Preliminary Geotechnical Investigation Report - 505 Yonge Street, Barrie, Ontario, Revision 1

September 22, 2023

Prepared for:
Renaissance Barrie Retirement Trust

Cambium Reference No.: 9574-004

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1.0 INTRODUCTION

Cambium Inc. (Cambium) was originally retained by Park City Inc. in 2019 to complete a preliminary geotechnical investigation in support of the design and construction of five residential condominium buildings (up to eight storeys in height) with commercial units, one level of underground parking throughout the extents of the development portion of the site, and several retaining walls around the perimeter of the site. In 2021, Cambium was retained by Renaissance Barrie Retirement Trust (Client) following their purchase of the property to update the geotechnical recommendations to support a new residential commercial development at the site.

The site is located to the east of Yonge Street, directly adjacent to the intersection of Yonge Street and D'Ambrosio Drive, and consists of 505, 511, 515 and 533 Yonge Street, Barrie, Ontario (Site). At the time of investigation, the site is currently developed along the southwestern perimeter with a parking area and associated two storey brick commercial building (505 Yonge Street), and three residential dwellings (511, 515 and 533 Yonge Street). The three residential dwellings have basements, and the commercial building is built into the existing onsite slope, with a basement walkout at the rear of the building. The remainder of the site is undeveloped and forested towards the northern and eastern quadrants of the property. The site descends in grade from approximately +/- 248 mASL at the north west area of the site to +/- 233 mASL at the east portion of the property (approximately +/- 15 m grade differential). Tollendale Creek is located directly east of the eastern property limits and has an 'edge of water' elevation of 231.55 mASL (September 1, 2017, survey).

At the time of preparing this report, the updated development plan includes three multi-storey apartment buildings with above and below ground parking areas. The proposed buildings are 8, 10 and 12 storeys tall. The proposed 10 storey building with also include a commercial space at the ground level. The underground parking structure will span to the extents of the proposed footprint of all buildings and will consist of two underground levels. The proposed development plan is overlayed on Figures 1 and 2, respectively.

The purpose of this geotechnical investigation was to obtain information about the subsurface conditions by means of advancing eleven boreholes (six outfitted with monitoring wells) at select locations across the proposed development area and based on the findings, provide recommendations pertaining to the geotechnical design and slope stability assessment of the proposed parking garage, retaining walls and buildings. This report presents the methodology and findings of the geotechnical investigation completed at the site and addresses requirements and constraints for the design and construction of the proposed structure and facilities.

As part of the scope of work, Cambium was also retained to complete a hydrogeological assessment, which will be provided under a separate cover.

2.0 METHODOLOGY

2.1 Borehole Investigation

Cambium completed a geotechnical investigation at the Site on August 15, 16, 26, 27 and October 15, 2019. A total of eight boreholes, designated as BH101-19 through BH108-19 were advanced at predetermined locations throughout the Site to depths between 5.0 metres below ground surface (mbgs) and 15.7 mbgs. Cambium returned to site on September 15 and 22, 2021 to conduct three additional boreholes, designated as BH109-21 through BH111-21. The additional boreholes were advanced to depths ranging from 3.5 to 14.0 mbgs. All borehole locations, surface elevations, termination depths and monitoring well statuses are summarized below in Table 1.

Table 1 Borehole Summary

Borehole	General Location	Ground Surface Elevation (mASL)	Termination Depth (mbgs)	Elevation at Termination Depth (mASL)	Groundwater Monitoring Installation
BH101-19	High-Rise Structure #1	247.8	15.7	232.1	None
MW/BH102-19	High-Rise Structure #2	247.6	15.7	231.9	Monitoring Well
BH103-19	Parking Area	246.1	6.6	239.5	None
BH104-19	High-Rise Structure #4	243.6	11.4	232.2	None
BH105-19	High-Rise Structure #2	246.6	6.6	240.0	None
MW/BH106-19	High-Rise Structure #3	244.5	8.1	236.4	Monitoring Well
BH107-19	High-Rise Structure #3	241.3	5.0	236.3	None
MW/BH108-19	High-Rise Structure #4	242.6	11.1	231.5	Monitoring Well
MW/BH109-21	High-Rise Structure #1	247.0	14.0	233.0	Monitoring Well
MW/BH110-21	High-Rise Structure #4	243.9	8.0	235.9	Monitoring Well
MW/BH111-21	High-Rise Structure #4	239.6	3.5	236.1	Monitoring Well

The coordinates for the boreholes were obtained from a handheld GPS unit while the elevation of the boreholes was surveyed relative to the 'top spindle' of a fire hydrant located on the east side of Yonge Street, in front of 515 Yonge Street, which has an elevation of 246.44 metres above sea level (mASL) according to a survey plan provided by the Client (Topographical Plan Survey of all Lots 38 and 39 and Part of Block C Registered Plan 885, City of Barrie; Dino Astri Surveying, April 12, 2016). A Site Plan, including borehole locations and benchmark is appended as Figure 1 of this report.

Drilling and sampling was completed using either a truck-mounted drill rig or Minute-Man tripod drill depending on the hole location, operating under the supervision of a Cambium Geotechnical Analyst. The boreholes were advanced to the sampling depths by means of continuous flight hollow stem augers with 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) N values were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm into the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive materials. Soil samples were collected at approximately 0.75 m intervals in the upper 3.0 m, 1.5 m intervals between 3 mbgs and 16 mbgs and generally 3 m intervals below 16 mbgs. The encountered soil units were logged in the field using visual and tactile methods, and samples were placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage.

Open boreholes were checked for groundwater and general stability prior to backfilling. As noted in Table 1, boreholes BH102-19, BH106-19 and BH108-19 through BH111-21 were outfitted as monitoring wells in order to assess the groundwater conditions at the site. All other boreholes were backfilled and sealed in accordance with Ontario Regulation (O.Reg.) 903, as amended, and the property was reinstated as close to pre-existing conditions as reasonably possible.

Borehole logs are provided in Appendix A. Site soil and groundwater conditions are described and geotechnical recommendations are discussed in the following sections of this report.

2.2 Physical Laboratory Testing

Physical laboratory testing, including seven particle size distribution analyses (LS-702,705), was completed on selected soil samples to confirm textural classification and to assess geotechnical parameters. Moisture content testing was completed on all retrieved soil samples. The testing results are presented in Appendix B and are discussed in Section 3.0.

3.0 SUBSURFACE CONDITIONS

The detailed soil profiles encountered within the boreholes are described on the attached borehole logs in Appendix A. It should be noted that the conditions indicated on the borehole logs are for specific locations only and can vary between and beyond the borehole locations. The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change. In addition, the descriptions provided in the borehole logs are inferred from a variety of factors, including: visual observations of the soil samples retrieved, laboratory testing, measurements prior to and after drilling, and the drilling process itself (drilling speed, shaking/grinding of the augers, etc.).

Quaternary Geological mapping (M2645 Quaternary Geology, Eastern half of the Barrie and Elmvale Areas, Ontario Geological Survey) indicates that the area of the site is within a deposit of undifferentiated glacial till having a moderately stony to stony, silty sand to sand matrix. Fluvial sediments consisting of very fine to coarse grained sand, gravel, silt, and clay matrix exist within the general vicinity of the site.

Based on the results of the borehole investigation, subsurface conditions at the Site generally consists of silty sand fill material overlying silty sand to sandy silt glacial till soils. Bedrock was not encountered during this geotechnical investigation.

3.1 Asphalt

A layer of asphaltic concrete was encountered at the surface of three boreholes advanced within the existing parking areas at the site. The asphalt was 25 mm, 50 mm, and 75 mm in thickness within boreholes BH102-19, BH104-19, and BH110-21, respectively.

3.2 Topsoil

A surficial layer of topsoil, approximately 200 to 750 mm in thickness, was encountered at the surface of boreholes BH106-19 through BH109-21, and BH111-21. The topsoil was

predominantly sandy in composition and noted as moist at the time of investigation, with natural moisture contents between 6% and 21% based on laboratory testing. Based on SPT N values between 9 and 24, the topsoil was observed to be loose to compact. Assessment of the organic matter content or nutrients in the topsoil was beyond the scope of this investigation. Further delineation of topsoil depths at the site would require test pits in a grid pattern to augment the borehole information.

3.3 Fill Soils

Fill soils were generally encountered in each of the boreholes advanced throughout the site with the exception of BH107-19. The fill varied between imported granular materials encountered within boreholes BH101-19 through BH104-19 and reworked native soils encountered within the remaining boreholes. The granular fill soils generally consisted of sand to gravelly sand containing varying amounts of silt and cobbles. The reworked native soils typically varied from sand to silty sand with varying amounts of silt and gravel. Traces of organics were noted within the reworked fill. The fill was generally very loose to dense in relative density based on SPT N values ranging from 2 to 38 blows. Based on the laboratory analysis, the soil moisture content of the fill soils varied between 3% and 19%, and the soils were generally moist at the time of investigation.

The thickness of the fill encountered throughout the site is summarized below in Table 2.

Table 2 Fill Thickness Summary

Borehole	Ground Surface Elevation (mASL)	Thickness of Topsoil (m)	Thickness of Fill Soils (m)	Elevation at Base of Fill or Topsoil (mASL)
BH101-19	247.79	-	2.30	245.46
MW/BH102-19	247.57	-	3.00	244.57
BH103-19	246.14	-	1.50	244.64
BH104-19	243.60	-	3.00	240.60
BH105-19	246.64	-	2.30	244.34
MW/BH106-19	244.45	0.75	1.55	242.15
BH107-19	241.33	0.75	-	240.58
MW/BH108-19	242.59	0.75	1.55	240.29
MW/BH109-21	247.04	0.20	1.30	245.54
MW/BH110-21	243.90	-	3.00	240.90
MW/BH111-21	239.61	0.20	0.00	239.41

3.4 Silty Sand to Sandy Silt Glacial Till

The predominant native soil encountered throughout the site consisted of silty sand to sandy silt with varying amounts of clay and gravel and occasional rounded coarse gravel which was identified as a glacial till. The glacial till soils extended to the termination depth within all of the borehole locations. SPT N values within the glacial till deposit ranged from between 14 to greater than 50 blows per 50 mm of penetration indicating a compact to very dense relative density. Soil moisture content of the glacial till deposit ranged from between 3% to 13%, and at the time of drilling the soil was generally in moist state with wet seams noted within the deposit.

Laboratory particle size distribution analyses were completed for seven samples of the glacial till soils, taken from the boreholes and depths provided in Table 3 in order to identify the soil texture. The testing results are provided in Appendix B and are summarized in Table 3 based on the Unified Soil Classification System (USCS).

Table 3 Particle Size Distribution Analysis – Silty Sand to Sandy Silt Glacial Till

Borehole	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay	Moisture Content (%)
BH101-19-SS12	13.7 – 14.2	Silty Sand some clay trace gravel	2	51	30	17	8.6
BH103-19-SS4	2.3 – 2.7	Silty Gravelly Sand, trace clay	23	42	25	10	11.0
BH104-19-SS7	6.1 – 6.6	Silty Sand some clay trace gravel	3	55	32	10	7.5
BH106-19-SS6	4.6 – 5.0	Silty Sand some gravel trace clay	11	58	23	8	8.6
BH107-19-SS2	0.8 – 1.2	Silty Sand trace gravel trace clay	6	60	26	8	9.4
BH109-21-SS6	4.5 – 5	Sandy Silt some Clay trace Gravel	5	29	55	11	14.0
BH111-21-SS3	1.5 – 1.9	Gravelly Sand some Silt	32	53	15		9.7

3.5 Bedrock

Bedrock was not encountered within the investigation depths.

3.6 Groundwater

During the geotechnical investigation conducted in 2019, groundwater (free water) was observed in each of the boreholes (BH101-19 through BH108-19) advanced at the site on completion of drilling at depths between 4.0 mbgs and 11.0 mbgs. Caving (sloughing) was observed in four of the boreholes advanced within the site at depths between 4.3 mbgs and

8.5 mbgs. During the site investigation three monitoring wells were installed in boreholes BH102-19, BH106-19, and BH108-19.

During the geotechnical investigation conducted in September 2021, groundwater (free water) was not observed in any of the boreholes, however, wet soils were encountered in borehole BH109-21 and BH111-21 at depths of 3.0 and 1.5 mbgs, respectively. During the site investigation, all three boreholes were outfitted with monitoring wells. Following completion of the geotechnical investigation, groundwater levels were recorded in monitoring wells BH109-21 through BH111-21 at depths between 1.8 to 4.32 mbgs.

Cambium technician's have been returning to the site to record groundwater levels since the initial site visit on August 15, 2019. Groundwater and caving observations taken during the geotechnical investigation are summarized below in Table 4.

The moisture content of the soils generally ranged from 3% to 27% and soils were generally brown to grey in colour. Seams of wet soils were encountered throughout the boreholes at varying depths. It should be noted that soil moisture and groundwater levels at the Site may fluctuate seasonally and in response to climatic events.

The groundwater flow and additional groundwater considerations will be provided with the hydrogeological study conducted by Cambium to the Client under a separate cover.

Table 4 Groundwater and Caving Observations

Date	Borehole	Borehole Collar Elevation (mASL)	Depth of Groundwater (mbgs)	Elevation of Groundwater (mASL)	Caving Depth (mbgs)
August 15 2019	BH101-19	247.79	8.2	239.7	8.5
August 16 2019	MW/BH102-19	247.57	8.2	239.4	-**
August 26 2019	BH103-19	246.14	5.8	240.3	5.9
	BH104-19	243.60	11.0	232.6	-
August 27 2019	BH105-19	246.64	4.0	242.6	5.2
	MW/BH106-19	244.45	7.6	236.9	-
	BH107-19	241.33	4.1	237.2	4.3

Date	Borehole	Borehole Collar Elevation (mASL)	Depth of Groundwater (mbgs)	Elevation of Groundwater (mASL)	Caving Depth (mbgs)
September 16 2021	MW/BH109-21	247.04	-*	N/A	-
September 16 2021	MW/BH110-21	243.90	-	N/A	-
September 22 2021	MW/BH111-21	239.61	-	N/A	-

*Groundwater (free water) not encountered upon completion of drilling
** Monitoring well installed within hollow-stem augers; borehole would not be able to cave

Table 5 Follow-Up Groundwater Level Readings

Monitoring Well	Ground Surface (mASL)	August 27, 2019	October 16, 2019	October 24, 2019	November 19, 2019	December 10, 2019	January 10, 2020
BH/MW102-19	247.57	243.13	243.02	243.04	243.47	243.67	243.92
BH/MW106-19	244.45		240.19	240.32	240.85		241.38
BH/MW108-19	242.59		240.84	240.98	241.62	241.99	241.74

Monitoring Well	Ground Surface (mASL)	February 11, 2020	March 11, 2020	April 2, 2020	May 8, 2020	June 17, 2020	September 24, 2021
BH/MW102-19	247.57	243.92	244.10	244.21	243.80	243.67	243.41
BH/MW106-19	244.45	241.28	242.08	241.42	241.14	241.10	242.08
BH/MW108-19	242.59	241.62	242.05	241.83	241.50	241.40	241.92
BH/MW109-21	247.04						245.27
BH/MW110-21	243.90						239.59
BH/MW111-21	239.61						237.78

4.0 SLOPE STABILITY STUDY

4.1 General

Stability analyses were carried out to assess the Factor of Safety (FOS) against slope failure. Slope stability analyses were performed using Slope/W, an industry standard two-dimensional limit equilibrium slope modelling program. Inputs required for the Slope/W program include soil stratigraphy and geotechnical design parameters as discussed in the following sections. The results of the stability analyses are presented in Table 6 and illustrated in Figures 3 to 14.

4.2 Adopted Parameters for Stability Analyses

Based on the results of a desktop review and findings of the geotechnical investigations the geotechnical parameters used to evaluate the stability of the slope are presented in Table 6. Effective stress strength parameters were based on published laboratory test results and in situ testing correlations. Peak undrained shear strengths were interpreted from in situ test results and in situ testing correlations.

Table 6 Parameters for Stability Analyses

Lithological Unit	Unit Weight (kN/m²)	Peak Effective Strength Parameters C' (kPa)	Peak Effective Strength Parameters (ϕ')	Peak Undrained Strength Parameters
Topsoil	15	0	20 º	-
Sand (Fill)	17	0	26 º	-
Sand	18	0	28 º	-
Silty Sand*	18	0	30 º	-
Sandy Silt	17	0	30 º	-
Silty Sand**	21	0	36 º	-
Native Material***	21	0	36 º	-

* Encountered above 237.5 mASL
** Encountered below 237.5 mASL
*** Inferred material, deepest borehole advanced to 232.5 mASL during geotechnical investigation

4.3 Loading Cases

The loading cases used in the stability evaluation are presented in Table 7 along with the recommended minimum FOS from the Ontario Ministry of Natural Resources River and Stream Systems: Erosion Hazard Limit Technical Guidelines. Also included in the table are the assumed strength parameters and water levels for each loading case.

It is noted that previous slope stability reports pertaining to the existing slope conditions were submitted to the LSRCA by other consultants and deemed acceptable by the LSRCA for determining the existing slope is in a stable condition. The purpose of our slope stability modelling was to determine the effects the loading the proposed development would have on the existing slopes.

A topographic survey was provided by the Client and produced by the surveying contractor, JoeTOPO. The slope of interest is the native slope on the property instead of the fill embankment placed during the previous development of site as it is understood that much of the fill embankment is to be replaced with the proposed underground parking garage and that in order to achieve the design bearing capacities recommended within this report the building(s) will need to be founded on competent native soils. The native slope appears to have an approximate top of stable slope elevation of ~240.0 mASL, with southwest to northeast strike and dip ranging from 3H:1V to 1.5H:1V downslope towards the east. Sections A-A,' B-B,' and E-E' have been situated through the proposed Building 3, and Section C-C' and D-D' through the proposed Building 2, as shown on Figure 2.

In general, where subsurface information was limited, engineering judgement was used to infer subsurface conditions. In the existing condition models, the parking garage was assumed to have a spread load of 350 kPa at an elevation of 238 mASL. Proximity of the parking garage to the top of subject slope approximated using the proposed development site plan provided by the Client and overlain the site in Figure 1. Given the recommendations provided herein, the spread load for the proposed building was assumed as 350 kPa which was deemed a conservative value as the ultimate building load will likely be designed based on the SLS bearing capacity as opposed to the ULS bearing capacity (350 kPa).

Table 7 Stability Loading Cases and Results

Figure	Loading Case	Design Minimum FOS*	Description	FOS
3	Slope East of Proposed Building 4 (Section A-A') Building Induced Slip Failure	1.3 - 1.5	Models the long term static stability of the slope assuming pore pressures have normalized. The modelled slope is subjected to surcharge equal to the maximum allowable bearing capacity to determine risk of induced global instability.	**1.7**
4	Slope East of Proposed Building 4 (Section A-A') Extreme Case	**	Models the long term static stability of the slope assuming groundwater is modelled in an extreme scenario where the groundwater is acting against the slope and only drains at the toe. The modelled slope is at the critical section of the existing slope face. *The extreme case slip assumes the building induced loading will result in a global slip failure.*	**1.7**
5	Slope South of Proposed Carpark (Section B-B') Building Induced Slip Failure	1.3 - 1.5	Models the long term static stability of the slope assuming pore pressures have normalized. The modelled slope is subjected to surcharge equal to the maximum allowable bearing capacity to determine risk of induced global instability.	**1.8**
6	Slope South of Proposed Carpark (Section B-B') Extreme Case	**	Models the long term static stability of the slope assuming groundwater is modelled in an extreme scenario where the groundwater is acting against the slope and only drains at the toe. The modelled slope is at the critical section of the existing slope face. *The extreme case slip assumes the building induced loading will result in a global slip failure.*	**1.7**
7	Slope East of Proposed Building 3 (Section C-C') Building Induced Slip Failure	1.3 - 1.5	Models the long term static stability of the slope assuming pore pressures have normalized. The modelled slope is subjected to surcharge equal to the maximum allowable bearing capacity to determine risk of induced global instability.	**1.8**
8	Slope East of Proposed Building 3 (Section C-C') Extreme Case	**	Models the long term static stability of the slope assuming groundwater is modelled in an extreme scenario where the groundwater is acting against the slope and only drains at the toe. The modelled slope is at the critical section of the existing slope face. *The extreme case slip assumes the building induced loading will result in a global slip failure.*	**1.7**
9	Slope South of Proposed Building 3 (Section D-D')	1.3 - 1.5	Models the long term static stability of the slope assuming pore pressures have normalized. The modelled slope is subjected to surcharge equal to the maximum allowable	**2.1**

Figure	Loading Case	Design Minimum FOS*	Description	FOS
	Building Induced Slip Failure		bearing capacity to determine risk of induced global instability.	
10	Slope South of Proposed Building 3 (Section D-D') Extreme Case	**	Models the long term static stability of the slope assuming groundwater is modelled in an extreme scenario where the groundwater is acting against the slope and only drains at the toe. The modelled slope is at the critical section of the existing slope face. *The extreme case slip assumes the building induced loading will result in a global slip failure.*	**2.0**
11	Slope East of Proposed Building 4 (Section E-E') Building Induced Slip Failure	1.3 - 1.5	Models the long term static stability of the slope assuming pore pressures have normalized. The modelled slope is subjected to surcharge equal to the maximum allowable bearing capacity to determine risk of induced global instability.	**1.6**
12	Slope East of Proposed Building 4 (Section E-E') Extreme Case	**	Models the long term static stability of the slope assuming groundwater is modelled in an extreme scenario where the groundwater is acting against the slope and only drains at the toe. The modelled slope is at the critical section of the existing slope face. *The extreme case slip assumes the building induced loading will result in a global slip failure.*	**1.4**

**As per Table 4.3 of Ontario Ministry of Natural Resources River and Stream Systems: Erosion Hazard Limit Technical Guidelines*

***Extreme case use unlikely design case / groundwater conditions to determine if there'd be significant changes to the global factor of safety in an extremely unlikely/impractical scenario.*

5.0 GEOTECHNICAL CONSIDERATIONS

The following recommendations are based on the borehole information and are intended to assist designers. Recommendations should not be construed as providing instructions to contractors, who should form their own opinions about site conditions. It is possible that subsurface conditions beyond the borehole locations may vary from those observed. If significant variations are found before or during construction, Cambium should be contacted so that we can reassess our findings, if necessary.

5.1 Site Preparation

Any existing fill material and organic materials encountered should be excavated and removed from beneath the proposed building footprints and structural areas; additionally, this material should be excavated and removed to a minimum distance of 3.0 m around the proposed building footprints. The fill material may potentially be left in place beneath any proposed non-structural areas and landscaped areas. The fill material includes, but is not limited to, the fill materials as identified in this report. Any topsoil and materials with significant quantities of organics and deleterious materials (i.e., construction debris, asphalt etc.) are not appropriate for use as fill below parking and driving areas.

Structures such as existing foundations, previously backfilled excavations, deleterious materials such as boulders, organics, rubble, unsuitable fill, softened soils, and un-decommissioned groundwater wells may be/are present at this site. The presence of these structures when and if encountered will likely effect construction methods and costs. Existing groundwater wells are required to be decommissioned in accordance with O.Reg. 903.

The exposed subgrade should be proof-rolled and inspected by a qualified geotechnical engineer prior to placement of any granular fill. Any loose/soft soils identified at the time of proof-rolling that are unable to uniformly be compacted should be sub-excavated and removed. The excavations created through the removal of these materials should be backfilled with approved engineered fill consistent with the recommendations provided below.

The near surface sand and silty sand soils can be very unstable if they are wet or saturated. Such conditions are common in the spring and late fall. Under these conditions, temporary use of granular fill, and possible reinforcing geotextiles, may be required to prevent severe rutting on construction access routes.

5.2 Frost Penetration

Based on the Ontario Provincial Standard Drawing (OPSD) 3090.101, the typical frost penetration depth for the proposed structure is expected to be approximately 1.5 mbgs. Footings for the proposed structure should be situated at or below this depth for frost penetration or should be protected. If construction is carried out during the winter months, all footing locations where excavated soils become exposed to potential frost penetration should be poured within the same day to prevent potential future settlements. If the footings cannot be poured within the same day the soils are excavated, the surface should be covered with thermal insulation equivalent to 1.5 m of soil cover to prevent potential freezing of the frost susceptible soils at the Site.

It is assumed that any pavement structure thickness will be less than 1.5 m; therefore, grading and drainage are important for good pavement performance and life expectancy. Any utilities should be located below this depth or be appropriately insulated.

5.3 Excavations

From preliminary designs provided by the client, it is understood that the proposed finished floor elevation of the basement garage is 238.00 mASL. If an elevator shaft in installed to access the lower floor of the parking, the finished floor elevation in the footprint of the elevator may be lower than 238 mASL. In the event that an elevator is installed as such, Cambium should be consulted to review final designs plans to reassess our recommendations, as necessary.

Temporary excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). The native soils at this site would generally be classified as Type 2 soils in accordance with OHSA, with unsupported side walls extending no

greater than 1.2 m, above which any soils must be sloped at no steeper than 1H:1V. Existing fill soils encountered throughout the property and adjacent to the Yonge Street right-of-way would be classified as Type 3 soils and may be excavated with side slopes no steeper than 1H: 1V extending from the top of the excavation to the base. All soils encountered below the groundwater table at the site should be considered a Type 4 soil and may be excavated with unsupported side slopes no steeper than 3H:1V. Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability. If localized instability is noted during excavations or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions. If required, the excavation sidewalls should be fully supported (shored). The excavation support system should be designed to resist the lateral earth pressures of the soils, hydrostatic pressures and any surcharges while limiting ground movements to tolerable levels. It is a common practice for a specialist contractor to design and install the excavation support system.

Temporary shoring may be required to support open excavations adjacent to the Yonge Street right of way and any other neighbouring properties.

Temporary excavations should not be extended below a line drawn down at 7 vertical to 10 horizontal from existing services (i.e. sewer, water mains, etc.) without appropriately supporting the service or providing temporary shoring and/or bracing.

In the areas of sandy silt to silty sand subgrade soils and high groundwater levels, careful construction methods will be required to minimize soil disturbance during excavation and construction operations. A skim coat or mud mat (75 mm thick) of Unshrinkable Fill (U-fill) is recommended to be placed on the excavated subsoils (immediately after excavation) to prevent soil heaving and disturbance.

5.4 Dewatering

Static groundwater levels recorded within the installed monitoring well locations were noted as being between 240.1 to 245.24 mASL since groundwater readings began on August 27, 2019. It should be noted that the groundwater table is influenced by seasonal fluctuations and major precipitation events.

Based on the groundwater conditions measured in the monitoring wells and the anticipated founding elevations, the foundation excavations will likely be below the groundwater table. The sandy/silty deposits encountered in the boreholes are highly susceptible to disturbance by groundwater seepage. In this regard, depending on the time of year the construction takes place, localized pro-active dewatering of the groundwater levels to at least 1.0 m below the foundation excavation elevations using a well-point system may be required to maintain the integrity of the excavation. If possible, it is recommended that construction excavations during the wet/spring seasons be avoided to reduce the need for pro-active dewatering.

If a well-point dewatering system is used, registration on the Environmental Activity and Sector Registry (EASR) or a Permit to Take Water (PTTW) may be required from the Ministry of the Environment, Conservation and Parks (MOECP) as pumping could exceed 50,000 L/day or 400,000 L/day, respectively. Please refer to the Hydrogeological Assessment report for additional comment and recommendation in this regard.

5.5 Backfill and Compaction

Excavated non-organic fill and native sandy soils from the site may be appropriate for use as fill below grading and parking areas, provided that the actual or adjusted moisture content at the time of construction is within a range that permits compaction to required densities. Some moisture content adjustments may be required depending on seasonal conditions.

Geotechnical inspections and testing of general fill and engineered fill are required to confirm acceptable quality.

Foundation wall backfill should consist of imported free-draining granular material meeting the specifications for OPSS Granular B, or an approved equivalent, placed in maximum 200 mm

thick lifts, compacted to 95% of standard proctor maximum dry density (SPMDD), taking care to keep heavy compaction equipment from damaging the walls.

Native soils free of organics (having suitable moisture content) is considered to be suitable for reuse as general non-structural grade fill/backfill, placed in maximum 200 mm thick lifts compacted to 95% of SPMDD.

The backfill material, if any, in the upper 300 mm below the pavement subgrade elevation should be compacted to 100% of SPMDD in all areas.

Construction rubble from the existing structures and the existing paved parking lot areas are not considered to be suitable for reuse as backfill and is recommended to be removed from site.

5.6 Foundation Design

It is our understanding that the proposed development at the subject property would consist of constructing three residential condominium buildings (between eight to twelve stories in height) with commercial units, two levels of underground parking throughout the extents of the development, and several retaining walls around the perimeter of the site. It is assumed that the proposed structures will be designed with shallow footings founded below an elevation of 238.00 mASL. All exterior foundations must be provided with a minimum of 1.5 meters of earth cover for frost protection or alternative equivalent insulation.

Based on the information obtained from the boreholes, undisturbed and dewatered silty sand to sandy silt glacial till soils identified at the site are considered to be suitable for the support of the proposed structures. The following Table 8 provides the recommended design geotechnical bearing capacities for serviceability limit state (SLS) and ultimate limit state (ULS) at the borehole locations.

Table 8 Allowable Bearing Pressures at Required Depths

Borehole	Depth (mbgs)	Elevation (mASL)	Bearing Capacity - SLS (kPa)	Bearing Capacity - ULS (kPa)	Soil Type
BH101-19	Below 2.5	Below 245.3	250	350	Till
MW/BH102-19	Below 3.0	Below 244.5	250	350	Till
BH103-19	Below 2.5	Below 243.7	250	350	Till
BH104-19	4.5 – 6.0 Below 6.0	239.0 – 237.6 Below 237.6	200 250	275 350	Till
BH105-19	Below 2.5	Below 244.2	250	350	Till
MW/BH106-19	Below 2.5	Below 242.2	250	350	Till
BH107-19	Below 1.0	Below 240.4	200	275	Till
MW/BH108-19	Below 2.5	Below 240.1	250	350	Till
MW/BH109-21	Below 6.0	Below 241.0	250	350	Till
MW/BH110-21	4.5 – 6.0 Below 6.0	239.9 – 237.8 Below 237.8	200 250	275 350	Till
MW/BH111-21	Below 1.5	Below 238.1	250	350	Till

The existing fill material identified at the property is not considered to be suitable to support the proposed structures. Cambium should be contacted if alternative design recommendations (including engineered fill) are required.

Total and differential settlements are expected to be less than 25 mm and 10 mm, respectively. All footings should be stepped along a line of 7 vertical to 10 horizontal or flatter where variable founding levels take place.

Prior to placing foundation concrete, the foundation subgrade should be cleaned of all deleterious materials such as boulders, organics, rubble, unsuitable fill, softened, disturbed or caved materials as well as any standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the founding subgrade and placed concrete must be provided.

All foundation components must be evaluated by a qualified geotechnical engineer to ensure that founding soils exposed in the base of the excavation are consistent with the recommended design bearing pressure intended by the geotechnical engineer.

5.7 Subdrainage and Floor Slabs

The guidelines below are based on the assumptions that a “drained” foundation system will be provided. These guidelines should be revisited if it is decided that the construction of the basement would be water-tight.

To prevent hydrostatic pressure from building up beneath the floor and potential groundwater infiltration, it is suggested that the granular base for the floor be drained. Provision should be made for at least 300 mm to 600 mm of geotextile wrapped clear crushed stone to underlie the floor. A vapour barrier beneath the slab should be provided. Perimeter and under floor slab drainage systems would be also required for the proposed building. The perforated pipes should discharge to a positive outlet such as a storm water sewer or a sump from which the water is pumped. Basement floor slabs, elevator pits and foundation walls should also be waterproofed.

5.8 Slope Stability

Slope stability analyses were completed to verify the appropriate site specific stable slope allowance and determine the potential for sudden failure. Survey data was provided by the Client and was produced by surveying contractor JoeTOPO; the topographic survey data drawing was unnamed but was received as an electronic file titled ‘JoeTOPO – 505 – 533 Yonge Street, Barrie’. The topographic drawing shows a ‘Top of Bank’ line running along the native slope bank from southwest to northeast at an approximate elevation of 240 mASL. A drawing titled ‘Conceptual Site Plan, Sheet A101, 505 to 533 Yonge Street’ prepared by Salter Pilon Architecture references the Top of Bank line and provides a 6.0-meter setback at which the conceptual design is based on. The conceptual drawing was overlain by the JoeTOPO survey data to generate the slices used for the slope stability analysis.

Four sections (A through D) were sliced and evaluated for local instability, global instability, and instability that could be induced by the proposed buildings.

As discussed in Section 4.0, the slope stability model and analysis was conducted using the information gathered from the borehole investigation, laboratory analysis, topographic survey, and Slope/W computer software.

5.8.1 Local Slip Failures

Risk of localized slip failures were encountered along Sections B-B' and C-C.' Localized slip failures along Section B-B' are likely due to sand fill that remains present above the native top of bank. The sand fill material is likely to be removed from the native slope in this area during construction, therefore mitigating risks of localized slip failures. However, if the material is not removed during excavations, it should be regraded to a slope less than 2H:1V and compacted to 98% SPMDD. Localized slip failures along Section C-C' are due to the high inclination of the native slope. The localized slip failure will unlikely lead to full slope failure should slope be maintained appropriately in the event surficial sloughing occurs.

5.8.2 Global Instability

Global slip failures along the native slopes were not encountered during the slope stability analysis and are unlikely to occur at the site under normal conditions.

5.8.3 Building Induced Global Instability

A surcharge of 350 kPa was applied to the proposed parking garage and building footprint, the maximum allowable bearing capacity for ultimate limit state design. It is noted that the ultimate limit design bearing capacity is a conservative value as the actual load on the subsoil would be designed per the provided serviceability limit bearing capacities. The slope stability analyses conducted under the worst-case loading situation shows that the proposed buildings should be constructed on dense to very silty sand at an elevation of 238 mASL. Following these recommendations, the Factor of Safety criteria put forth by the Ontario Ministry of Natural Resources River and Stream Systems: Erosion Hazard Limit Technical Guidelines would be met.

5.9 Lateral Earth Pressures

It is anticipated that the foundation walls for the basements of the proposed structures will support about 1.5 m of fill material with the proposed retaining walls supporting between 2.0 and 2.5 m of native soils. Lateral earth pressure coefficients (K) for foundation and retaining wall design are shown in Table 9. It is assumed that lateral loads will result from compacted granular backfill. If the retaining walls are constructed by another form of wall that does not have granular backfill we should be contacted to provide additional recommendations.

Table 9 Lateral Earth Pressure Coefficients – Foundation Wall & Retaining Walls

Soil	Bulk Unit Weight γ (kN/m³)	Internal Friction Angle Φ' (°)	Active earth pressure coefficient Ka (Rankine)	Passive earth pressure coefficient Kp (Rankine)	At-rest earth pressure coefficient Ko (Rankine)
Compacted Granular A and Granular B Type II	22	34	0.28	3.54	0.44
Compacted Granular B Type I	21	32	0.31	3.25	0.47
Silty Sand to Silty Sand* (Native)	20	30	0.33	3.00	0.5

The coefficients provided in Table 9 assume that the surface of the granular backfill is horizontal against the retaining wall, and the wall is vertical and smooth. Cambium should be contacted to provide updated lateral earth pressure coefficients should any sloped soil/fill be placed against the retaining wall.

Where sheet piles are to be used within the native soils: Ko=0.47, Ka=0.31, Kp=3.26.

A unit weight of 22 kN/m^3 should be assumed for compacted granular backfill loadings and 20 kN/m³ for the native soils.

5.9.1 Earthquake-Induced Pressures

Earthquakes will induce additional pressures on retaining structures.

For active earth pressure loads:

$$P_{ae} = \frac{1}{2}\gamma H^2(1 - k_v)K_{ae}$$

Where

P_{ae} = resultant active lateral earth load inducing static and dynamic loads;

γ = unit weight of the soil behind the wall;

k_v = vertical component of the earthquake acceleration (as a decimal fraction of the acceleration due to gravity);

k_h = horizontal component of the earthquake acceleration (as a decimal fraction of the acceleration due to gravity); and

K_{ae} = horizontal component of active earth pressure coefficient including effects of earthquake loading;

And

$$K_{ae} = \frac{\cos(\delta + \alpha cos^2(\phi' - \varphi - i))}{cos^2 i \ \cos\delta \cos(\delta + i + \varphi)(1 + X_a^{1/2})^2}$$

$$X_a = \frac{\sin(\delta + \varphi')\sin(\phi' - \varphi - \beta)}{\cos(\delta + i + \varphi)\cos(\beta - i)}$$

$$\varphi = \tan^{-1}[k_h/(1 - k_v)]$$

$$i = 90 - \alpha$$

For the site, γ is as above for either native soils or compacted granular fill, α=90°, i=0, and δ=14°.

For temporary shoring, Kh=0.057 and Kv=0.038, while for permanent structures Kh=0.134 and Kv =0.09.

5.9.2 Ultimate Bond Stress for Anchor Design

The estimated ultimate bond stress for the sand and silt soils is 0.38 MPa with an estimated Ultimate Load transfer of 100 kN/m which is suitable for anchors constructed using a single stage of grouting. Multiple stages of grouting can increase this load transfer value, however, higher values above 100kN/m should be based on detailed experience by the contractor and confirmed with Cambium, in this instance there may be a requirement for load testing of some of the tiebacks.

5.9.3 Shoring Design

It is likely that extensive shoring design and construction will be required where the property line runs adjacent to Yonge Street if the proposed parking garage is to be constructed directly adjacent to the property line. If a shoring design is conducted for the proposed parking garage, the lateral earth pressures found herein should be applied to the design and Cambium should be retained to conducted a plan review and make any necessary changes.

5.10 Seismic Site Classification

The structures should be designed to withstand forces caused by seismic activity in accordance with the Ontario Building Code (OBC). In order to determine a site classification, it is assumed that soils as encountered in the samples retrieved in the boreholes would remain continuous to a minimum depth of 30 m below the bottom of any foundations. In addition, average 'N_{60}' values for soils were assumed for the site. Based on these assumptions, in combination with the known local geological conditions, the site class for the proposed building is "D" as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012.

These earthquake/seismic design parameters should be reviewed in detail by the structural engineer and incorporated into the design as required. Consideration could be given to carrying out a Multichannel analysis of surface waves (MASW) survey to determine the average shear-wave velocity (V_s) within the upper 30 m of the sub-surface soils, as there may be potential to reclassify the site class dependent on the results.

Peak ground acceleration and spectral acceleration (period of 0.2 seconds) for the site are calculated to be 0.064g and 0.108g respectively using the 2015 National Building Code Seismic Hazard Calculation. A detailed report of the calculation and its results can be found in Appendix C.

5.11 Buried Utilities

Trench excavations should comply with the recommendations provided in section 4.2.

The bedding and cover material for any buried utilities should consist of OPSS 1010 Granular A or B Type II, placed in accordance with pertinent Ontario Provincial Standard Drawings (OPSD 802.013). The bedding and cover material shall be placed in maximum 200 mm thick lifts and should be compacted to at least 98% of SPMDD. The cover material shall be a minimum of 300 mm over the top of the pipe and compacted to 98% of SPMDD, taking care not to damage the utility pipes during compaction.

If wet or saturated conditions exist within any utility excavation, consideration should be given to using 19 mm diameter crushed clear stone wrapped in a geotextile filter fabric as pipe bedding.

5.12 Preliminary Pavement Design

The performance of the pavement structure is dependent upon proper subgrade preparation. All topsoil and organic materials should be removed down to native subgrade soil and backfilled with approved engineered fill or native material, compacted to 98% of SPMDD. The subgrade should be compacted, proof rolled, and inspected by a Geotechnical Engineer. Any areas where rutting or appreciable deflection is noted should be sub excavated and replaced with suitable fill. The fill should be compacted to at least 100% of SPMDD.

The following recommended minimum pavement structure design has been developed for two traffic loading scenarios; light duty and heavy duty. The heavy duty design is appropriate for areas where heavy trucks and maintenance vehicles are anticipated to drive while the light duty design is appropriate for areas where no heavy traffic is anticipated. The recommended minimum pavement structure is provided in Table 10.

Table 10 Recommended Pavement Structure

Pavement Layer	Heavy Duty Access Road	Light Duty (Parking Lot)
Surface Course Asphalt	40 mm HL3 or HL4	40 mm HL3 or HL4
Binder Course Asphalt	90 mm HL8 (2 lifts)	50 mm HL8
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	400 mm OPSS 1010 Granular B	300 mm OPSS 1010 Granular B

Material and thickness substitutions must be approved by the Design Engineer.

The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement.

Compaction of the subgrade should be verified by a Geotechnical Engineer prior to placing the granular fill. Granular layers should be placed in 200 mm maximum loose lifts and compacted to at least 100% of SPMDD. The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing. The final asphalt surface should be sloped at a minimum of 2% to shed runoff.

The need for suitable subgrade drainage is essential for longevity of the pavement structure. The subgrade must be free of depressions and sloped (minimum 2%) to provide drainage towards subgrade drains. Grading adjacent to pavement areas should be designed to ensure that water is not permitted to pond adjacent to the outside limits of the pavement. Pavement subdrains leading to catch basins are recommended to facilitate drainage of the subgrade and the granular materials.

5.13 Design Review and Inspections

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed.

Cambium should be retained to complete testing and inspections during construction operations to examine and approve subgrade conditions, placement and compaction of fill materials, granular base courses, and asphaltic concrete.

6.0 CLOSING

Please note that this report is governed by the attached qualifications and limitations. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned at (705) 719-0700.

Cambium Inc.

Mac Garrison, M.Eng., P.Eng.
Project Coordinator / Geotechnical Engineer

Rob Gethin, P.Eng.
Group Manager – Geotechnical Services

Qualifications and Limitations

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A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the

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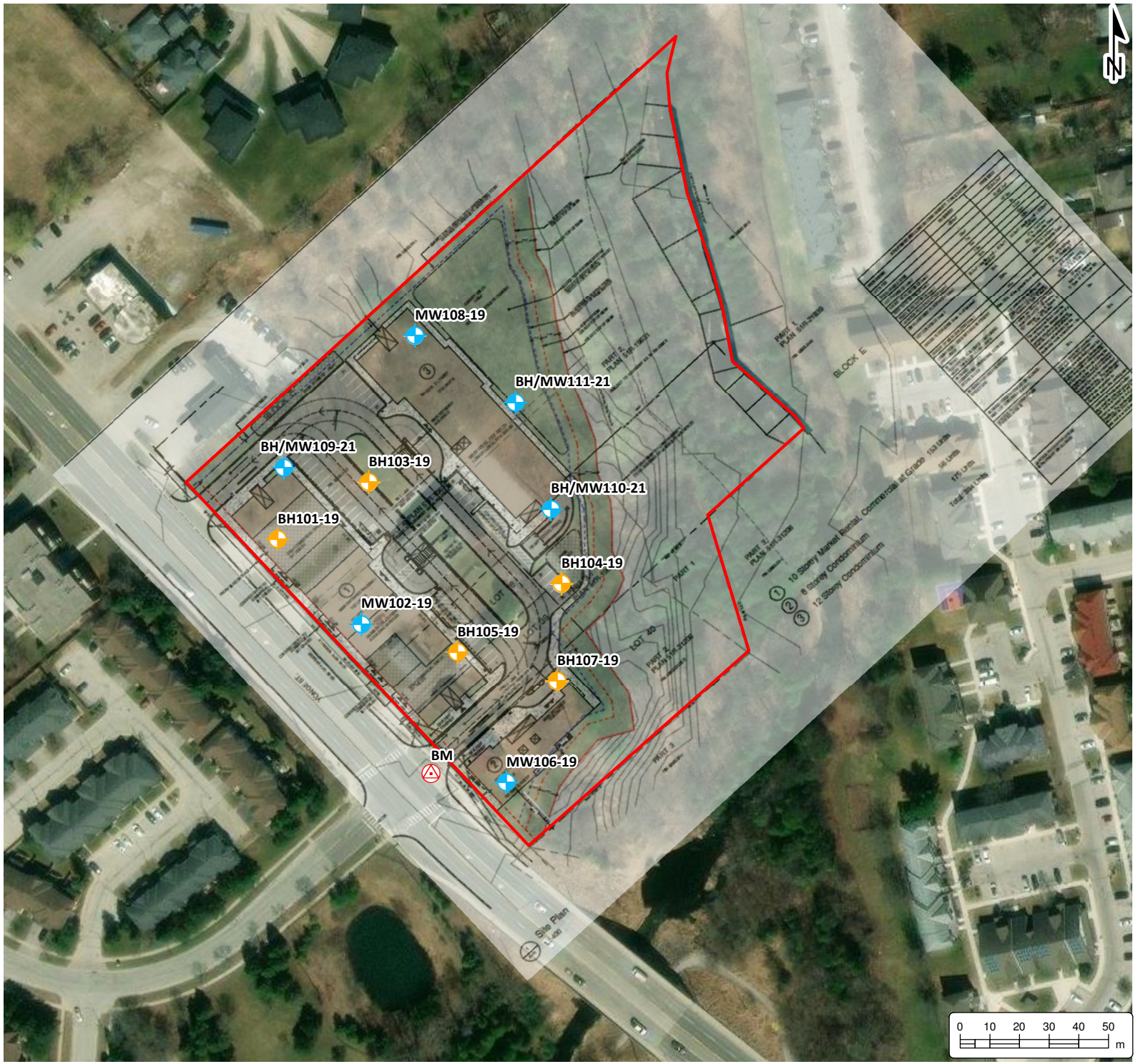
Appended Figures



GEOTECHNICAL INVESTIGATION

RENAISSANCE RETIREMENT
BARRIE TRUST
505, 511, 515 and 533 Yonge Street
Barrie, Ontario

LEGEND

- Benchmark
- Borehole
- Monitoring Well
- Site (approximate)

Notes:
- Benchmark is the top nut of a fire hydrant.
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

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BOREHOLE LOCATION PLAN

Project No.:	9574-004	Date: / Rev.:	December 2021 / September 2023
Scale:	1:1,824	Projection:	NAD 1983 UTM Zone 17N
Created by:	TLC	Checked by:	RG
Figure:	1		

O:\GIS\MXDs\9500-9999\9574-004 Renaissance Retirement Barrie Trust - Geo & Hydro G - 505 Yonge Street, Barrie\2021-12-15 FIG 1 - Borehole Location Plan.mxd

GEOTECHNICAL INVESTIGATION

RENAISSANCE RETIREMENT
BARRIE TRUST
505, 511, 515 and 533 Yonge Street
Barrie, Ontario

LEGEND

- Benchmark
- Borehole
- Monitoring Well
- Slope Stability Cross Section
- Site (approximate)

Notes:
- Benchmark is the top nut of a fire hydrant.
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
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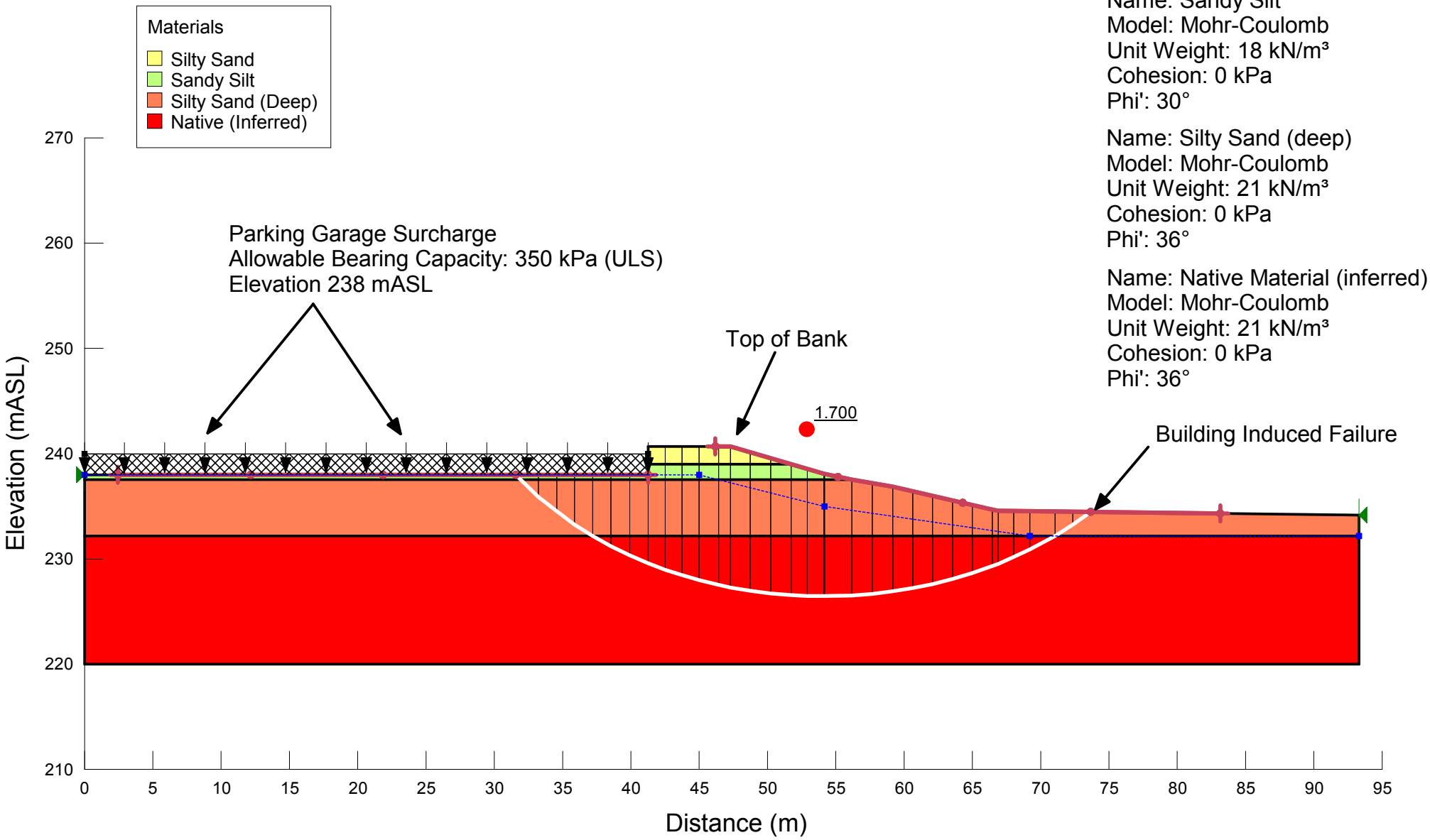
SLOPE STABILITY SECTIONS

Project No.: 9574-004		Date: December 2021 Rev.: September 2023	
Scale: 1:1,500		Projection: NAD 1983 UTM Zone 17N	
Created by: TLC	Checked by: RG	Figure: **2**	

O:\GIS\MXDs\9500-9999\9574-004 Renaissance Retirement Barrie Trust - Geo & Hydro G - 505 Yonge Street, Barrie\2021-12-15 FIG 2 - Slope Stability Sections.mxd

9574-004: 505 Yonge Street, Barrie, ON
Figure 3: Section A-A' Slope Stability Analysis
U/G Parking Stucture / Building Induced Slip Failure



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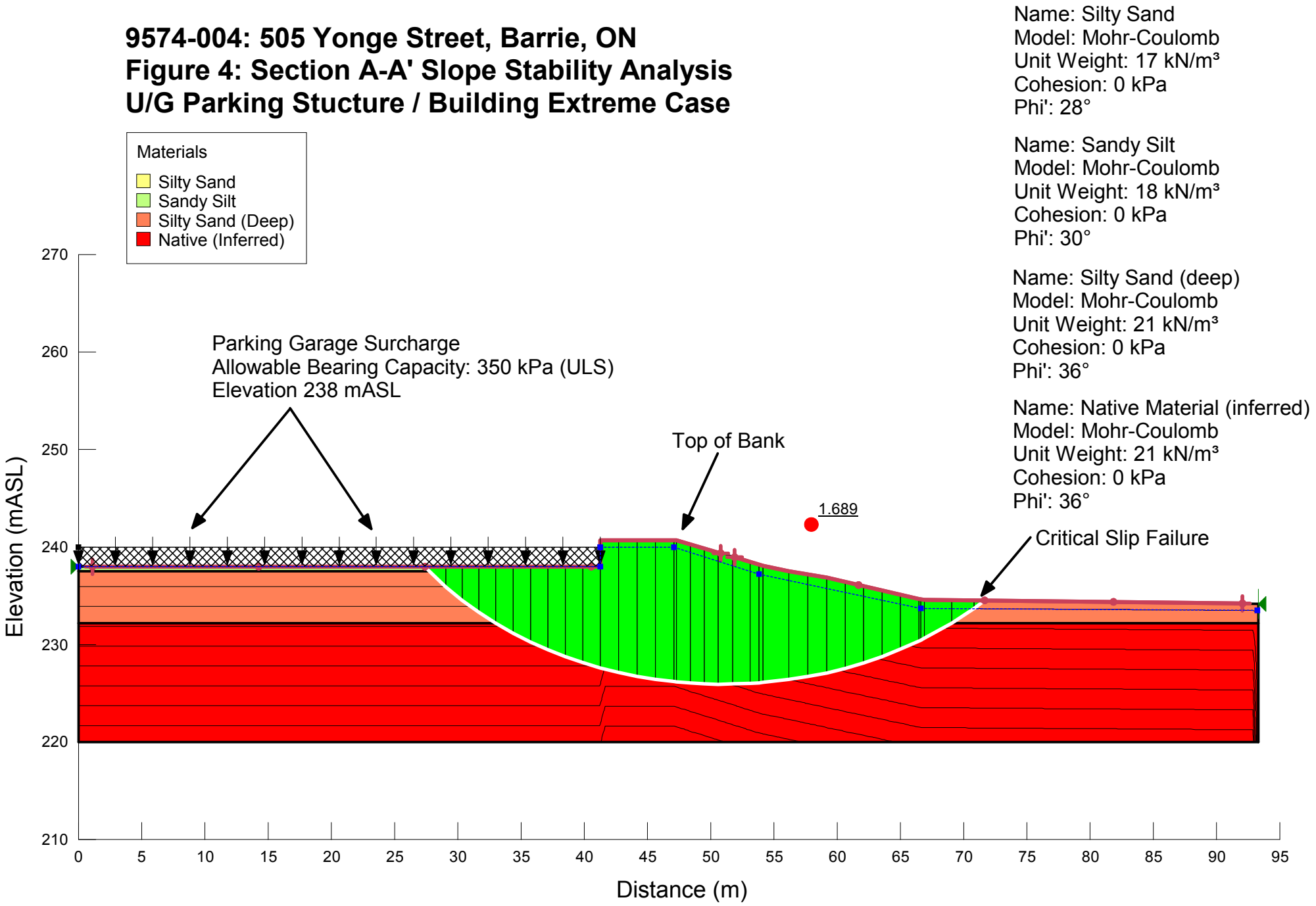
Cohesion: 0 kPa
Phi': 28°

Name: Sandy Silt
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 30°

Name: Silty Sand (deep)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 4: Section A-A' Slope Stability Analysis
U/G Parking Stucture / Building Extreme Case



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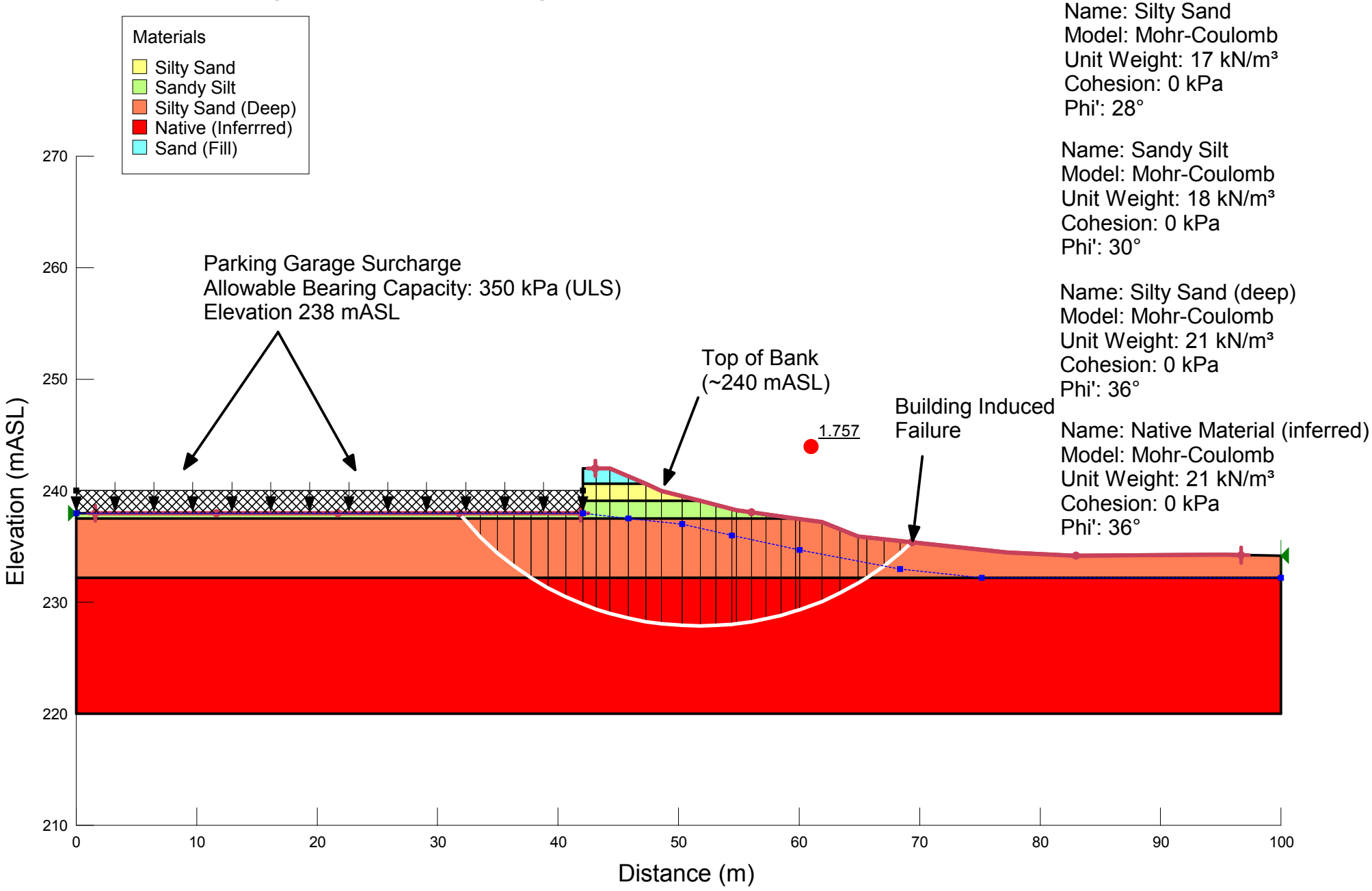
Name: Sandy Silt
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 30°

Name: Silty Sand (deep)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 5: Section B-B' Slope Stability Analysis
U/G Parking Stucture / Building Induced Slip Failure



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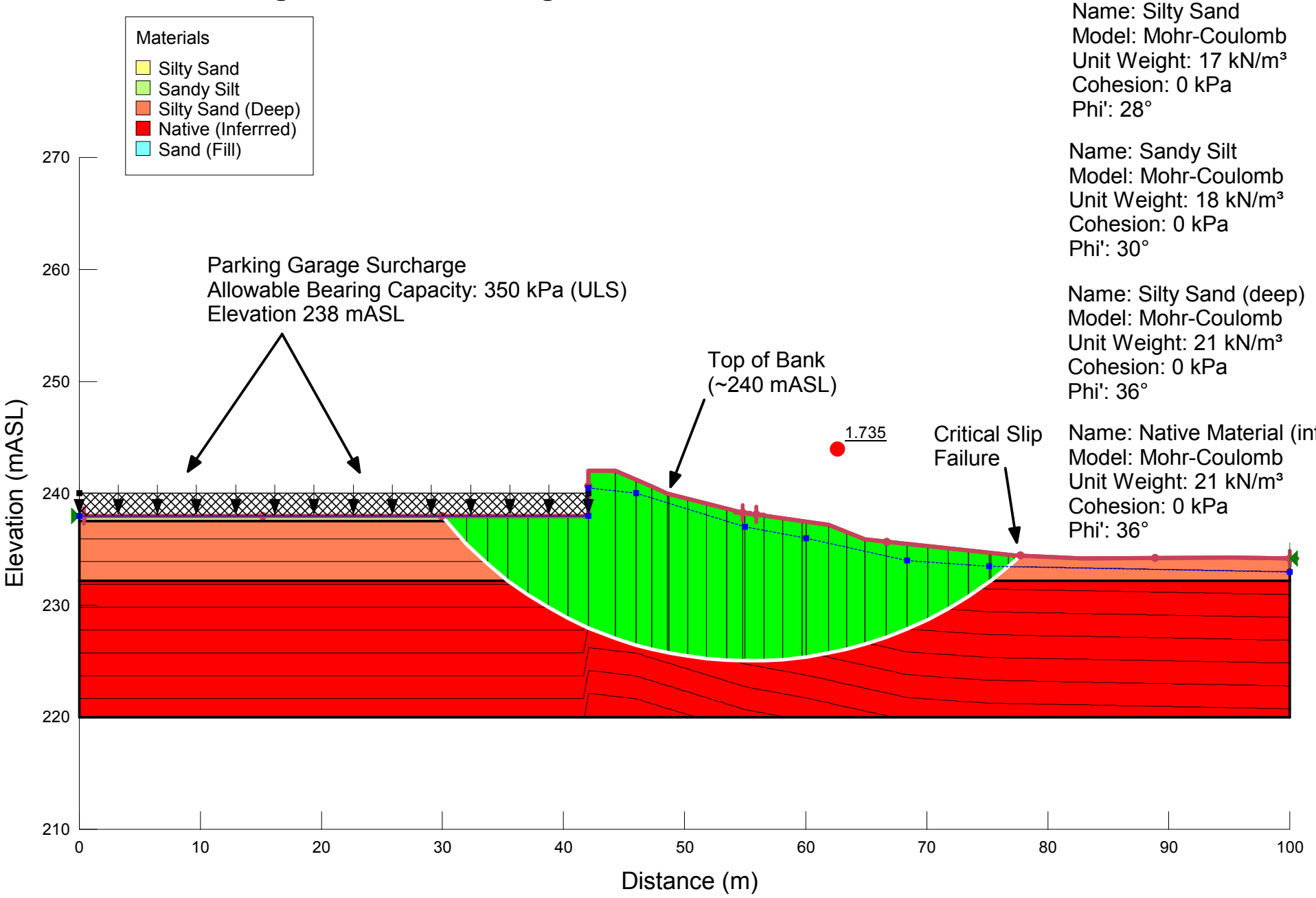
Unit Weight: 17 kN/m³
Cohesion: 0 kPa
Phi': 28°

Name: Sandy Silt
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 30°

Name: Silty Sand (deep)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 6: Section B-B' Slope Stability Analysis
U/G Parking Stucture / Building Extreme Case



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Cohesion: 0 kPa
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Unit Weight: 17 kN/m³
Cohesion: 0 kPa
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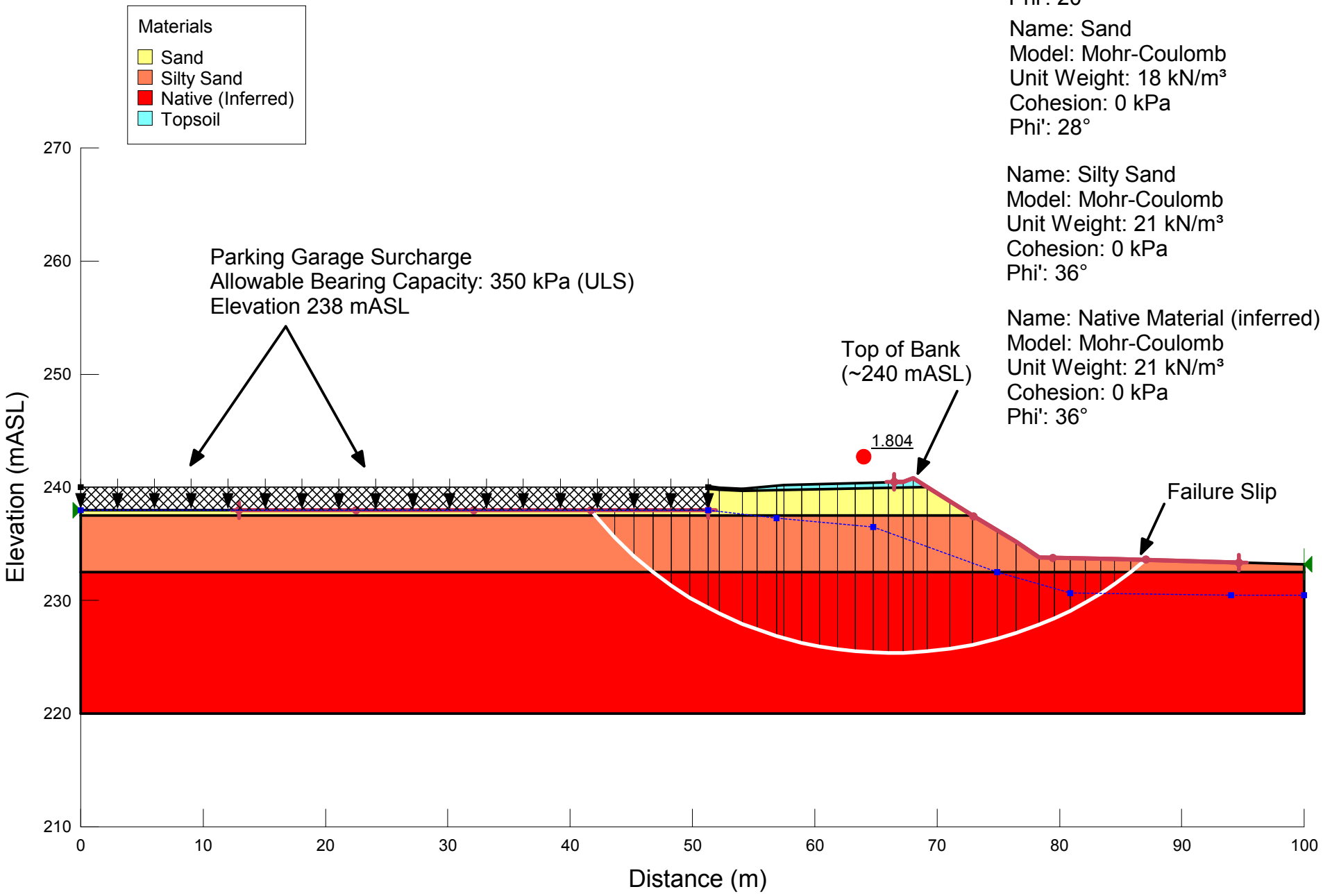
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 30°

Name: Silty Sand (deep)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 7: Section C-C' Slope Stability Analysis
U/G Parking Stucture / Building Induced Slip Failure



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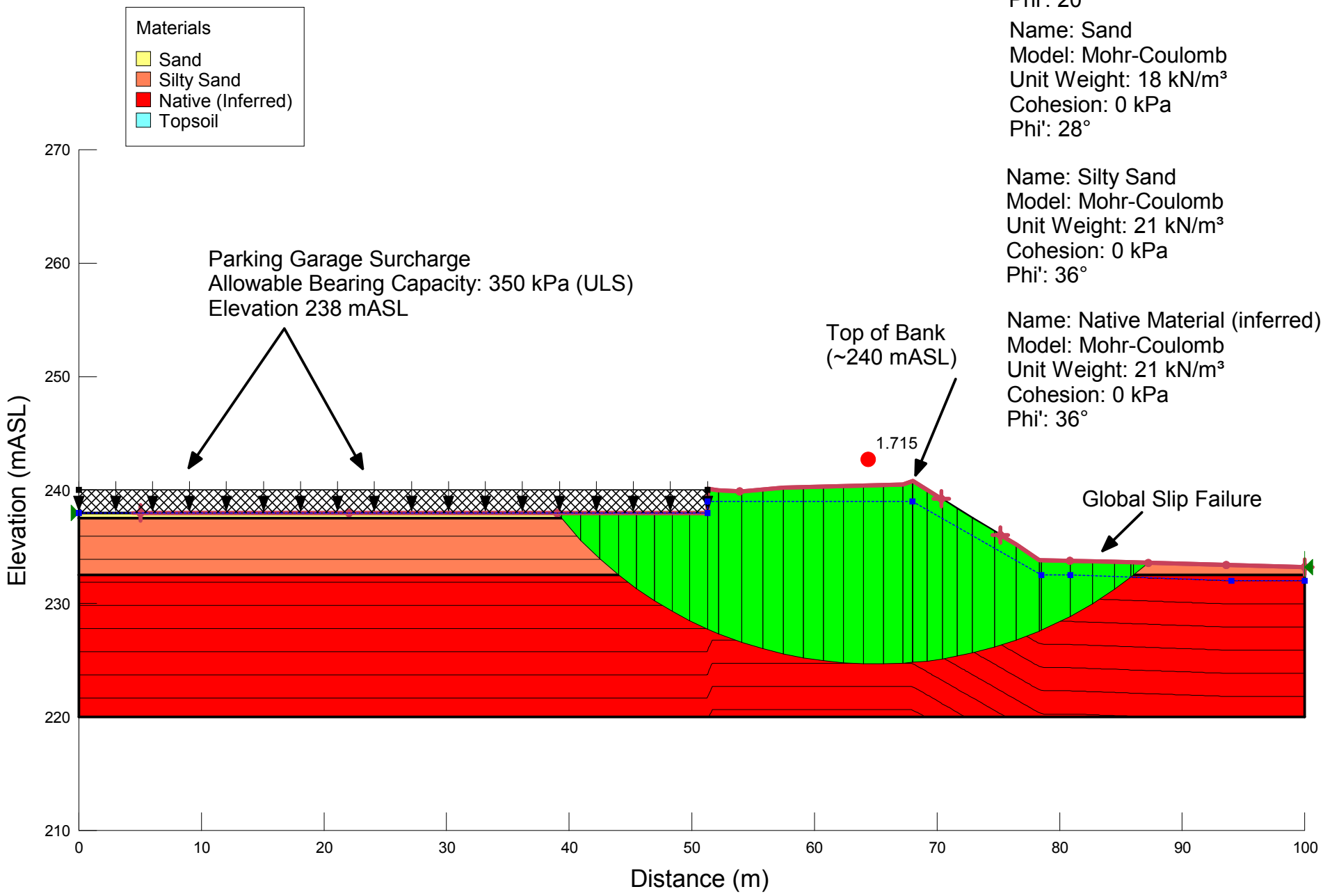
Phi': 28°

Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 8: Section C-C' Slope Stability Analysis
U/G Parking Stucture / Building Extreme Case



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Unit Weight: 15 kN/m³
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Phi': 20°

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Unit Weight: 18 kN/m³
Cohesion: 0 kPa
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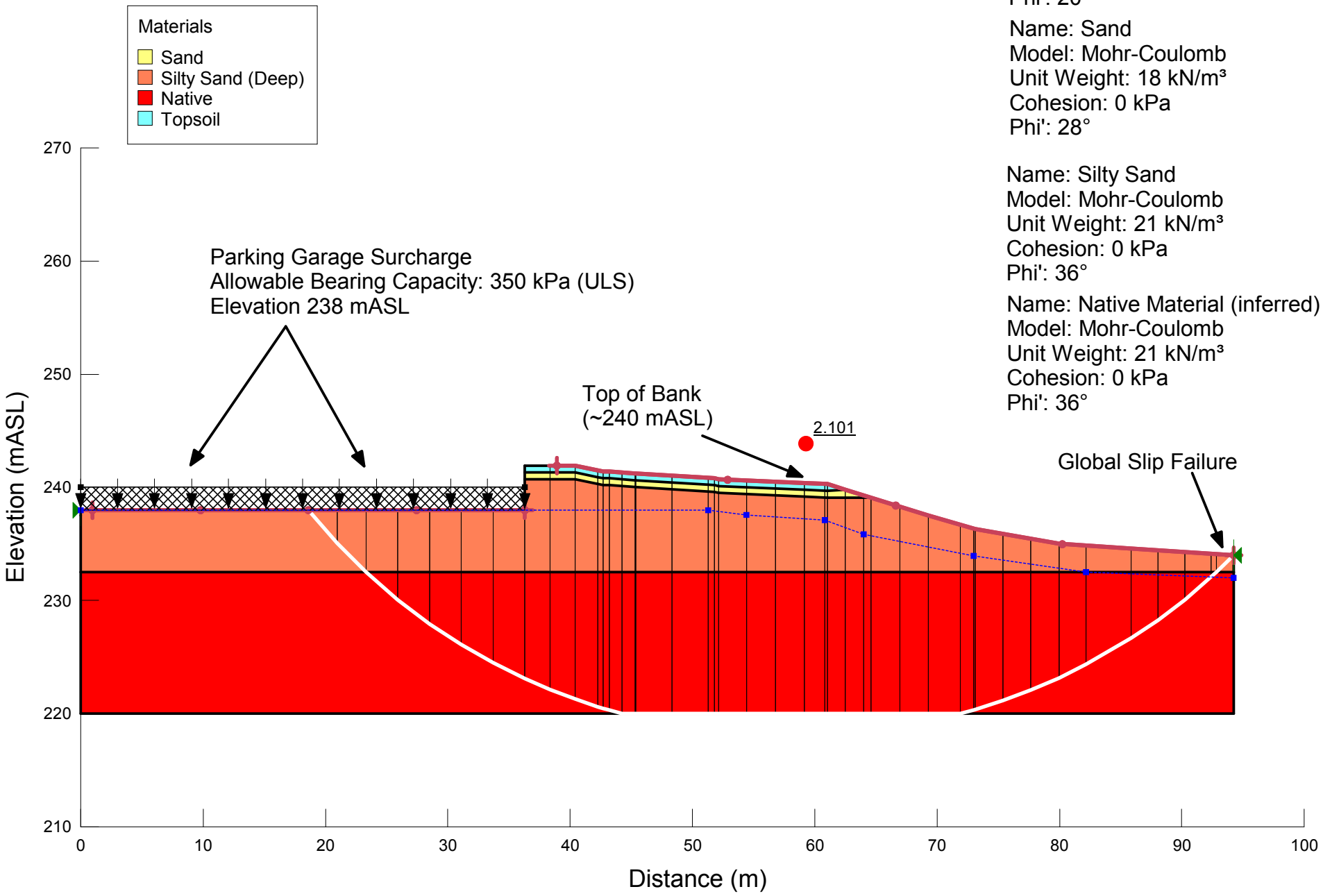
Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 9: Section D-D' Slope Stability Analysis
U/G Parking Stucture / Building Induced Slip Failure



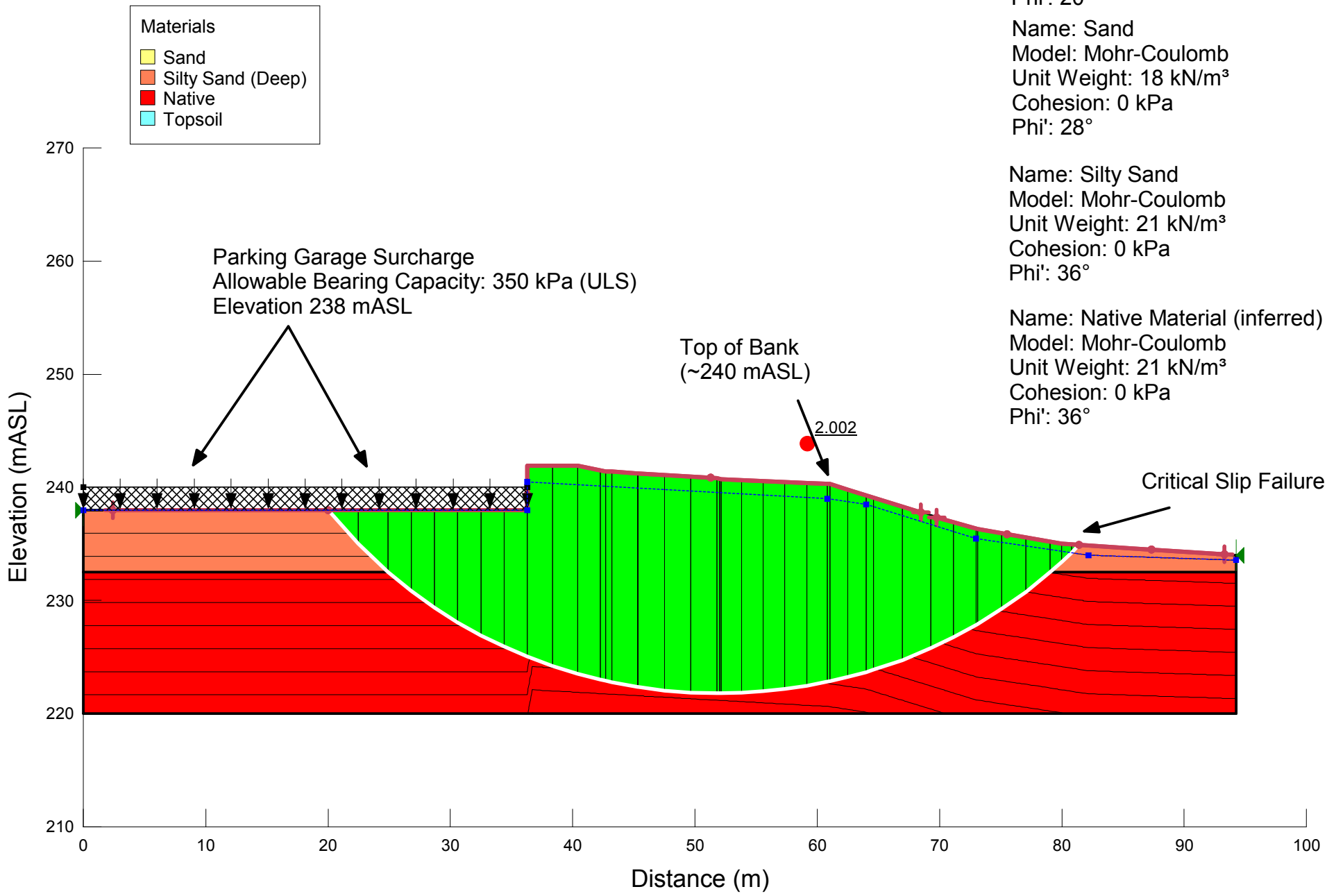
Name: Topsoil
Model: Mohr-Coulomb
Unit Weight: 15 kN/m³
Cohesion: 0 kPa
Phi': 20°

Name: Sand
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 28°

Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 10: Section D-D' Slope Stability Analysis
U/G Parking Stucture / Building Extreme Case



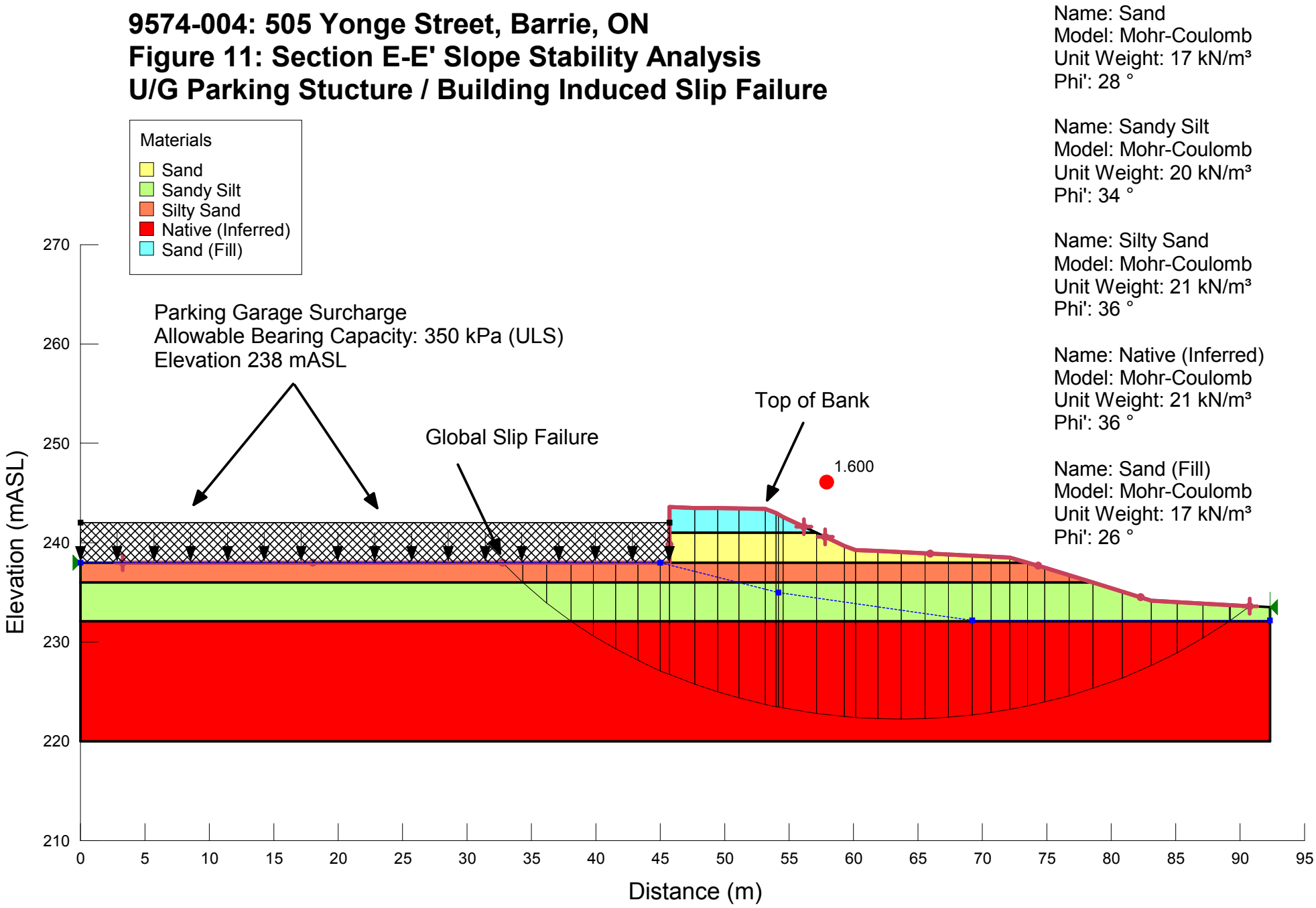
Name: Topsoil
Model: Mohr-Coulomb
Unit Weight: 15 kN/m³
Cohesion: 0 kPa
Phi': 20°

Name: Sand
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion: 0 kPa
Phi': 28°

Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

Name: Native Material (inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Cohesion: 0 kPa
Phi': 36°

9574-004: 505 Yonge Street, Barrie, ON
Figure 11: Section E-E' Slope Stability Analysis
U/G Parking Stucture / Building Induced Slip Failure



Name: Sand
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Phi': 28 °

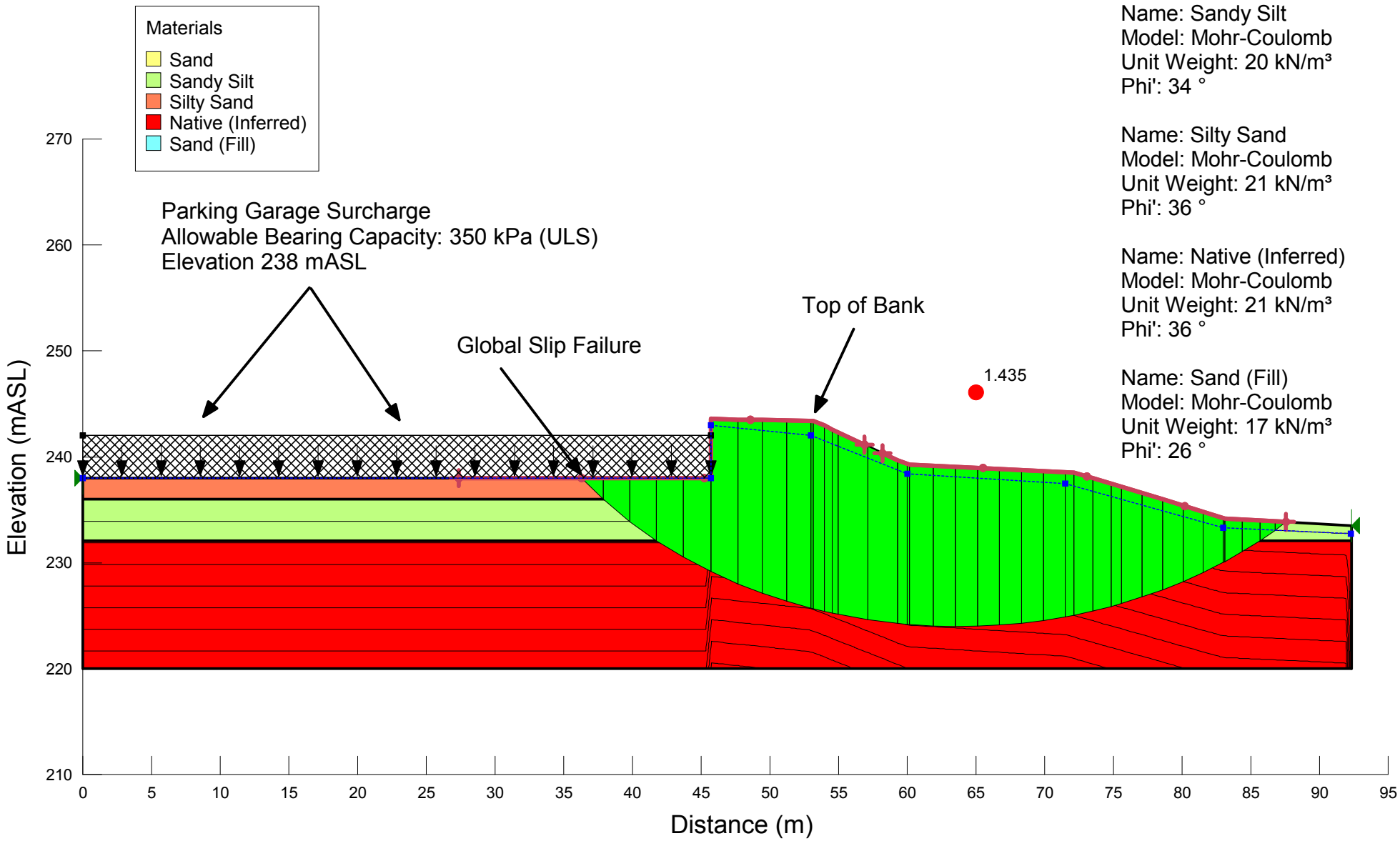
Name: Sandy Silt
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Phi': 34 °

Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Phi': 36 °

Name: Native (Inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Phi': 36 °

Name: Sand (Fill)
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Phi': 26 °

9574-004: 505 Yonge Street, Barrie, ON
Figure 12: Section E-E' Slope Stability Analysis
U/G Parking Stucture / Building Extreme Case



Name: Sand
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Phi': 28 °

Name: Sandy Silt
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Phi': 34 °

Name: Silty Sand
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Phi': 36 °

Name: Native (Inferred)
Model: Mohr-Coulomb
Unit Weight: 21 kN/m³
Phi': 36 °

Name: Sand (Fill)
Model: Mohr-Coulomb
Unit Weight: 17 kN/m³
Phi': 26 °

Appendix A
Borehole Logs

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Log of Borehole: BH101-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 15, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607082, 4912922
Elevation: 247.79 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 247		Gravelly Sand: Brown gravelly sand, some silt, trace clay, occasional cobbles, moist, compact, FILL	1	SS	40	19				
1			2	SS	40	23				
246		Sand: Brown sand, some silt, some gravel, trace clay, occasional cobbles, moist, compact, FILL	3	SS	80	22				
2 / 245		Silty Sand: Brown silty sand, trace gravel, trace clay, occasional cobbles, moist, dense	4	SS	90	43				
3			5	SS	90	40				
244										
4 / 243		Wet, very dense	6	SS	50	50/ 205 mm				
5 / 242										

Logged By: CM
Input By: CM

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T: 866-217-7900
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Log of Borehole: BH101-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 15, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607082, 4912922
Elevation: 247.79 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
6										
			7	SS	60	50/ 280 mm				Spoon bouncing at 6.1 mbgs
241 — 7										
			8	SS	60	50/ 205 mm				
240 — 8										
			9	SS	50	50/ 205 mm				
239 — 9		Moist, increased gravel content, less cobbles								
			10	SS	60	50/ 205 mm				Spoon bouncing at 11 mbgs
238 — 10										
237 — 11										
236										

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Log of Borehole: BH101-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 15, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607082, 4912922
Elevation: 247.79 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
12										
235 / 13			11	SS	50	50/ 230 mm				GSA SS12: 2% Gravel 51% Sand 30% Silt 17% Clay
234 / 14		Compact	12	SS	100	26				
233 / 15		Very dense	13	SS	40	50/ 205 mm				Spoon bouncing at 15.4 mbgs Groundwater observed at 8.2 mbgs and caving measured at 8.5 mbgs upon completion
232 / 16		Borehole terminated at 15.7 mbgs								

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Log of Borehole: BH102-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 16, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607110, 4912895
Elevation: 247.57 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 247		Asphalt: (25 mm)							Cap	Top of Standpipe (TOS) elevation: 247.46 mASL. Groundwater measured at 4.10 mbgs (243.47 mASL) on November 19, 2019.
		Gravelly Sand: Brown gravelly sand, with silt, trace clay, occasional cobbles, moist, compact, FILL	1	GS	-	-				
1			2	SS	30	15				
246			3	SS	50	20			Cuttings	
2										
245		Dense	4	SS	90	38				
3										
		Silty Sand: Brown silty sand, some gravel, trace clay, occasional cobbles, moist, very dense	5	SS	100	50/ 230 mm			Bentonite Plug	
244										
4										
243		Sandy Silt: Brown sandy silt, with gravel, trace clay, moist, very dense	6	SS	75	50/ 205 mm				
5										
242										

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Log of Borehole: BH102-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 16, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607110, 4912895
Elevation: 247.57 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
6 / 241		Grey							PVC Standpipe	
			7	SS	20	50/ 75 mm				
7 / 240										
			8	SS	70	50/ 255 mm				
8 / 239		Wet								
9 / 238			9	SS	50	50/ 230 mm			Sand Pack	Spoon bouncing at 9.1 mbgs
10 / 237										
11 / 236			10	SS	0	50/ 125 mm				Tip of spoon came off when it was being pulled out of hole, thus no sample was acquired

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Log of Borehole: BH102-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 16, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607110, 4912895
Elevation: 247.57 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
12 / 235		Moist, trace gravel, occasional cobbles	11	SS	100	50/ 205 mm				
13 / 234			12	SS	100	50/ 230 mm			PVC Screen	
14 / 233			13	SS	100	50/ 305 mm			Cap	
15 / 232		Borehole terminated at 15.7 mbgs								Groundwater first observed at 8.2 mbgs
16 / 231										

Logged By: CM
Input By: CM

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Log of Borehole: BH103-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 26, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607113, 4912942
Elevation: 246.14 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
246 / 0		Sand: Brown sand, with gravel, some topsoil, trace silt, trace organics, occasional cobbles, moist, compact, FILL	1	SS	40	14				
		Silty Sand: Brown silty sand, trace gravel, trace organics, trace clay, moist, loose, FILL	2	SS	70	9				
245 / 1										
		Sand: Brown sand, some silt, some gravel, trace clay, moist, compact	3	SS	60	23				
244 / 2		Wet								
		Dense	4	SS	5	44				GSA SS4: 23% Gravel 42% Sand 25% Silt 10% Clay
243 / 3			5	SS	95	41				
		Moist								
242 / 4										
		Sandy Silt: Brown sandy silt, some gravel, moist, very dense	6	SS	60	50/ 205 mm				
241 / 5										

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Log of Borehole: BH103-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 26, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607113, 4912942
Elevation: 246.14 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
240 — 6		Occasional cobbles	7	SS	70	50/ 230 mm				Groundwater observed at 5.8 mbgs and caving measured at 5.9 mbgs upon completion
239 — 7		Borehole terminated at 6.6 mbgs								

Logged By: CM
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Log of Borehole: BH104-19

Client:	Park City Inc.	**Project Name:**	Geotech Investigation - 505 Yonge Street	**Project No.:**	9574-001
Contractor:	Walker Drilling	**Method:**	Hollow Stem Augers	**Date Completed:**	August 26, 2019
Location:	505 Yonge Street, Barrie, ON	**UTM:**	17T 607178, 4912908	**Elevation:**	243.60 mASL

Elevation (m)	Depth	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
243	0	Asphalt: (50) mm								
		Sand: Brown sand, trace silt, trace gravel, some asphalt fragments, occasional cobbles, moist, compact, FILL	1	GS	-	-				
	1		2	SS	50	12				
242		Loose	3	SS	60	8				
	2									
		Some silt, trace clay, wet, very loose	4	SS	40	2				
241	3									
		Silty Sand: Grey silty sand, some gravel, trace clay, moist, compact	5	SS	65	14				
240	4									
239		Sandy Silt: Grey sandy silt, some clay, some gravel, moist, dense	6	SS	100	36				
	5									
238	6									

Logged By: CM **Input By:** CM

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Log of Borehole: BH104-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 26, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607178, 4912908
Elevation: 243.60 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
237 / 7		Silty Sand: Brown silty sand, some gravel, trace clay, occasional cobbles, moist, very dense	7	SS	100	50/ 230 mm				GSA SS7: 3% Gravel 55% Sand 32% Silt 10% Clay
236 / 8		Dense	8	SS	5	46				
235 / 9			9	SS	80	43				
234 / 10			10	SS	20	50/ 75 mm				Borehole open and groundwater at 11.0 mbgs upon completion
233 / 11		Very dense, wet								
232 / 12		Borehole terminated at 11.4 mbgs due practical refusal								

Logged By: CM
Input By: CM

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Log of Borehole: BH105-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 27, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607143, 4912886
Elevation: 246.64 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 246		Sand: Brown sand with silt, some topsoil, trace gravel, occasional organics, trace cobbles, moist, loose, FILL	1	SS	20	5				
			2	SS	10	6				
1 / 245		Sandy Silt: Brown sandy silt, some gravel, trace clay, occasional cobbles, moist, compact, FILL	3	SS	35	14				
2 / 244		Sand: Brown sand, some gravel, trace silt, trace clay, occasional cobbles, moist, dense	4	SS	50	43				
			5	SS	60	46				
3 / 243										
4 / 242		Sand: Brown sand, some gravel, some silt, trace clay, occasional cobbles, moist, very dense	6	SS	50	50/ 255 mm				
5 / 241		Wet								

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Log of Borehole: BH105-19

Client:	Park City Inc.	**Project Name:**	Geotech Investigation - 505 Yonge Street	**Project No.:**	9574-001
Contractor:	Walker Drilling	**Method:**	Hollow Stem Augers	**Date Completed:**	August 27, 2019
Location:	505 Yonge Street, Barrie, ON	**UTM:**	17T 607143, 4912886	**Elevation:**	246.64 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
6										
			7	SS	90	50/ 230 mm				Groundwater observed at 4.0 mbgs and caving measured at 5.2 mbgs upon completion
240		Borehole terminated at 6.6 mbgs								
7										

Logged By: CM **Input By:** CM

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Log of Borehole: BH106-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 27, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607159, 4912841
Elevation: 244.45 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 244		Topsoil: Brown sandy topsoil, moist, compact, FILL	1	SS	50	24			Cap	Top of Standpipe (TOS) elevation: 244.35 mASL. Groundwater measured at 3.60 mbgs (240.85 mASL) on November 19, 2019.
1 / 243		Sand: Brown sand, some silt, trace gravel, trace clay, occasional organics, moist, loose, FILL	2	SS	5	6			Cuttings	
		Dense	3	SS	80	33			Bentonite Plug	
2 / 242		Sand: Brown sand, some silt, trace gravel, trace clay, occasional cobbles, moist, dense	4	SS	60	47			PVC Standpipe	
3 / 241		Silty Sand: Brown silty sand, some gravel, trace clay, occasional cobbles, moist, dense	5	SS	70	45			Cuttings	
4 / 240		Grey, very dense	6	SS	60	50/ 205 mm			Bentonite Plug	GSA SS6: 11% Gravel 58% Sand 23% Silt 8% Clay
5 / 239										

Logged By: CM **Input By:** CM

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Log of Borehole: BH106-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: August 27, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607159, 4912841
Elevation: 244.45 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
6 / 238									Sand Pack PVC Screen	
			7	SS	55	50/ 180 mm				
7 / 237		Dense, wet	8	SS	60	48			Cap	
8 / 236		Borehole terminated at 8.1 mbgs due to practical refusal								Groundwater first observed at 7.6 mbgs
9										

Logged By: CM
Input By: CM

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Log of Borehole: BH107-19

Client:	Park City Inc.	**Project Name:**	Geotech Investigation - 505 Yonge Street	**Project No.:**	9574-001
Contractor:	Walker Drilling	**Method:**	Hollow Stem Augers	**Date Completed:**	August 27, 2019
Location:	505 Yonge Street, Barrie, ON	**UTM:**	17T 607176, 4912875	**Elevation:**	241.33 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
241 / 0		Topsoil: Brown sandy topsoil, moist, compact, FILL	1	SS	45	11				
240 / 1		Sand: Grey sand, with silt, with gravel, trace clay, moist, compact	2	SS	60	22				GSA SS2: 6% Gravel 60% Sand 26% Silt 8% Clay
239 / 2		Dense	3	SS	75	22				
238 / 3		Compact	4	SS	80	32				
237 / 4		Dense	5	SS	70	28				
236 / 5		Borehole terminated at 5.0 mbgs	6	SS	80	38				Groundwater observed at 4.1 mbgs and caving measured at 4.3 mbgs upon completion
6										

Logged By: CM **Input By:** CM

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Log of Borehole: BH108-19

Client: Park City Inc.
Project Name: Geotech Investigation - 505 Yonge Street
Project No.: 9574-001
Contractor: Walker Drilling
Method: Hollow Stem Augers
Date Completed: October 16, 2019
Location: 505 Yonge Street, Barrie, ON
UTM: 17T 607143, 4912886
Elevation: 242.59 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
242 / 0		Topsoil: Brown sandy topsoil, moist, loose, FILL	1	SS	20	9			Cap	Top of Standpipe (TOS) elevation: 243.38 mASL. Groundwater measured at 0.97 mbgs (241.62 mASL) on November 19, 2019.
									Grout	
241 / 1		Sand: Brown sand, some silt, some gravel, trace organics, moist, compact, FILL	2	SS	40	16			Bentonite Plug	
		Less organics, occasional cobbles	3	SS	90	16			Cuttings	
240 / 2		Sand: Brown sand, some gravel, some silt, occasional cobbles, moist, very dense	4	SS	75	50/ 255 mm				
239 / 3			5	SS	60	50/ 230 mm			PVC Standpipe	
238 / 4									Bentonite Plug	
237 / 5			6	SS	50	50/ 205 mm				
6						50/				

Logged By: CM
Input By: CM

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Log of Borehole: BH108-19

Client:	Park City Inc.	**Project Name:**	Geotech Investigation - 505 Yonge Street	**Project No.:**	9574-001
Contractor:	Walker Drilling	**Method:**	Hollow Stem Augers	**Date Completed:**	October 16, 2019
Location:	505 Yonge Street, Barrie, ON	**UTM:**	17T 607143, 4912886	**Elevation:**	242.59 mASL

Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
236 / 7		Silty Sand: Grey silty sand, some gravel, occasional cobbles, moist, very dense	7	SS	50	50/ 230 mm				
235 / 8		Less cobbles	8	SS	60	50/ 180 mm			Sand Pack	
234 / 9		Trace clay, wet, dense	9	SS	100	38			PVC Screen	
233 / 10										
232 / 11		Occasional cobbles, moist, very dense	10	SS	100	50/ 305 mm			Cap	Groundwater first observed at 8.5 mbgs
231 / 12		Borehole terminated at 11.1 mbgs								

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Log of Borehole: BH/MW109-21

Client: Core Group (2570974 Ontario Inc.) **Project Name:** Geotechnical Investigation **Project No.:** 9574-004

Contractor: Landshark Drilling **Method:** Hollow Stem Auger **Date Completed:** September 16, 2021

Location: 505 Yonge St., Barrie, ON **UTM:** 17T, 4912949 m N, 607084 m E **Elevation:** 247.04 mASL

Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
247 / 0		TOPSOIL: Black topsoil, some organics, compact, moist	1A						Monument	Top of Standpipe (TOS) elevation: 248.19 mASL. Groundwater measured at 1.77 mbgs (245.27 mASL.) on September 24, 2021
		SANDY SILT: Brown sandy silt, trace gravel, compact, moist, FILL	1B	SS	95	12			Cap	
246 / 1			2	SS	95	13				
		SANDY SILT: Brown sandy silt, some clay, trace gravel, compact, moist	3	SS	100	18			Cuttings	
245 / 2		-dense	4	SS	70	43				
244 / 3		-wet	5	SS	65	44				Wet soils encountered at 3.0 mbgs during the investigation
243 / 4									PVC Standpipe	
		-grey	6	SS	75	48				GSA SS6: 5% Gravel 29% Sand 55% Silt 11% Clay
242 / 5										
241 / 6		SILTY SAND: Grey silty sand, trace gravel, very dense, wet	7	SS	40	50/ 175 mm			Bentonite Plug	
240 / 7										
			8	SS	80	50/ 225 mm				
239 / 8										

Logged By: C. Malliaros **Input By:** C. Malliaros

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Log of Borehole: BH/MW109-21

Client: Core Group (2570974 Ontario Inc.) **Project Name:** Geotechnical Investigation **Project No.:** 9574-004

Contractor: Landshark Drilling **Method:** Hollow Stem Auger **Date Completed:** September 16, 2021

Location: 505 Yonge St., Barrie, ON **UTM:** 17T, 4912949 m N, 607084 m E **Elevation:** 247.04 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
238 — 9									Sand Pack PVC Screen	
			9	SS	80	50/ 125 mm				
237 — 10										
			10	SS	100	50/ 250 mm				
236 — 11										
235 — 12			11	SS	100	50/ 225 mm				
234 — 13										
			12	SS	100	50/ 250 mm				
233 — 14									Cap	
232 — 15		Borehole terminated in SILTY SAND at 14.0 mbgs due to exploration depth achieved								

Logged By: C. Malliaros **Input By:** C. Malliaros

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Log of Borehole: BH/MW110-21

Client: Core Group (2570974 Ontario Inc.) **Project Name:** Geotechnical Investigation **Project No.:** 9574-004
Contractor: Landshark Drilling **Method:** Hollow Stem Auger **Date Completed:** September 16, 2021
Location: 505 Yonge St., Barrie, ON **UTM:** 17T, 4912935 m N, 607174 m E **Elevation:** 243.90 mASL

Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0		ASPHALT: (75 mm)							Flushmount	Top of Standpipe (TOS) elevation: 243.73 mASL. Groundwater measured at 4.33 mbgs (239.58 mASL.) on September 24, 2021
		GRAVELLY SAND: Brown gravelly sand, compact, moist, FILL	1A	GS	-	-			Cap	
			1B							
243 — 1		SAND: Brown sand, some gravel, very loose, moist, FILL	2	SS	80	4			Cuttings	
		-loose								
			3	SS	60	6				
242 — 2										
		-very loose	4	SS	90	2			PVC Standpipe	
									Bentonite Plug	
241 — 3										
		SAND: Grey sand, some silt, very loose, moist	5	SS	80	2				
240 — 4										
		-compact	6	SS	100	22				
239 — 5										
									Sand Pack	
238 — 6									PVC Screen	
		SILTY SAND: Grey silty sand, dense, moist	7	SS	90	35				
237 — 7										
		-compact	8	SS	90	29			Cap	
236 — 8										
		Borehole terminated in SILTY SAND at 8.0 mbgs due to exploration depth achieved								No wet soils encountered during the investigation
235 — 9										

Logged By: C. Malliaros **Input By:** C. Malliaros

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Log of Borehole: BH/MW111-21

Client: Core Group (2570974 Ontario Inc.) **Project Name:** Geotechnical Investigation **Project No.:** 9574-004

Contractor: Walker Drilling **Method:** Tripod **Date Completed:** September 22, 2021

Location: 505 Yonge St., Barrie, ON **UTM:** 17T, 4912971 m N, 607162 m E **Elevation:** 239.61 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 239		TOPSOIL: Black topsoil, some sand, some silt, some organics, wet, compact	1A / 1B	SS	50	11			Monument; Cap; Bentonite Plug; PVC Standpipe	Top of Standpipe (TOS) elevation: 239.78 mASL. Groundwater measured at 1.83 mbgs (237.93 mASL.) on September 24, 2021
1 / 238		SAND: Brown sand, trace gravel, trace silt, compact, moist -saturated	2	SS	10	29				
2 / 237		GRAVELLY SAND: Grey gravelly sand, some silt, very dense, saturated	3	SS	60	50/ 230 mm			Sand Pack; PVC Screen	Wet soils encountered at 1.5 mbgs during the investigation GSA SS3: 32% Gravel 53% Sand 15% Silt and Clay
			4	SS	20	50/ 75 mm				
3 / 236			5	SS	40	50/ 75 mm			Cap	
4 / 235		Borehole terminated in GRAVELLY SAND at 3.5 mbgs due to exploration depth achieved								
5 / 234										
6 / 233										
7 / 232										
8 / 231										
9										

Logged By: B. White **Input By:** C. Malliaros

Appendix B

Physical Laboratory Testing Results

Grain Size Distribution Chart

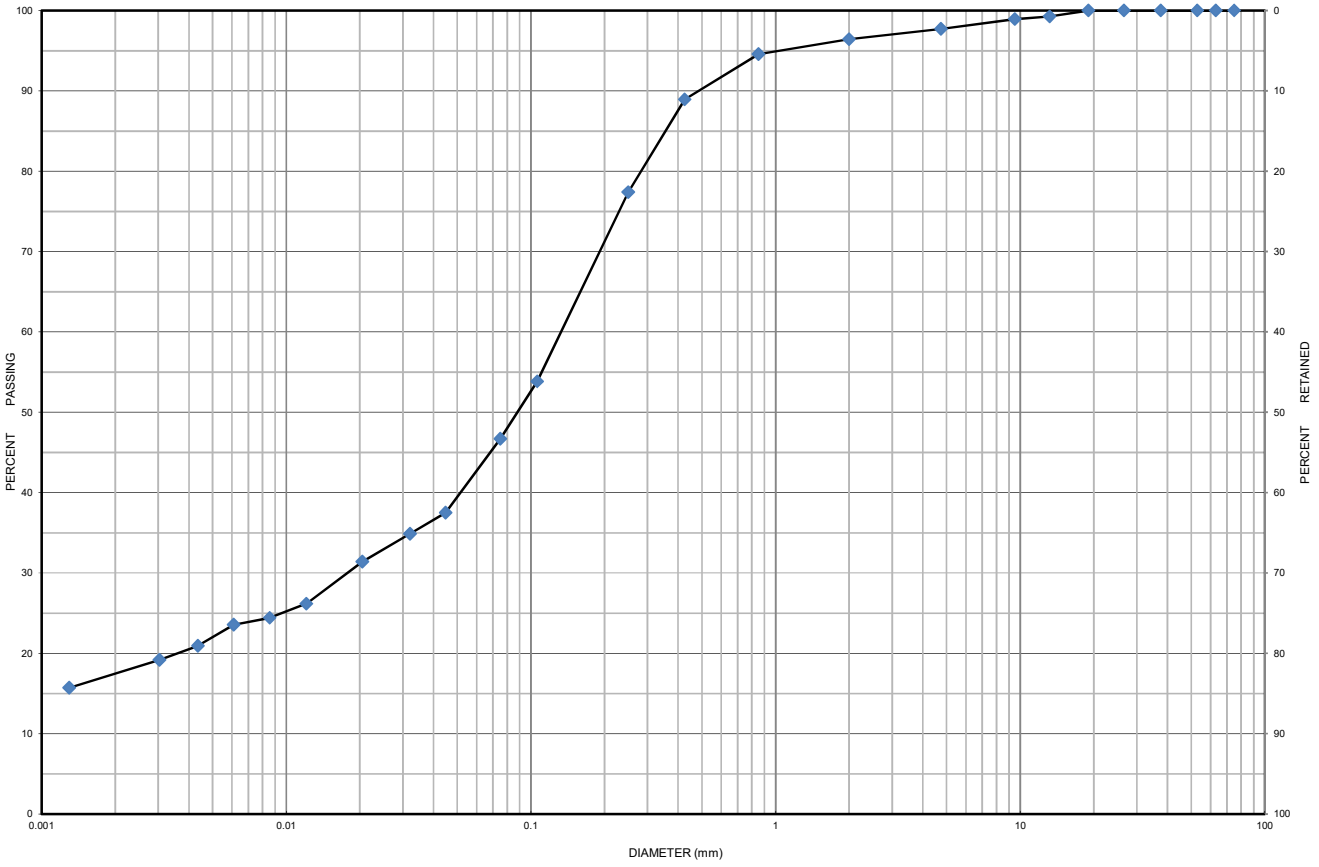
Project Number: *9574-001* **Client:** *iViva Homes*

Project Name: *Geotechnical - 505 Yonge St, Barrie, ON*

Sample Date: *Aug 14, 15, 26, 27, Oct 15, 2019* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 101-19 SS 12* **Depth:** *13.7 m to 14.2 m* **Lab Sample No:** *S-19-0886*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-19	SS 12	13.7 m to 14.2 m	2	51	47		8.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Clay trace Gravel		0.140	0.0180	0.0		

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Grain Size Distribution Chart

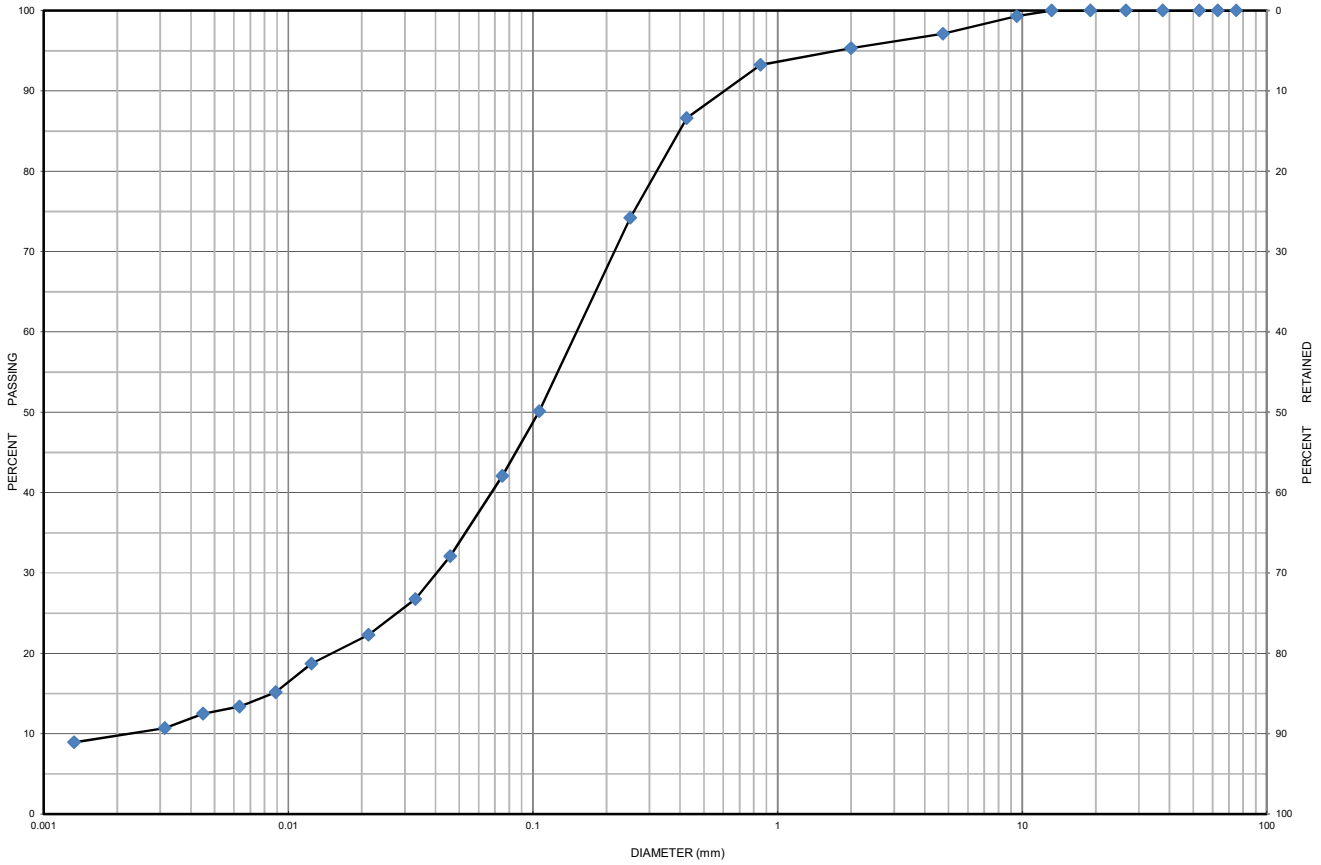
Project Number: *9574-001* **Client:** *iViva Homes*

Project Name: *Geotechnical - 505 Yonge St, Barrie, ON*

Sample Date: *Aug 14, 15, 26, 27, Oct 15, 2019* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 104-19 SS 7* **Depth:** *6.1 m to 6.6 m* **Lab Sample No:** *S-19-0887*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 104-19	SS 7	6.1 m to 6.6 m	3	55	42		7.5

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Clay trace Gravel		0.160	0.0400	0.0	80.00	5.00

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Grain Size Distribution Chart

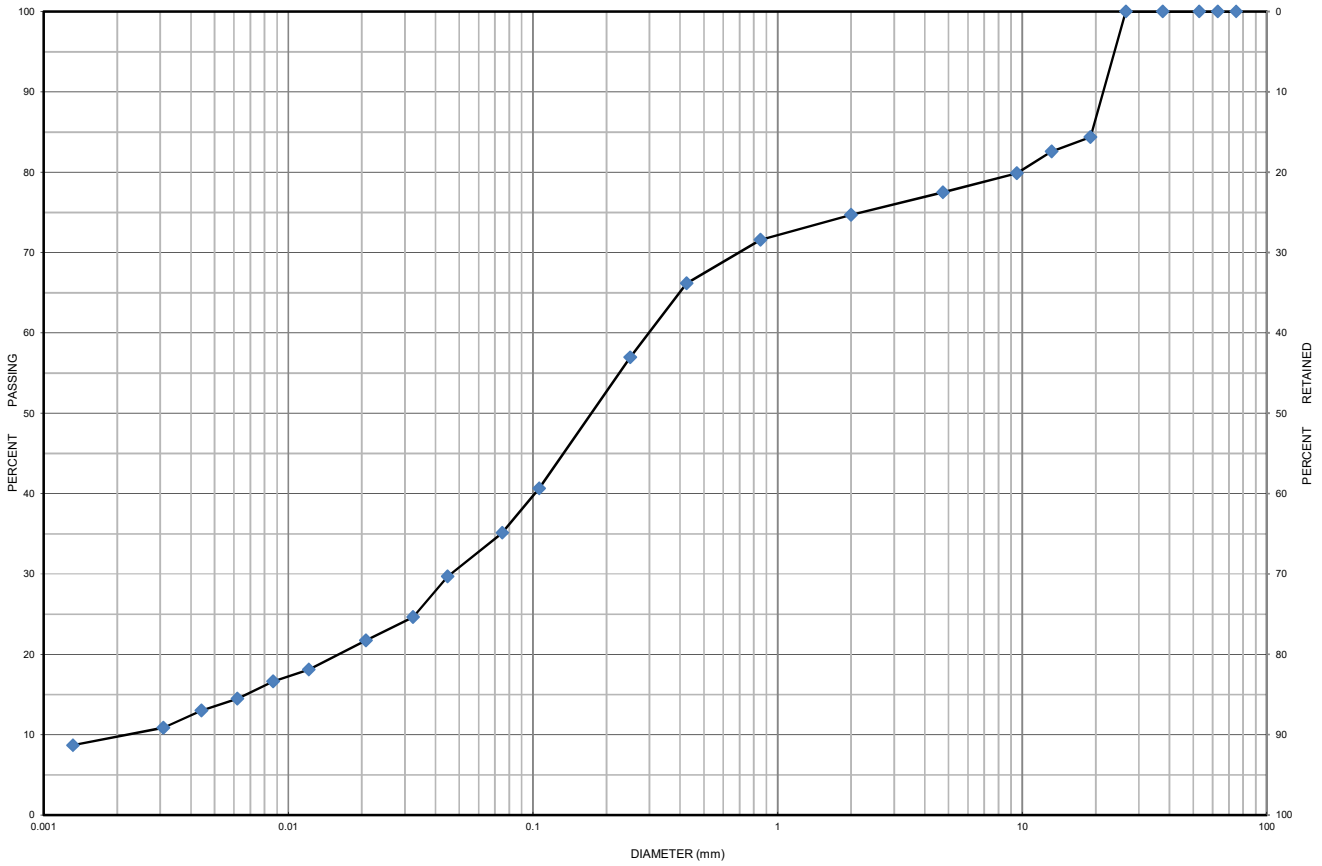
Project Number: *9574-001* **Client:** *iViva Homes*

Project Name: *Geotechnical - 505 Yonge St, Barrie, ON*

Sample Date: *Aug 14, 15, 26, 27, Oct 15, 2019* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 103-19 SS 4* **Depth:** *2.3 m to 2.7 m* **Lab Sample No:** *S-19-0888*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-19	SS 4	2.3 m to 2.7 m	23	42	35		11.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Silty Sand trace Clay		0.300	0.0450	0.002	150.00	3.38

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Grain Size Distribution Chart

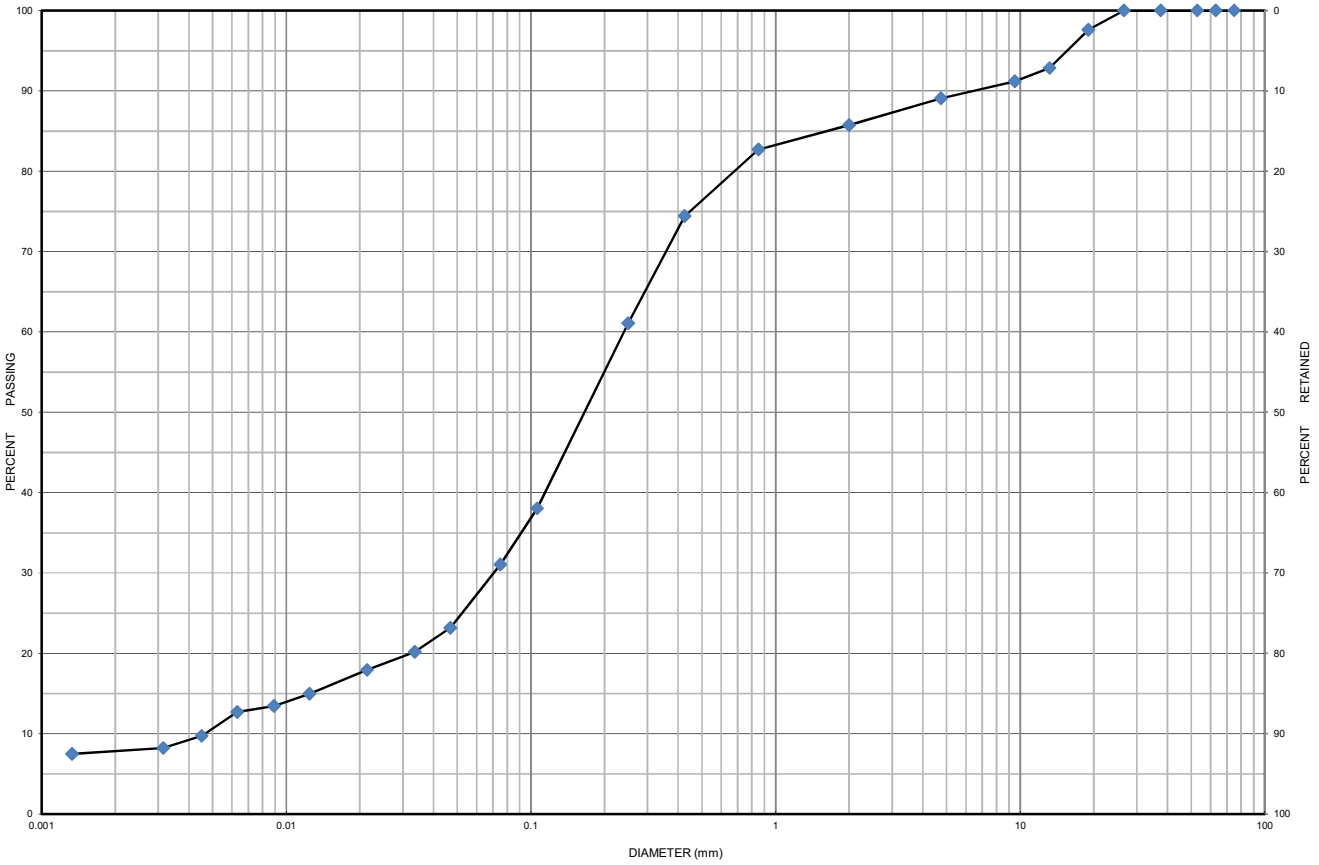
Project Number: *9574-001* **Client:** *iViva Homes*

Project Name: *Geotechnical - 505 Yonge St, Barrie, ON*

Sample Date: *Aug 14, 15, 26, 27, Oct 15, 2019* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 106-19 SS 6* **Depth:** *4.6 m to 5 m* **Lab Sample No:** *S-19-0889*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 106-19	SS 6	4.6 m to 5 m	11	58	31		8.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Gravel trace Clay		0.240	0.0700	0.0045	53.33	4.54

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Grain Size Distribution Chart

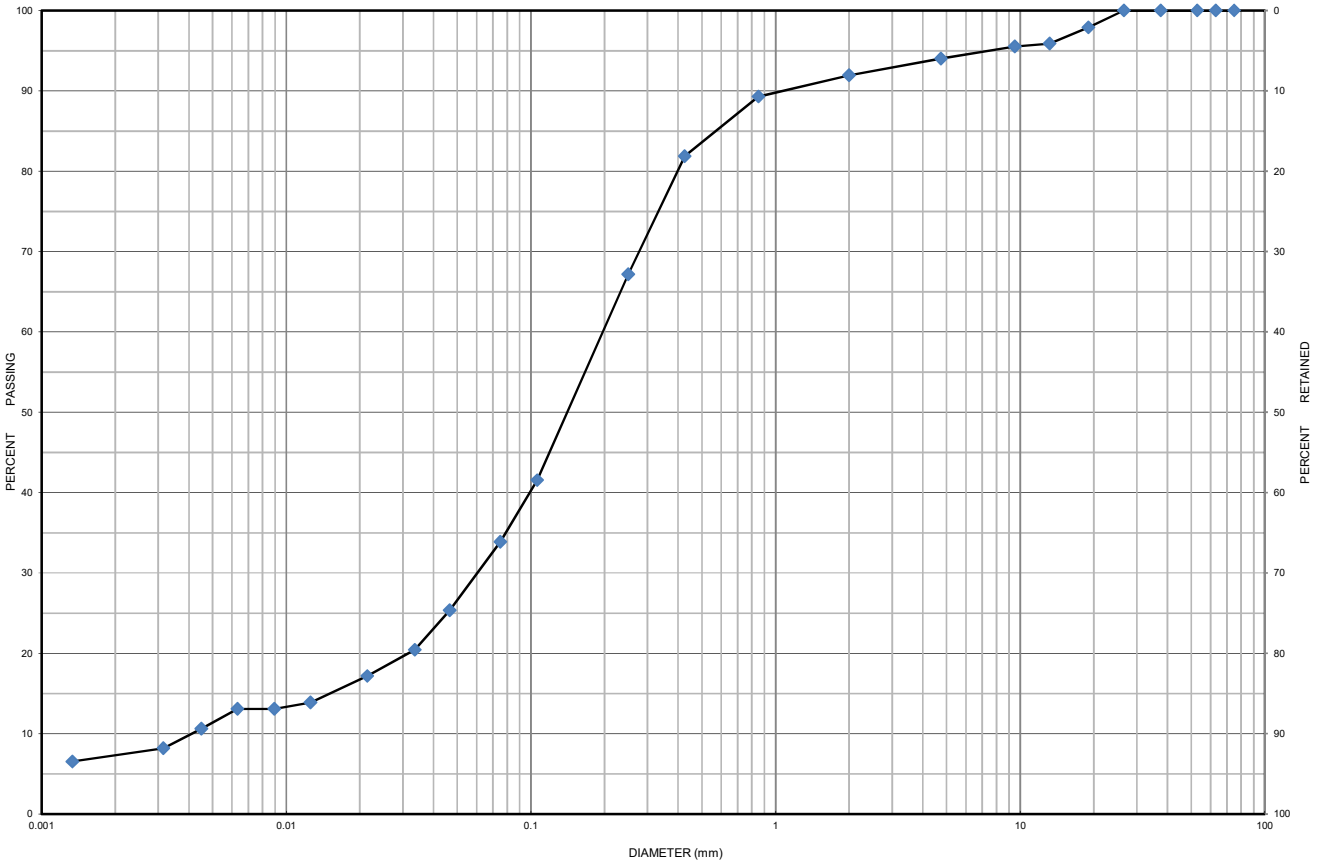
Project Number: *9574-001* **Client:** *iViva Homes*

Project Name: *Geotechnical - 505 Yonge St, Barrie, ON*

Sample Date: *Aug 14, 15, 26, 27, Oct 15, 2019* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 107-19 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-19-0890*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 107-19	SS 2	0.8 m to 1.2 m	6	60	34		9.4

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Gravel trace Clay		0.190	0.0500	0.003	63.33	4.39

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Moisture Content

Project Number: 9574-001
Project Name: 505 Yonge St., Barrie, ON
Client: iViva Homes
Date Taken: 2019-08-14

Lab Number: S-19-0885
Date Tested: 2019-10-23
Tested By: J.Burton

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
101	1	0.00-0.61	21.9	9.2	
101	10	10.67-11.13	14.9	6.1	
101	11	12.19-12.65	21.9	7.5	
101	12	13.72-14.17	118.7	8.6	
101	13	15.24-15.70	19.1	8.2	
101	2	0.61-1.22	10.7	4.2	
101	3	1.52-1.98	18.8	7.5	
101	4	2.29-2.74	18.5	7.5	
101	5	3.05-3.51	19.9	7.6	
101	6	4.57-5.03	30.3	10.5	
101	7	6.10-6.55	32.1	13.3	
101	8	7.62-8.08	28.5	11.4	
101	9	9.14-9.60	14.7	6.1	
102	11	12.19-12.65	19.4	6.4	
102	12	13.72-14.17	19.2	6.9	
102	13	15.24-15.64	15.9	6.5	
102	2	0.76-1.22	16.5	6.2	
102	3	1.52-1.98	17.1	7.1	
102	4	2.29-2.74	19.2	7.2	
102	5	3.05-3.51	16.3	6.6	
102	6	4.57-5.03	15.2	5.9	
102	7	6.10-6.55	13.5	6.1	
102	8	7.62-8.08	19.4	7.7	
102	9	100.58-9.60	30.0	10.1	
102	gs1	0.00-0.61	11.1	3.0	
103	1	0.00-0.61	21.7	9.0	1
103	2	0.76-1.22	37.0	17.3	1

1 – Contains organics
2 – Contains rubble
3 – Hydrocarbon Odour
4 – Unknown Chemical Odour
5 – Saturated – free water visible
6 – Very moist – near optimum moisture content
7 – Moist – below optimum moisture
8 – Dry – dry texture – powdery
9 – Very small – caution may not be representative
10 – Hold sample for gradation analysis

Moisture Content

Project Number: 9574-001
Project Name: 505 Yonge St., Barrie, ON
Client: iViva Homes
Date Taken: 2019-08-14

Lab Number: S-19-0885
Date Tested: 2019-10-23
Tested By: J.Burton

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
103	3	1.52-1.98	26.9	11.5	
103	4	2.29-2.74	23.2	11.0	N/R
103	5	3.05-3.51	25.9	10.4	
103	6	4.57-5.03	18.9	7.4	
103	7	6.10-6.55	25.1	7.4	
104	10	10.67-11.13	17.5	7.3	
104	2	0.76-1.22	5.9	2.6	
104	3	1.52-1.98	11.0	4.5	
104	4	2.29-2.74	35.9	18.6	1
104	5	3.05-3.51	27.3	10.2	
104	6	4.57-5.03	18.0	7.7	
104	7	6.10-6.55	67.3	7.5	n/r
104	8	7.62-8.08	5.0	3.2	N/R
104	9	9.14-9.60	18.0	6.9	
104	gs1	0.00-0.61	10.6	2.6	
105	1	0.00-0.61	28.3	12.7	
105	2	0.76-1.22	24.2	15.6	
105	3	1.52-1.98	22.1	10.1	
105	4	2.29-2.74	12.6	5.9	
105	5	3.05-3.51	13.9	5.4	
105	6	4.57-5.03	19.2	8.4	
105	7	6.10-6.55	30.4	12.0	
106	1	0.00-0.61	13.6	6.3	1
106	2	0.76-1.22	21.8	11.0	1
106	3	1.52-1.98	19.6	7.3	
106	4	2.29-30.18	18.8	7.6	
106	5	3.05-3.51	25.6	8.0	

1 – Contains organics
2 – Contains rubble
3 – Hydrocarbon Odour
4 – Unknown Chemical Odour
5 – Saturated – free water visible
6 – Very moist – near optimum moisture content
7 – Moist – below optimum moisture
8 – Dry – dry texture – powdery
9 – Very small – caution may not be representative
10 – Hold sample for gradation analysis

Moisture Content

Project Number: 9574-001
Project Name: 505 Yonge St., Barrie, ON
Client: iViva Homes
Date Taken: 2019-08-14

Lab Number: S-19-0885
Date Tested: 2019-10-23
Tested By: J.Burton

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
106	6	4.57-5.03	60.7	8.6	N/R
106	7	6.10-6.55	19.8	7.6	
106	8	7.62-8.08	22.3	7.9	
107	1	0.00-0.61	26.2	10.5	1
107	2	0.76-1.22	80.3	9.4	N/R
107	3	1.52-1.98	27.6	10.3	
107	4	2.29-2.74	27.5	8.4	
107	5	3.05-3.51	19.7	7.3	
107	6	4.57-5.03	24.6	7.7	
108	1	0.00-0.61	41.7	20.6	1
108	2	0.76-1.22	30.0	13.4	1
108	3	1.52-1.98	24.6	8.4	
108	4	2.29-2.74	20.4	7.4	
108	5	3.05-3.51	21.8	7.2	
108	6	4.57-5.03	15.9	6.0	
108	7	6.10-6.55	16.8	6.6	
108	8	7.62-8.08	17.8	6.6	
108	9	9.14-9.60	19.4	7.3	
109	10	10.67-11.13	20.2	7.3	
mystery	bag	0.00-0.00	116.1	17.0	

1 – Contains organics
2 – Contains rubble
3 – Hydrocarbon Odour
4 – Unknown Chemical Odour
5 – Saturated – free water visible
6 – Very moist – near optimum moisture content
7 – Moist – below optimum moisture
8 – Dry – dry texture – powdery
9 – Very small – caution may not be representative
10 – Hold sample for gradation analysis

Grain Size Distribution Chart

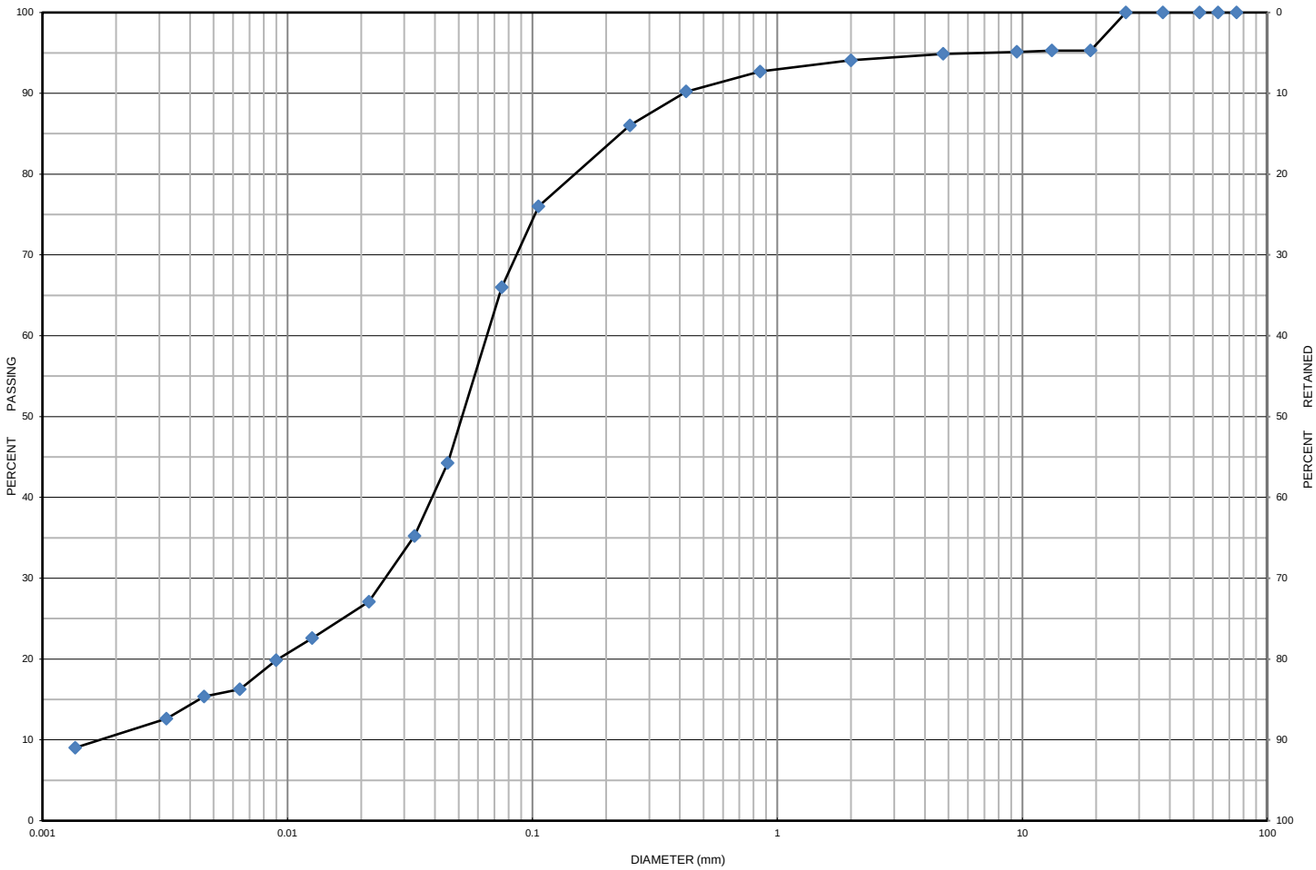
Project Number: *9574-004* **Client:** *Renaissance Retirment Barrie Trust*

Project Name: *505 Yonge Street, Barrie*

Sample Date: *September 16, 2021* **Sampled By:** *Chris Malliaros - Cambium Inc.*

Location: *BH 109-21 SS 6* **Depth:** *4.6 m to 5 m* **Lab Sample No:** *S-21-1181*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 109-21	SS 6	4.6 m to 5 m	5	29	55	11	14.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sandy Silt some Clay trace Gravel	ML	0.0660	0.0150	0.0017	38.82	2.01

Additional information available upon request

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(Senior Project Manager)

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Grain Size Distribution Chart

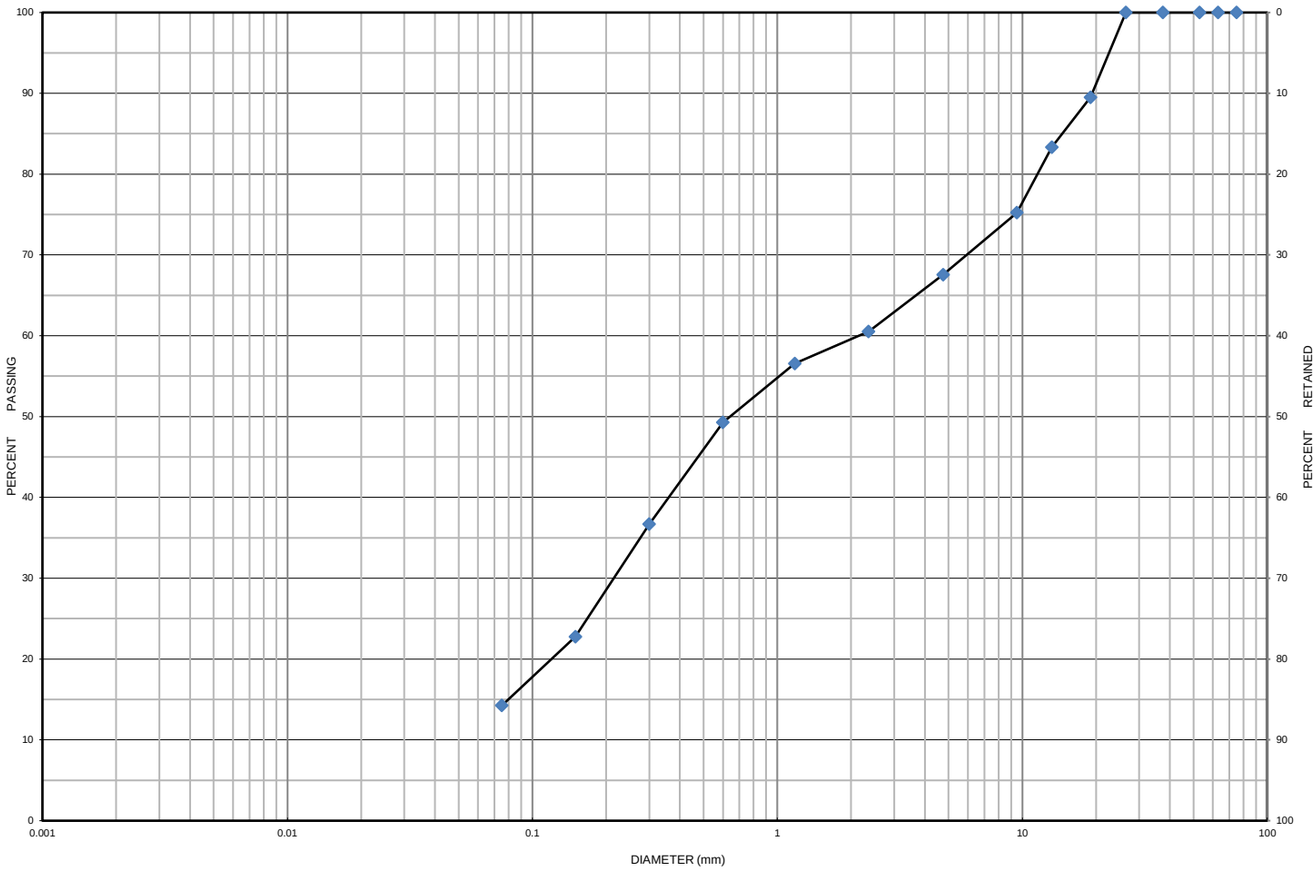
Project Number: *9574-004* **Client:** *Renaissance Retirment Barrie Trust*

Project Name: *505 Yonge Street, Barrie*

Sample Date: *September 22, 2021* **Sampled By:** *Ben White - Cambium Inc.*

Location: *BH 111-21 SS 3* **Depth:** *1.5 m to 1.9 m* **Lab Sample No:** *S-21-1182*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 111-21	SS 3	1.5 m to 1.9 m	32	53	15		9.7

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Sand some Silt	SM	2.115	0.220	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *October 1, 2021*

(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Moisture Content

Project Number: 9574-004
Project Name: 505 Yonge Street, Barrie
Client: Renaissance Retirement Barrie Trust
Date Taken: 2021-09-16

Lab Number: S-21-1180
Date Tested: 2021-09-24
Tested By: K. Janke

Borehole Number	Sample Number	Sample Depth (m)	Water Weight (g)	Water Content (%)	Additional Observations
109	01A	0.00-0.15	42.0	27.0	1
109	01B	0.15-0.61	21.1	11.7	
109	02	0.61-1.22	37.3	22.9	
109	03	1.52-2.13	19.2	9.4	
109	04	2.29-2.74	17.4	7.7	
109	05	3.05-3.51	22.2	10.6	
109	06	4.57-5.03	31.6	13.9	
109	07	6.10-6.55	18.3	10.3	
109	08	7.62-8.08	24.4	10.8	
109	09	9.14-9.60	20.5	8.4	
109	10	10.67-11.13	17.0	8.6	
109	11	12.19-12.65	18.3	7.4	
109	12	13.72-14.17	19.3	7.9	
110	01A	0.08-0.46	6.7	3.4	
110	01B	0.46-0.61	5.9	3.5	
110	02	0.76-1.22	13.1	7.1	
110	03	1.52-1.98	20.7	9.2	
110	04	2.29-2.74	27.6	12.4	
110	05	3.05-3.51	37.6	19.3	
110	07	6.10-6.55	16.5	7.9	
110	08	7.62-8.08	19.5	8.1	
111	01A	0.00-0.15	36.2	22.5	1
111	01B	0.15-0.61	7.2	4.0	
111	02	0.76-1.37	12.1	12.8	
111	03	1.52-1.91	28.7	11.7	
111	04	2.29-2.74	21.3	11.8	
111	05	3.05-3.20	20.6	10.2	

1 – Contains organics
2 – Contains rubble
3 – Hydrocarbon Odour
4 – Unknown Chemical Odour
5 – Saturated – free water visible
6 – Very moist – near optimum moisture content
7 – Moist – below optimum moisture
8 – Dry – dry texture – powdery
9 – Very small – caution may not be representative
10 – Hold sample for gradation analysis

Appendix C

Seismic Hazard Calculation Results

2015 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Site: 44.362N 79.656W **User File Reference:** 505 Yonge Street 2021-09-29 19:31 UT

Requested by: M. Garrison, Cambium, Inc.

Probability of exceedance per annum	0.000404	0.001	0.0021	0.01
Probability of exceedance in 50 years	2 %	5 %	10 %	40 %
Sa (0.05)	0.081	0.050	0.033	0.011
Sa (0.1)	0.112	0.072	0.048	0.017
Sa (0.2)	0.109	0.072	0.049	0.019
Sa (0.3)	0.093	0.063	0.043	0.017
Sa (0.5)	0.077	0.052	0.036	0.013
Sa (1.0)	0.047	0.031	0.021	0.006
Sa (2.0)	0.025	0.016	0.010	0.003
Sa (5.0)	0.006	0.004	0.002	0.001
Sa (10.0)	0.003	0.002	0.001	0.000
PGA (g)	0.064	0.041	0.027	0.009
PGV (m/s)	0.064	0.040	0.026	0.008

Notes: Spectral (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are given in units of g (9.81 m/s^2). Peak ground velocity is given in m/s. Values are for "firm ground" (NBCC2015 Site Class C, average shear wave velocity 450 m/s). NBCC2015 and CSAS6-14 values are highlighted in yellow. Three additional periods are provided - their use is discussed in the NBCC2015 Commentary. Only 2 significant figures are to be used. **These values have been interpolated from a 10-km-spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the directly calculated values.**

References

National Building Code of Canada 2015 NRCC no. 56190; Appendix C: Table C-3, Seismic Design Data for Selected Locations in Canada

Structural Commentaries (User's Guide - NBC 2015: Part 4 of Division B)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File 7893 Fifth Generation Seismic Hazard Model for Canada: Grid values of mean hazard to be used with the 2015 National Building Code of Canada

See the websites www.EarthquakesCanada.ca and www.nationalcodes.ca for more information