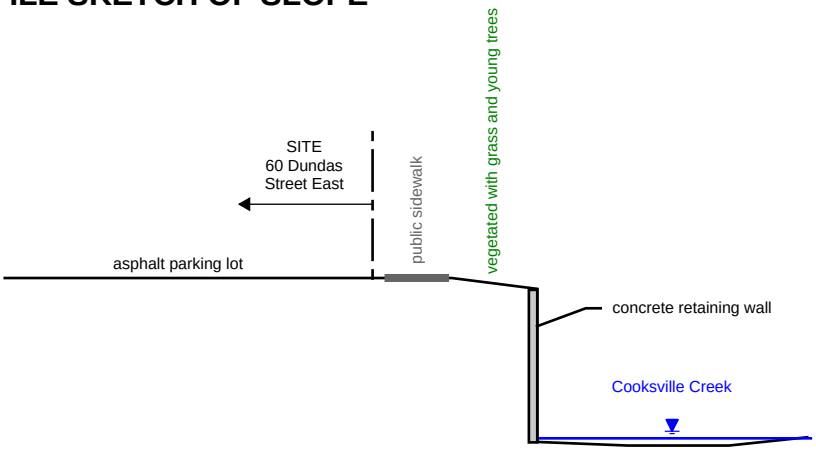
BOTTOM

No slope slide features observed at the toe of slope

13. PLAN SKETCH OF SLOPE



14. PROFILE SKETCH OF SLOPE



SLOPE RATING CHART

GROUNDED ENGINEERING

Site Location: **60 Dundas Street East**

File No. **21-067**

Property Owner:

Inspection Date: **May 17, 2022**

Inspected By: **J. Hunter**

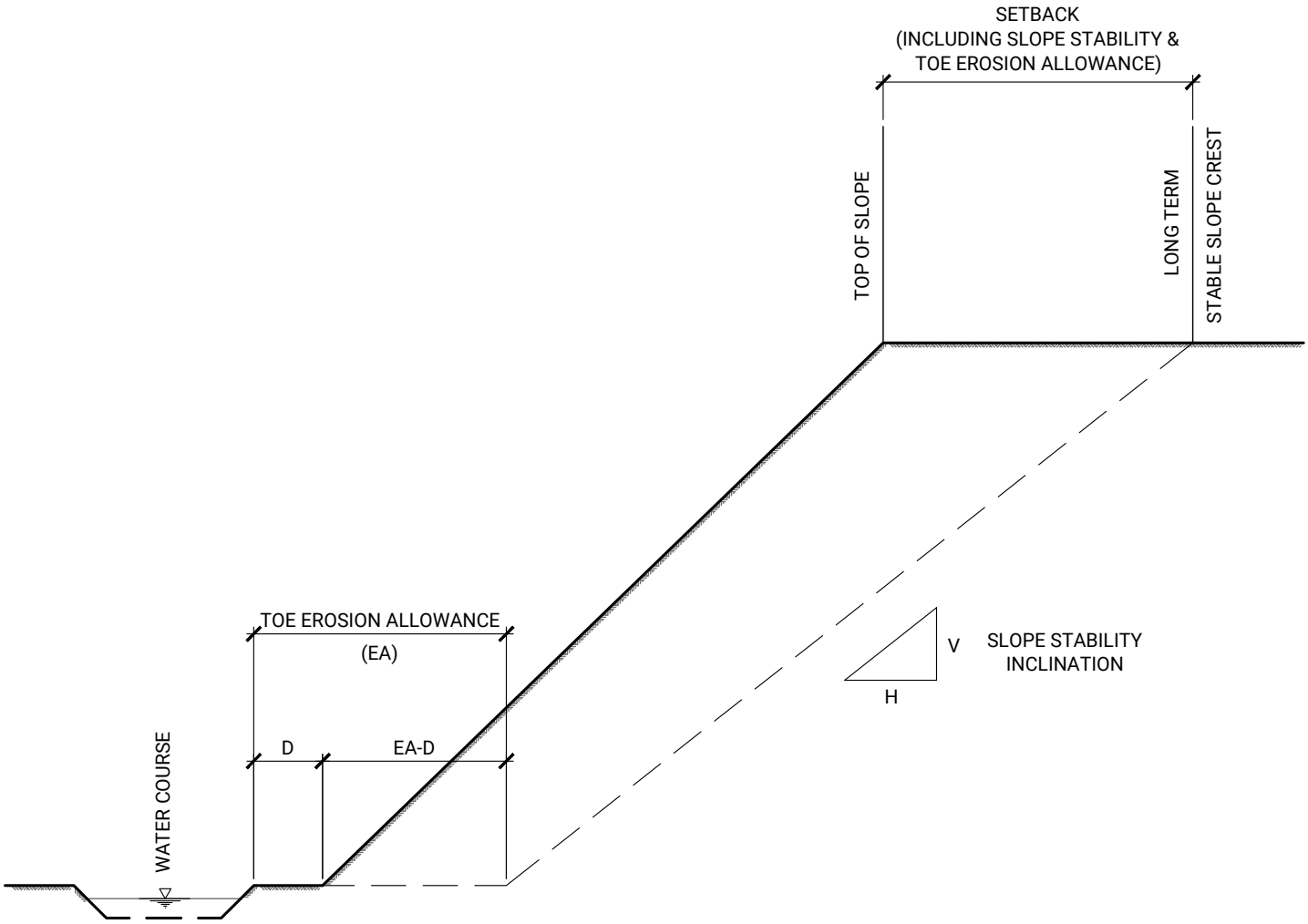
Weather: **Sunny, warm**

				Rating Value
1.	**SLOPE INCLINATION**			
		degrees	**horiz. : vert.**	
	a)	18 or less	3 : 1 or flatter	(0)
	b)	18 - 26	2 : 1 to 3 : 1	6
	c)	more than 26	steeper than 2 : 1	16
2.	**SOIL STRATIGRAPHY**			
	a)	Shale, Limestone, Granite (Bedrock)		0
	b)	Sand, Gravel		6
	c)	Glacial Till		(9)
	d)	Clay, Silt		12
	e)	Fill		(16)
	f)	Leda Clay		24
3.	**SEEPAGE FROM SLOPE FACE**			
	a)	None or Near bottom only		(0)
	b)	Near mid-slope only		6
	c)	Near crest only or, From several levels		12
4.	**SLOPE HEIGHT**			
	a)	2 m or less		0
	b)	2.1 to 5 m		2
	c)	5.1 to 10 m		(4)
	d)	more than 10 m		8
5.	**VEGETATION COVER ON SLOPE FACE**			
	a)	Well vegetated; heavy shrubs or forested with mature trees		(0)
	b)	Light vegetation; Mostly grass, weeds, occasional trees, shrubs		4
	c)	No vegetation, bare		8
6.	**TABLE LAND DRAINAGE**			
	a)	Table land flat, no apparent drainage over slope		(0)
	b)	Minor drainage over slope, no active erosion		2
	c)	Drainage over slope, active erosion, gullies		4
7.	**PROXIMITY OF WATERCOURSE TO SLOPE TOE**			
	a)	15 metres or more from slope toe		0
	b)	Less than 15 metres from slope toe		(6)
8.	**PREVIOUS LANDSLIDE ACTIVITY**			
	a)	No		(0)
	b)	Yes		6

	SLOPE INSTABILITY RATING	**RATING VALUES TOTAL**	**INVESTIGATION REQUIREMENTS**	**TOTAL**
(1.)	Low potential	< 24	Site inspection only, confirmation, report letter.	**19-26**
(2.)	Slight potential	25-35	Site inspection and surveying, preliminary study, detailed report.	
3.	Moderate potential	> 35	Boreholes, piezometers, lab tests, surveying, detailed report.	

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

APPENDIX E



LEGEND

D = AVAILABLE FLOOD PLAIN BETWEEN EDGE OF WATERCOURSE AND SLOPE TOE

EA = TOE EROSION ALLOWANCE

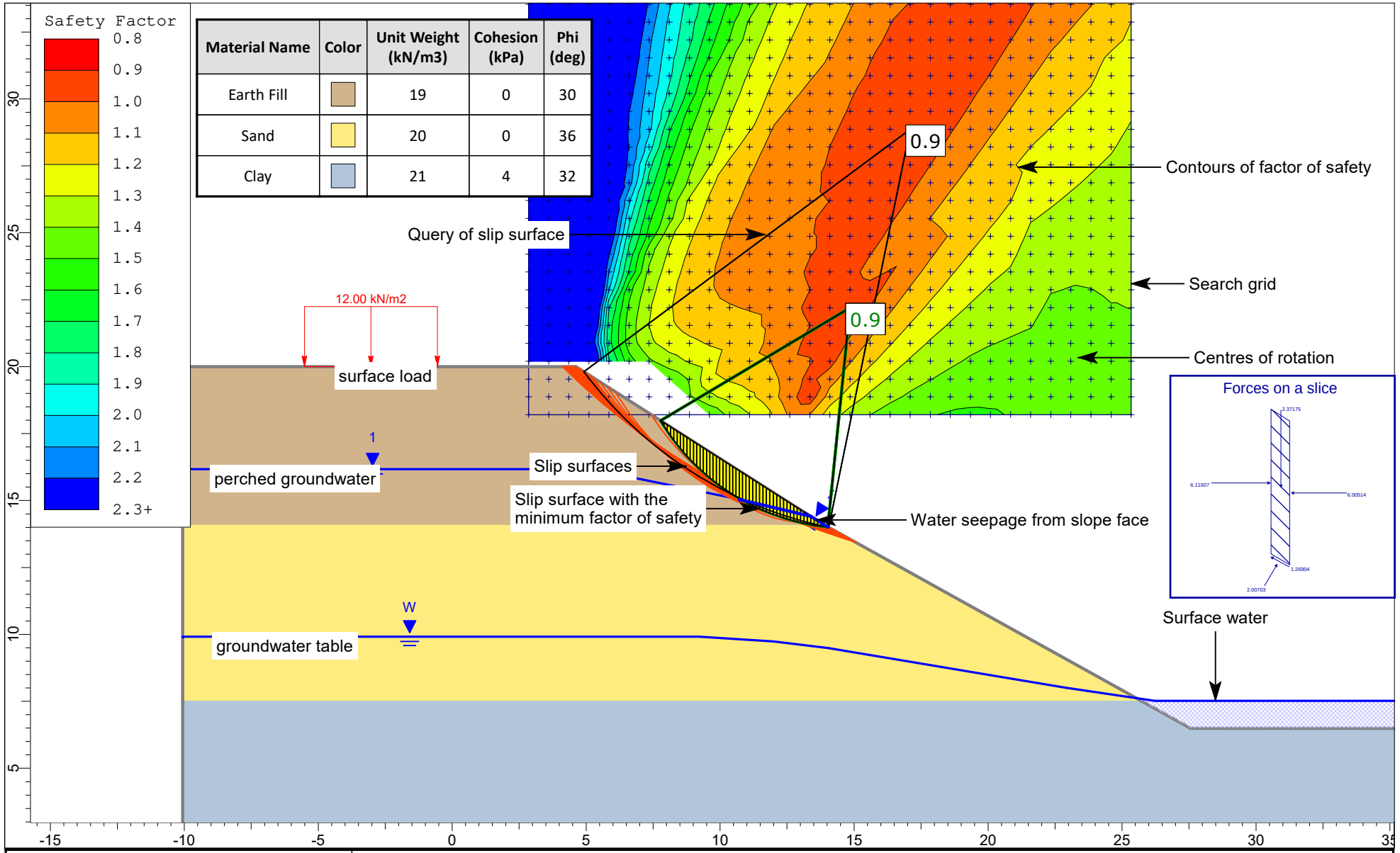
*THE DRAWING PROVIDED IS NOT TO SCALE

GROUNDED ENGINEERING

Title

LONG TERM STABLE SLOPE CREST MODEL

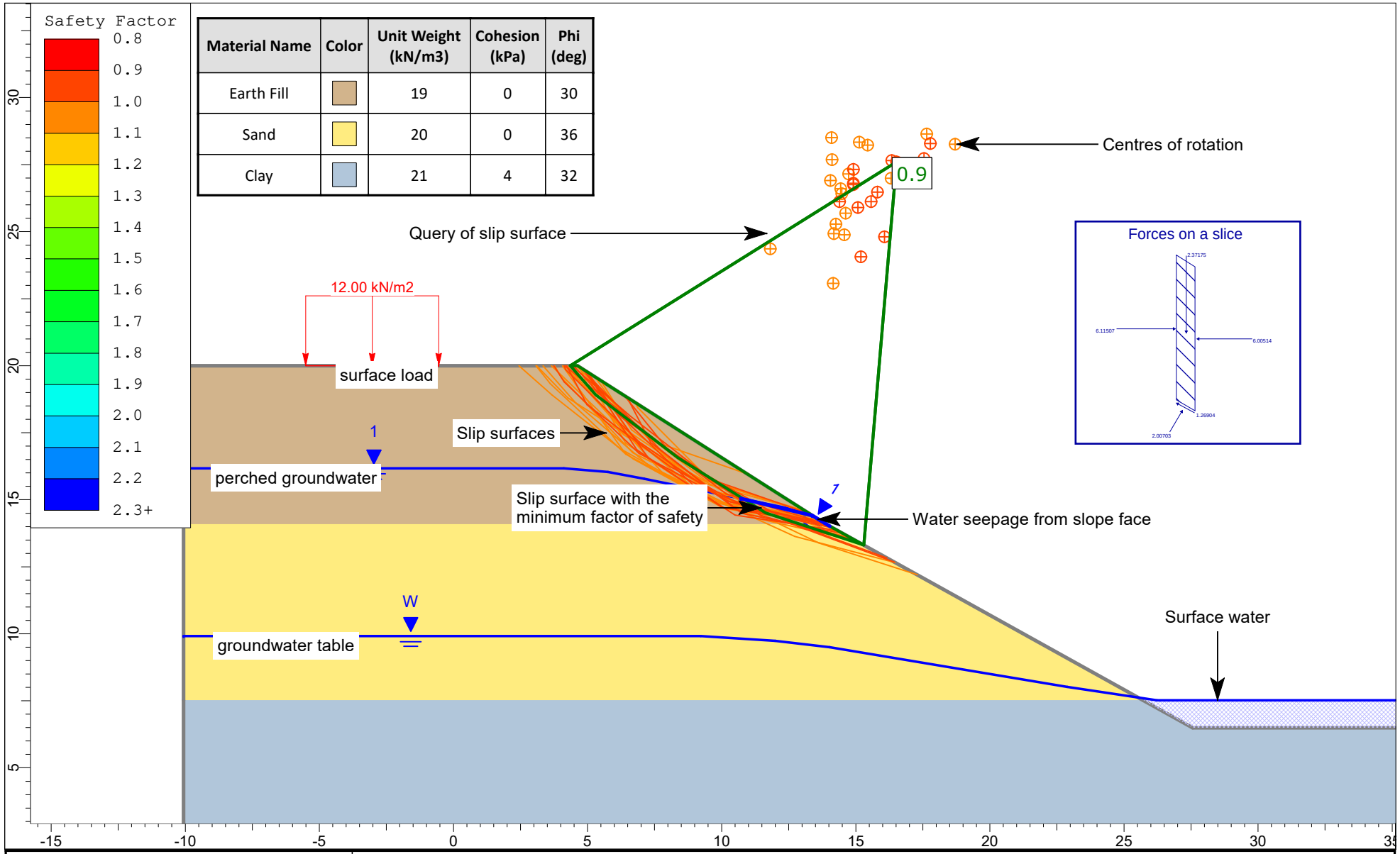
APPENDIX F



GROUNDED ENGINEERING

SLIDEINTERPRET 8.029

Project	EXAMPLE SLOPE STABILITY ANALYSIS		
Analysis Description	Global Stability	Model	Example | circular surfaces
Drawn By	Grounded Engineering	Scale 1:200	Date 2019-12-01
Source	Source		File Name Slide Example.slmd

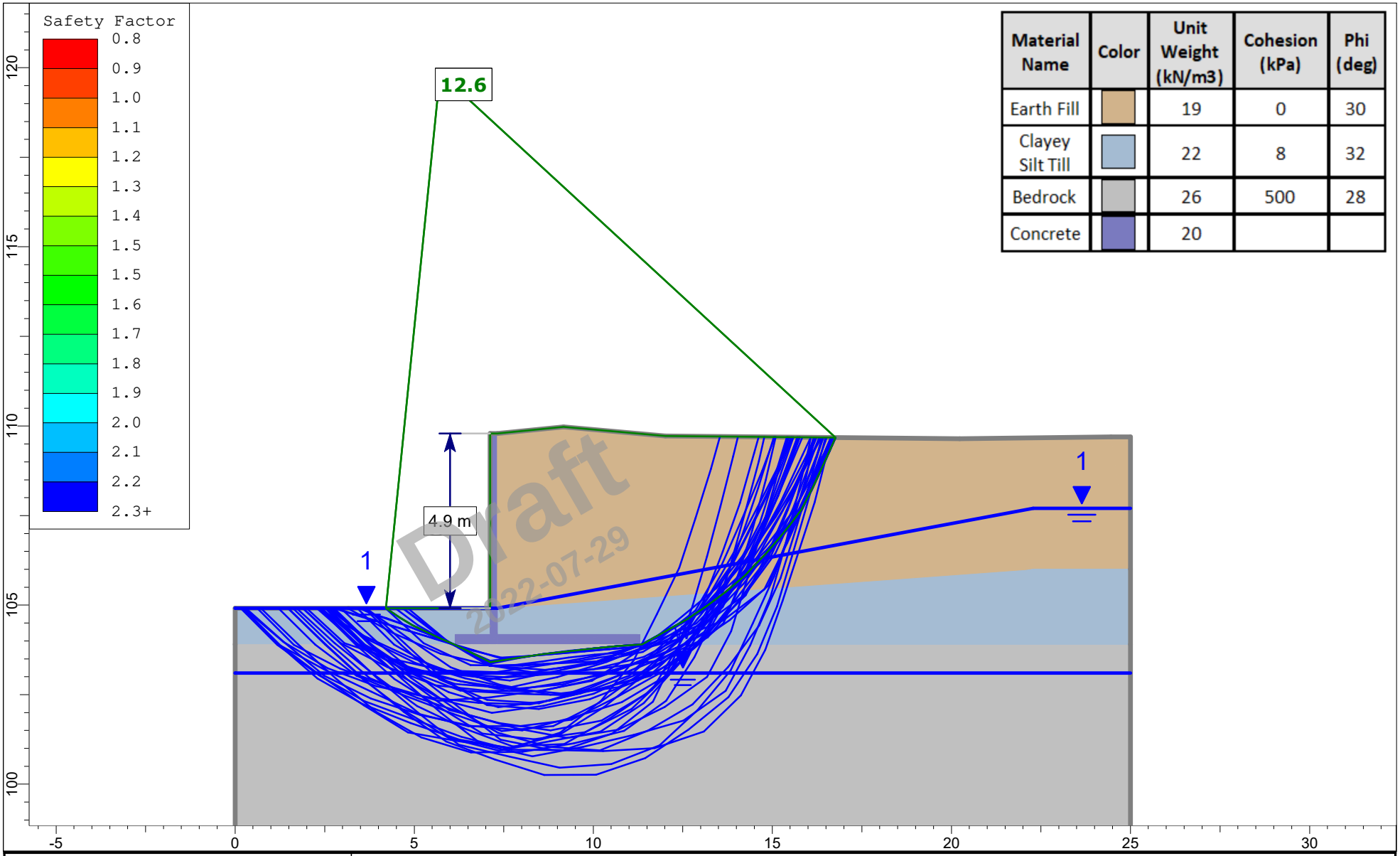


GROUNDED ENGINEERING

SLIDEINTERPRET 8.029

Project	EXAMPLE SLOPE STABILITY ANALYSIS		
Analysis Description	Global Stability	Model	Example | non-circular surfaces
Drawn By	Grounded Engineering	Scale 1:200	Date 2019-12-01
Source	Source		File Name Slide Example.slmd

APPENDIX G

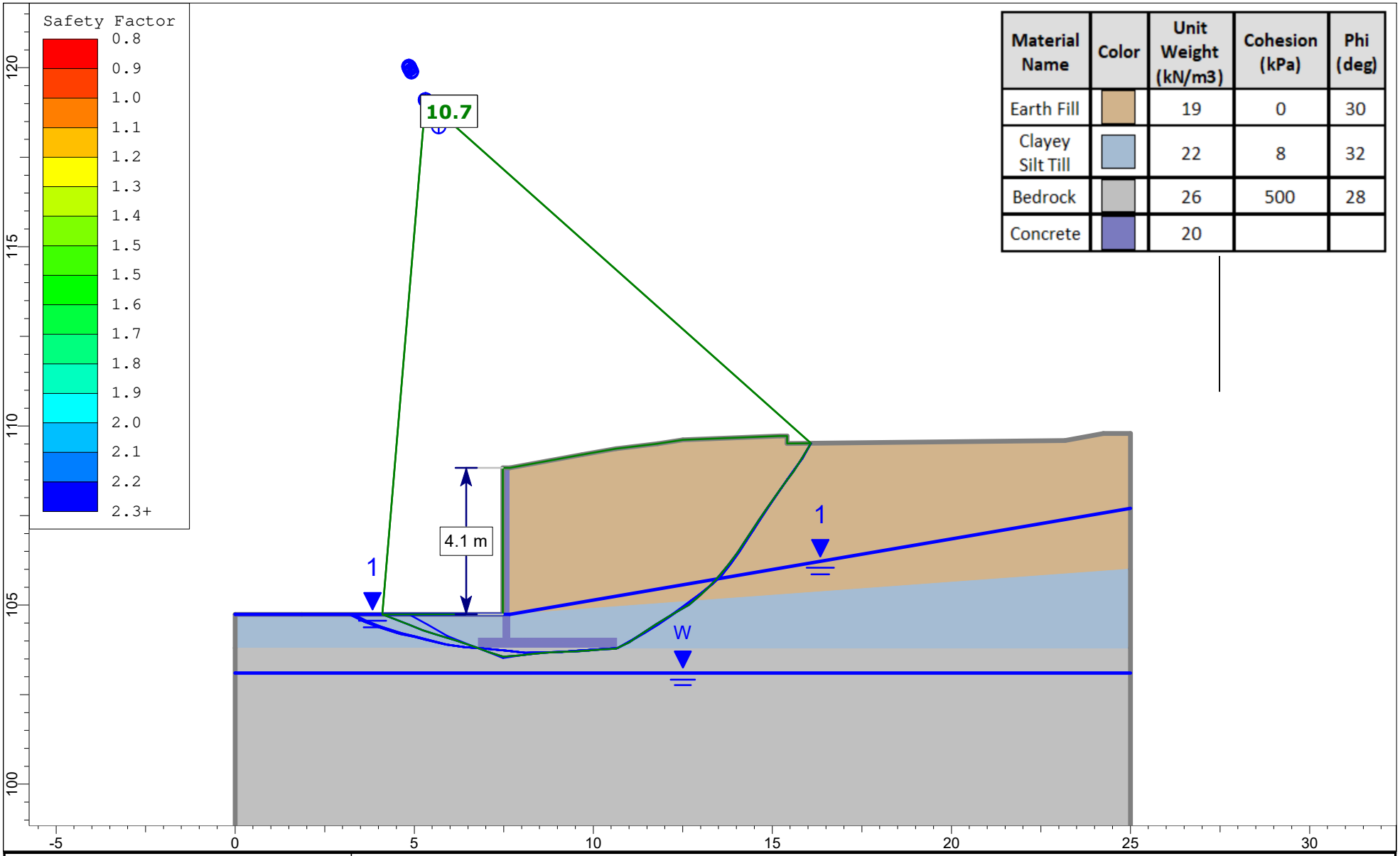


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28
Concrete		20		

GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	Model	Section A, Existing | non-circular, nwt
Drawn By	JH	Scale	1:150
Date	2022-07-29		
Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	File Name	21-067 60 Dundas St E Slope v2.slmd

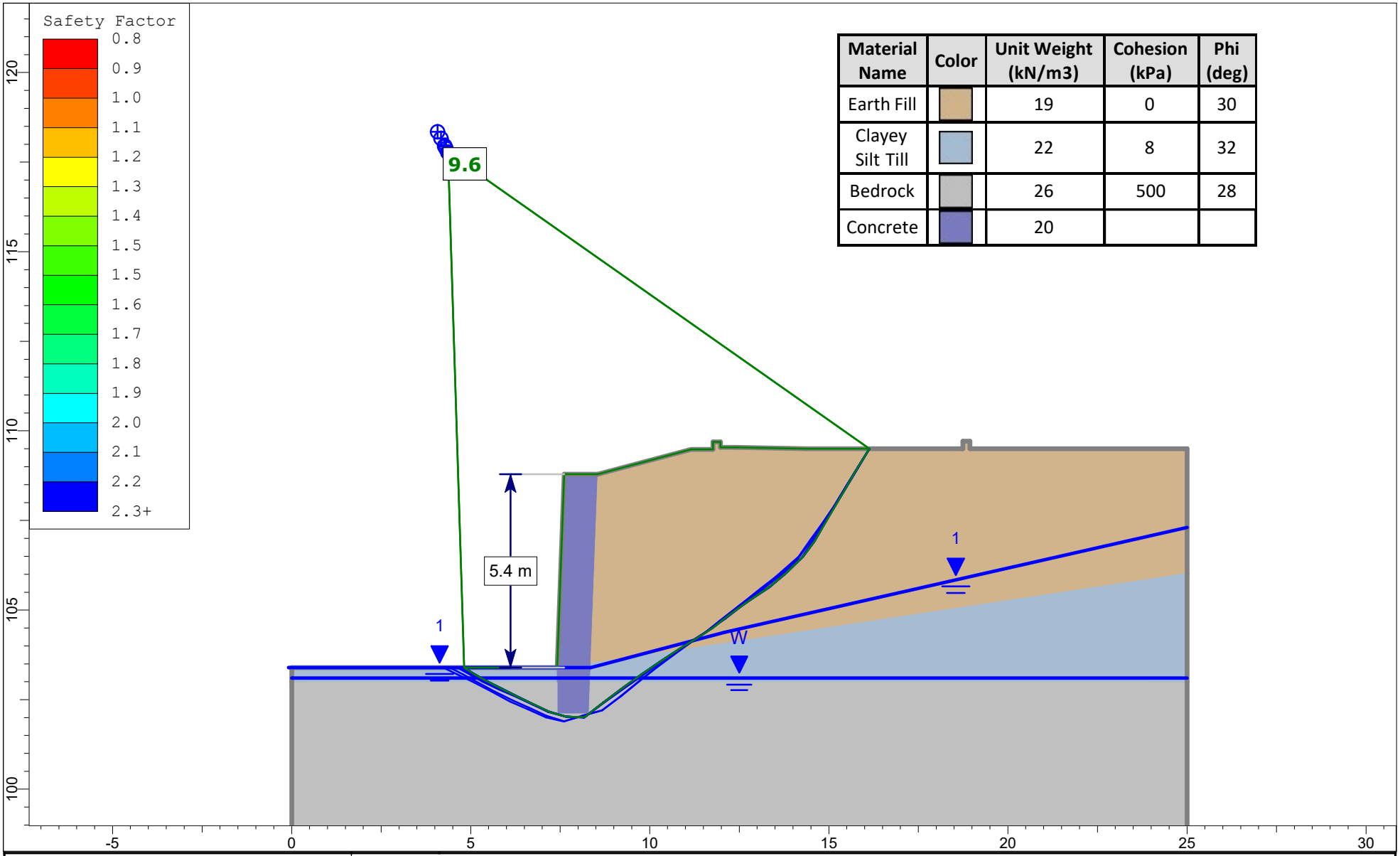


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28
Concrete		20		

GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	*Model*	Section B, Existing | non-circular, nwt
Drawn By	JH	*Scale* 1:150	*Date* 2022-07-29
Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	*File Name*	21-067 60 Dundas St E Slope v2.slmd

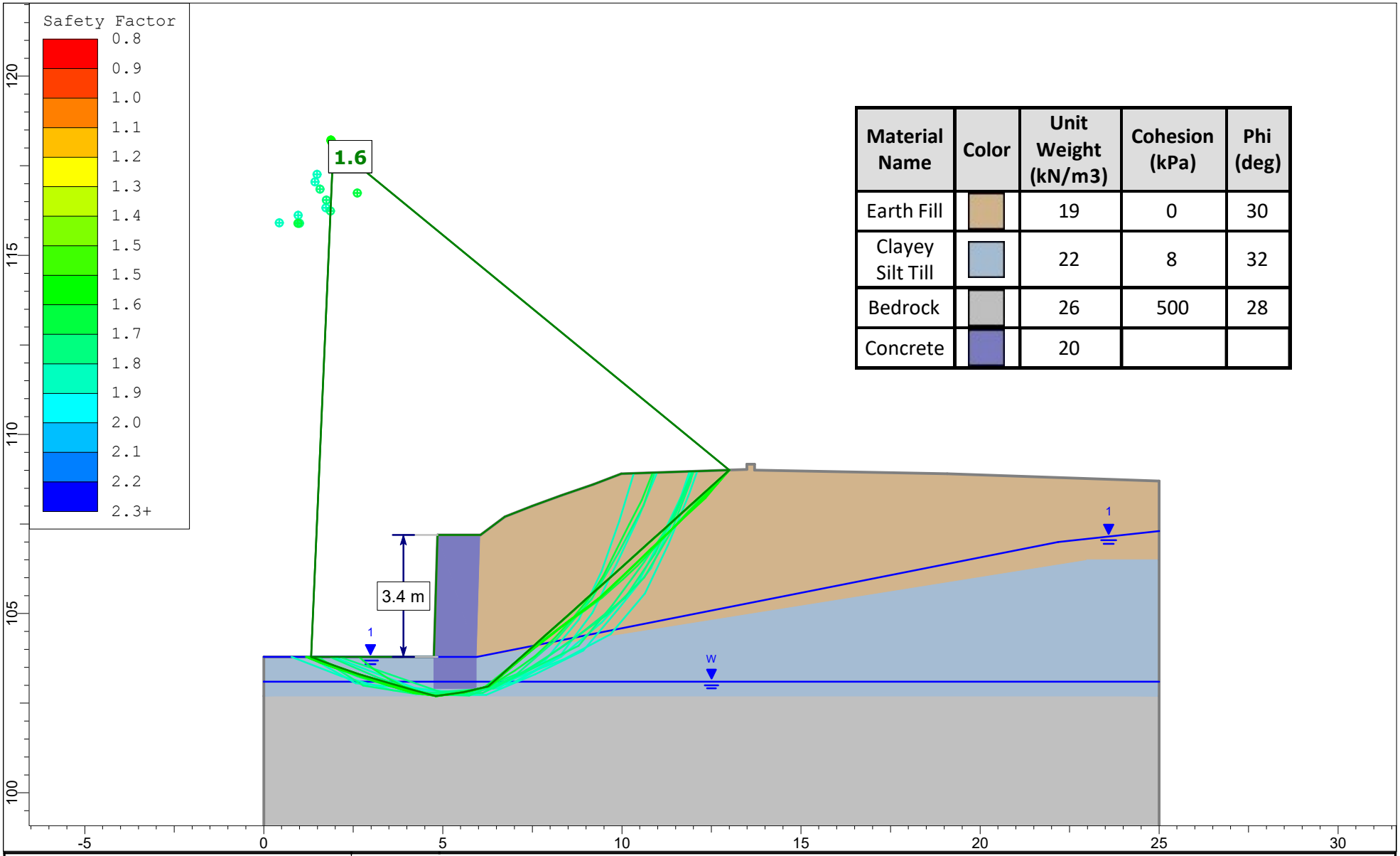


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28
Concrete		20		

GROUNDED ENGINEERING

SLIDEINTERPRET 9.018

File	21-067 | 60 Dundas St E			
Analysis	Global Stability: Section C, Existing Conditions			
Ref.	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021			
RS2 File	21-067 60 Dundas St E Slope v2.slmd	Scale	1:150	Eng JH

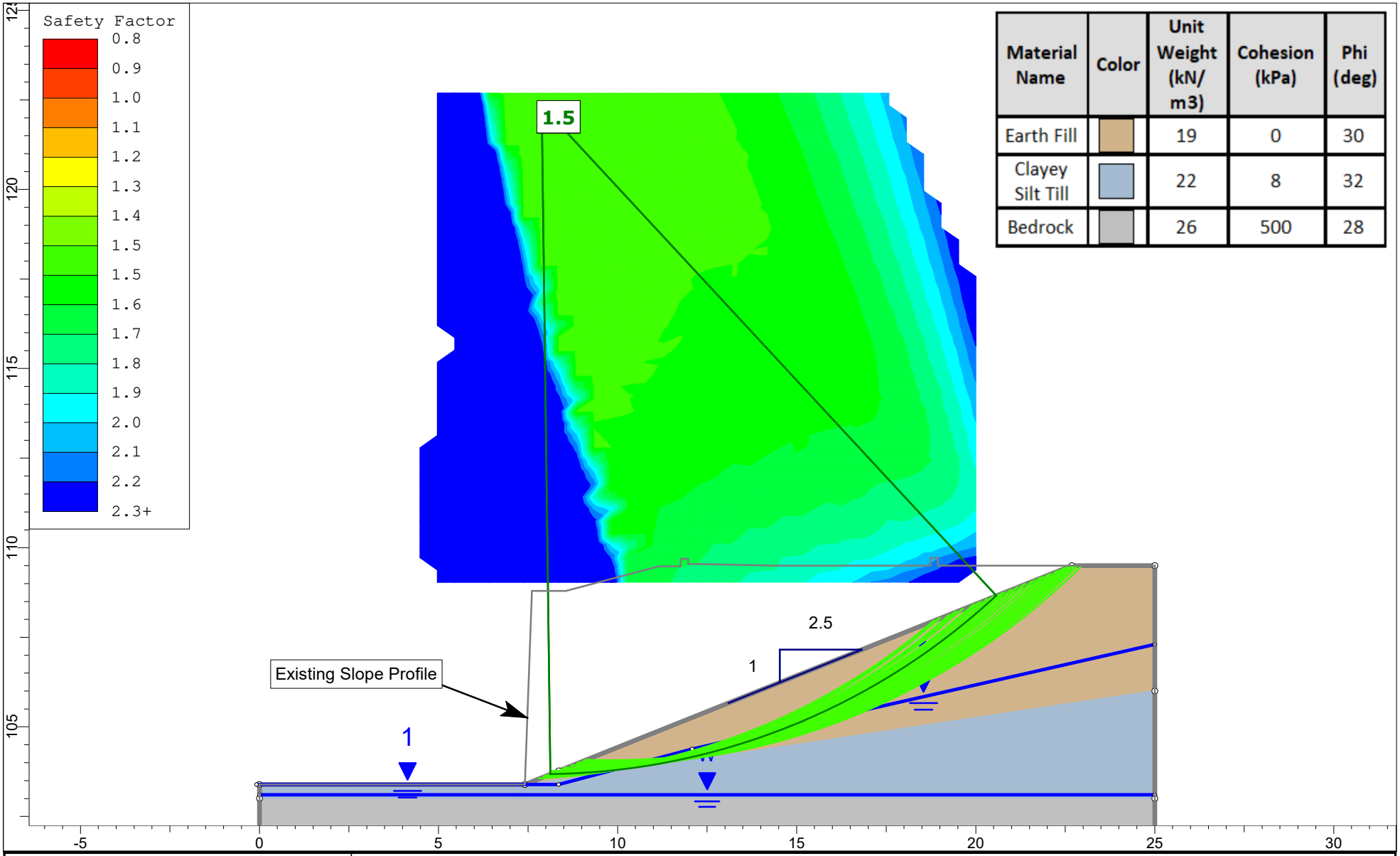


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28
Concrete		20		

GROUNDED ENGINEERING

File	21-067 | 60 Dundas St E			
Analysis	Global Stability: Section D, Existing Conditions			
Ref.	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021			
RS2 File	21-067 60 Dundas St E Slope v2.slmd	Scale	1:150	Eng JH

SLIDEINTERPRET 9.018

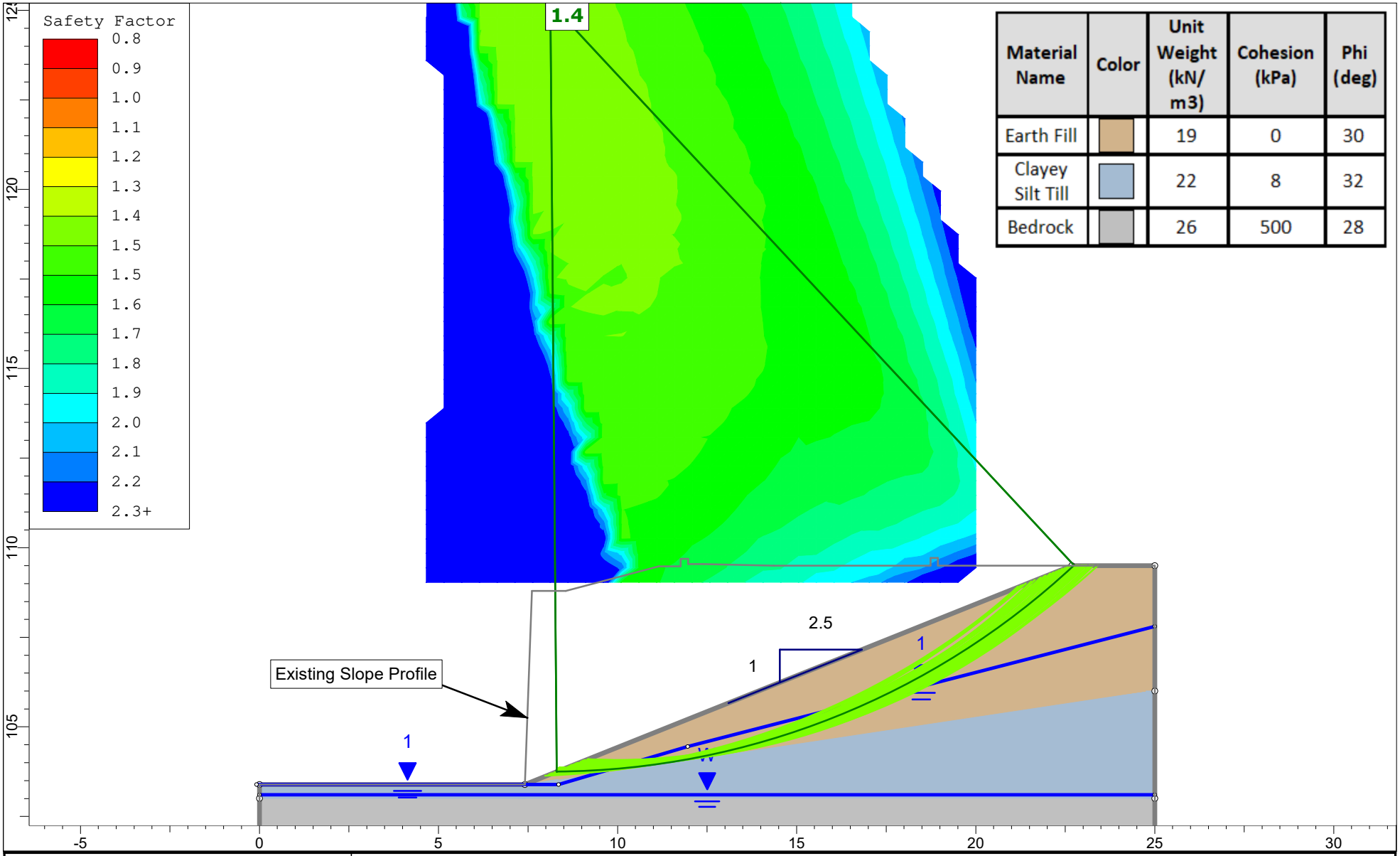


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28

GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	Model	Section C, LTSSC | circular, nwt
Drawn By	JH	Scale	1:150
Date	2022-07-29		
Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	File Name	21-067 60 Dundas St E Slope v2.slmd

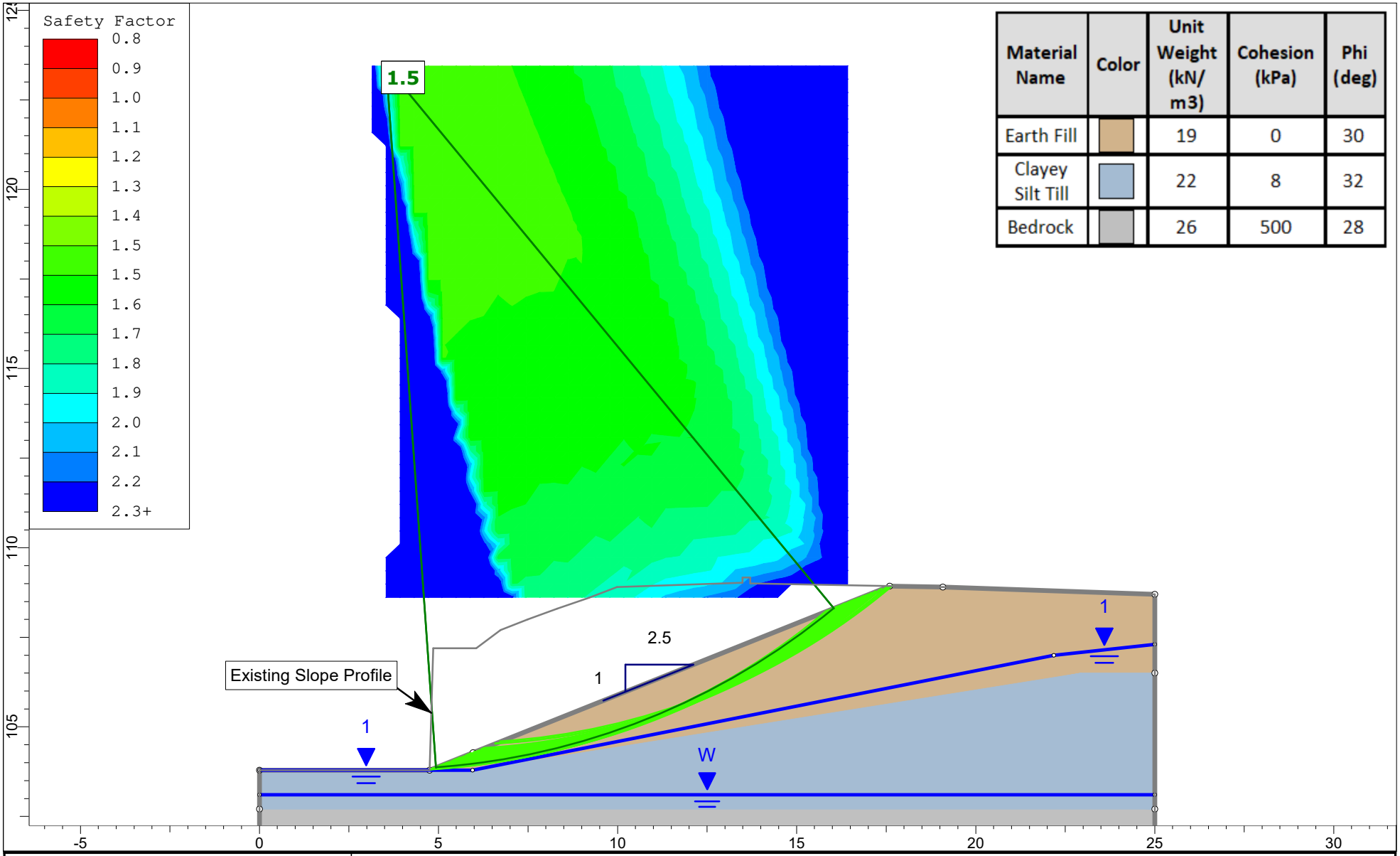


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28

GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	Model	Section C, LTSSC | circular, hwt
Drawn By	JH	Scale	1:150
Date	2022-07-29		
Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	File Name	21-067 60 Dundas St E Slope v2.slmd

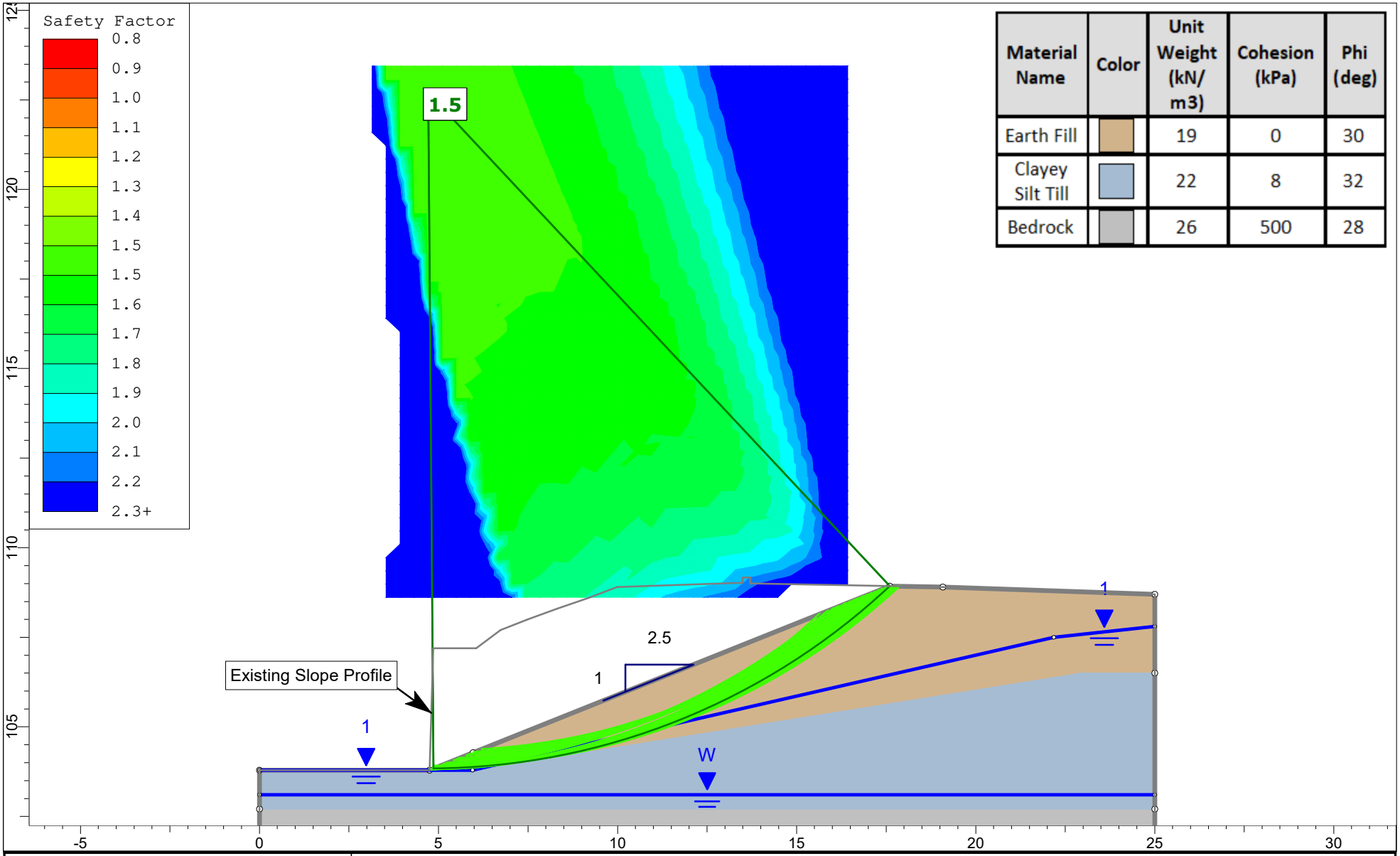


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
Bedrock		26	500	28

GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	Model	Section D, LTSSC | circular, nwt
Drawn By	JH	Scale	1:150
Date	2022-07-29		
Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	File Name	21-067 60 Dundas St E Slope v2.slmd



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Earth Fill		19	0	30
Clayey Silt Till		22	8	32
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GROUNDED ENGINEERING

SLIDEINTERPRET 9.023

Project	21-067 | 60 Dundas St E		
Analysis Description	Global Stability	Model	Section D, LTSSC | circular, hwt
Drawn By	JH	Scale	1:150
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Source	Aksan Piller Corporation Ltd., Survey Drawing, Reference No. 20-21-14108-00, dated April 5, 2021	File Name	21-067 60 Dundas St E Slope v2.slmd