PRI ENGINEERING

GEOTECHNICAL INVESTIGATION REPORT

PROPOSED MULTI-STOREY MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BOULEVARD WEST
ETOBICOKE, ONTARIO

Prepared for Apria Inc.

144 Front Street West, Suite 310
Toronto, ON M5J 2L7

November 18, 2019

Manish Nayar
Managing Director
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144 Front Street, Suite 310
Toronto, ON M5J 2L7

Subject: **Geotechnical Investigation Report**
Proposed Multi-Storey Mixed-Use Development
3353-3359 Lakeshore Boulevard West
Etobicoke, ON

Dear Mr. Nayar:

We are pleased to submit the following geotechnical investigation report, describing subsurface conditions and recommendations for the design and construction of the Proposed Multi-Storey Mixed-Use Development located at 3353-3359 Lakeshore Boulevard West in Etobicoke, Ontario. The proposed development includes a six (6) storey residential building with one (1) underground parking level, an outdoor amenity area, a paved access road, loading area and ramp leading to the underground parking level.

This report presents the results of the subsurface investigation for the subject site, which was completed in May 2019, and includes our comments and recommendations as they relate to the foundation design and construction. Attached is a site plan noting borehole and monitoring well locations when compare to both the existing conditions and the proposed development layout, borehole logs, and laboratory test results.

We trust that the information is straightforward and meets with your present requirements. Please contact us if you have any questions.

Yours truly,
PRI Engineering Inc.

Arash Yazdani, P.Eng.
Director of Engineering Services

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1 Introduction

As requested by Apria Inc. (Apria), PRI Engineering Inc. (PRI) is pleased to submit the following Geotechnical Investigation Report for the proposed Multi-Storey Mixed Use Development in Etobicoke, ON. The purpose of this report is to provide subsurface information for the design of the proposed multi-storey residential building foundation and provide considerations as they relate to the earthworks for the construction of the development. The project is located at 3353-3359 Lakeshore Boulevard West, Etobicoke, ON (the "Site"), south of Lakeshore Boulevard West, west of Twenty Seventh Street and east of Twenty Eighth Street. The site is approximately 1,410 m^2 consists primarily of abutted building structures with asphalt areas in the center of the site and along the east boundary. Existing businesses at the site are an autobody detailing business currently operating in the most easterly structure, with an auto sales business operating in the structure extending to the west. The existing central building finished concrete floor elevation is approximately 88.4 m above sea level (mASL) (0.5 m below exterior parking grade), with a ramp to the parking lot located at the northeast corner of the structure. The existing west structure concrete finished floor elevation is approximately 89.0 mASL (0.1 m above exterior parking grade). Site location and existing site layout are shown on the attached **Figure 1**.

We have reviewed the drawing package provided by Icon Architects Inc., dated November 11, 2019, and it is understood that the proposed multi-storey mixed-use development will consist of the following:

- → A Six (6) storey residential structure with a total ground floor area (GFA) of approximately 5,378 m^2 (ground floor GFA of approximately 621 m^2);
- → An underground parking area with a GFA of approximately 1,294 m^2;
- → A pavement access road to Lakeshore Blvd. W. at the northwest corner of the property extending along the west side of the property to the above grade staging areas and the access ramp that runs along the south side of the property to the underground parking level;
- → The second-floor level and overlying stories are to extend beyond the ground floor footprint, supported by structural columns / load-bearing wall to the west of the access road;

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→ An outdoor amenities area is to overlie the parking lot ramp and underground parking level at the southeast corner of the property; and
→ The lowest elevation for top of the underground parking floor slab is approximately 83.8 mASL, which is inferred to be approximately 5.8 m below ground surface (mBGS).

The proposed site layout is shown on the attached **Figure 2** with existing conditions noted on **Figure 1**.

Review of a previously completed Phase Two Environmental Site Assessment (ESA) was completed by Tanktek Environmental Services Ltd. (TT) dated October 28, 2015, was used as reference with respect to the anticipated subsurface conditions. Additionally, the historical monitoring well BH 4732C was used for water sampling as part of the hydrogeological study and ESA, the location of this monitoring well is noted on **Figures 1 and 2**, attached.

In conjunction with this geotechnical investigation report, a hydrogeological investigation and Phase Two ESA investigation were completed. PRI reviewed Hydrological Review criteria, as outlined by the City of Toronto (COT), in preparation for the hydrogeological investigation. D.M. Wills (DMW) reviewed the completed Phase I ESA, completed by TT, dated May 22, 2019, and coordinated investigation efforts with PRI. The field program, outlined in **Section 2** below, was developed to meet investigation requirements for the programs noted above. Both reports will be submitted under separate covers, with the Hydrogeological Report prepared by PRI and the Phase One/II ESA prepared by DMW.

The following report summarizes the completed field investigation, findings, laboratory results and finally a summary of comments and recommendations for construction and design considerations as it relates to the mixed-use development specifically, the access road, civil earthworks and foundations of superstructure.

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2 Geotechnical Investigation Procedures

2.1 Field Investigation Program

Prior to the field investigation, underground utility locates, including water, electrical, sewer, gas, telephone, cable, etc., were completed using Ontario One-call services and a private locator. Borehole locations were finalized in the field based on utility clearance and other obstructions (i.e. overheard lines, vehicles, equipment, etc.) observed at the time of the investigation.

A borehole program was carried out on May 27 to 30, 2019. Seven (7) exterior boreholes, designated as BH19-01 through BH19-05, and MW19-10 and MW19-11, were advanced within the existing asphalt parking areas, to refusal on bedrock, at depths ranging from approximately 3.7 mBGS to 4.4 mBGS. Exterior boreholes were advanced using a truck-mounted drill rig equipped with 108 mm Inner Diameter (I.D.) operating under full-time supervision of PRI, with some of the boreholes supervised by DMW. Boreholes were advanced through the overburden materials and sampled in general accordance with the Standard Penetration Test (SPT) procedure (ASTM D1586). The result of SPT sampling in terms of N-values are referred to as consistency for cohesive soils and relative density for non-cohesive materials.

Upon SPT refusal upon bedrock, boreholes BH19-02 and MW19-10 were advanced and sampled to depths of approximately 9.2 mBGS and 9.6 mBGS, respectively, using diamond bit HQ core tooling operating under full time supervision of PRI. Boreholes BH19-01, BH19-05 and MW19-11 were advanced to depths ranging from approximately 9.3 mBGS and 10.6 mBGS, using diamond bit tri-cone tooling with 108 mm Outer Diameter (O.D.) in preparation for monitoring well installation.

Four (4) interior boreholes, designated as BH19-06 to BH19-09, were advanced within the existing concrete floor slab, to refusal on bedrock, at depths ranging from approximately 2.7 mBGS to 4.7 mBGS. Interior boreholes were advanced using a track-mounted drill rig equipped with 51 mm O.D. direct push casing and sampling equipment operating under full time supervision of DMW.

Borehole location information and depth details are summarized in **Table 1** below.

Table 1: Borehole Surface Elevation and Termination Depths Summary

BOREHOLE ID	COORDINATES (NAD 83)		SURFACE ELEVATION (mASL)*	TERMINATION DEPTH (mBGS)	TERMINATION ELEVATION (mASL)*
	NORTHING	EASTING			
BH19-01	4828052.4	618953.9	89.0	9.6	79.4
BH19-02	4828064.6	618989.3	88.8	9.2	79.6
BH19-03	4828039.6	618958.4	89.0	4.6	84.4
BH19-04	4828034.6	618974.1	88.9	4.0	84.9
BH19-05	4828041.4	618992.2	88.7	9.3	79.4
BH19-06	4828050.9	618980.2	88.1	3.4	84.7
BH19-07	4828026.5	618973.0	89.0	4.7	84.3
BH19-08	4828029.8	618989.7	88.4	2.7	85.7
BH19-09	4828031.5	618992.8	88.2	3.8	84.4
MW19-10	4828045.1	618967.8	88.7	9.6	79.1
MW19-11	4828048.0	618989.9	88.8	10.6	78.2

***mASL = metres above sea level.**

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Recovered soil and bedrock samples were inspected and logged in the field using visual and tactile methods, with soil samples being placed in moisture proof containers and bedrock being placed within wooden core boxes for transportation to the laboratory for review and selected testing. Upon sampling, obtained soil samples were screened for Volatile Organic Compounds (VOCs) and other gases using an Eagle II Photoionization Detector (PID). Subsurface conditions including bedrock depth and groundwater seepage were logged, prior to backfilling. A borehole location plan is attached in the **Figures** section in this report, with borehole logs are summarized and attached as **Appendix A.**

2.2 Piezometer Installations

Groundwater monitoring wells were installed at all borehole locations, excluding borehole BH19-06. The exterior and interior monitoring wells were constructed using 60 mm O.D. and 33 mm O.D. schedule 40 PVC machine-slotted screen and riser pipe, respectively, packed, backfilled and capped in general accordance with Provincial Regulations (O. Reg. 903 amended). Monitoring may be used during construction to confirm groundwater elevations for dewatering activities, but should be decommissioned thereafter, according to the Regulations.

Monitoring well information summarized in borehole logs attached as **Appendix A.**

2.3 Elevation Survey

Exterior boreholes northing and easting coordinates (UTM NAD 83 coordinates) and surface elevations were surveyed using a Trimble GPS rover and base station utilizing a global geodetic. Interior boreholes locations and surface elevations were determined from the surveyed exterior and floor elevations. Borehole coordinates and elevations are summarized in **Table 1** above and in the **Figures** section attached.

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3 Laboratory Testing Program

Upon completion of drilling, recovered soil and bedrock samples were transported to the PRI office for engineering review. Based on the findings, the following laboratory testing program was completed, which included geotechnical and environmental testing.

3.1 Geotechnical Testing

Selected soil and bedrock samples were submitted to Canadian Certified Independent Laboratories (CCIL) at WSP for geotechnical testing in accordance to **Table 2** below. Geotechnical laboratory test results are incorporated into the borehole logs in **Appendix A**, with copies of the geotechnical laboratory test results provided in **Appendix B**.

Table 2: Geotechnical Laboratory Testing Summary

LABORATORY TEST	REFERENCE STANDARD	NUMBER OF TESTS
Natural Moisture Content	ASTM D2216-98	35
Particle Size Distribution Analysis	ASTM D422	5
Atterberg Limits	ASTM D4318	2
Unit Weight	ASTM D7263	3
Point Load Index Tests of Bedrock	ASTM D5731-16	8

3.2 Soil Corrosivity Testing

Three (3) soil samples were submitted to CCIL at SGS Laboratories for chemical corrosivity analysis. The samples were analyzed for chloride, sulphate, pH, electrical conductivity, resistivity, Redox potential, and sulphide concentrations. A summary of corrosivity analyses as per the ANSI/AWWA rating system is discussed in the section below. The Certificate of Analysis and ANSI/AWWA rating system are attached as **Appendix C**.

3.3 Environmental Testing

Selected soil and groundwater samples were selected by DMW and submitted for laboratory analysis, as part of ESA Phase II Investigation program. A summary of laboratory results are to be included in a separate ESA Phase Two Report, as prepared by DMW.

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4 Subsurface Conditions

The inferred subsurface profiles are based on the borehole logs from the field investigation program. While we believe conditions are representative of actual site conditions, if findings during construction deviate from those encountered at the completed boreholes, we should be consulted to revise our recommendations based on actual conditions at the time of construction. The following are the specific subsurface conditions encountered at borehole locations.

4.1 Overburden

Based on the completed boreholes, surficial asphalt with an underlying coarse-grained fill material was generally encountered outside the existing building perimeter, surficial concrete floor slab with an underlying coarse-grained fill material was encountered within the existing building interior. Underlying these materials was fine-grained soils, which was underlain by shale/limestone bedrock at all borehole locations. Inferred subsurface profiles are shown **on Figures 3 and 4**, attached.

4.1.1 Building Exterior – Surficial Asphalt

A surficial layer of hot mix asphalt was encountered in all exterior boreholes, with an approximate thickness of 70 mm.

4.1.2 Building Interior – Concrete Slab

A concrete slab was encountered in all interior boreholes, with an approximate thickness of 100 mm.

4.1.3 Gravel and Sand to Sand

Light Brown to orangey brown to dark brown to grey to black gravel and sand to sand soils were encountered directly underlying the surficial asphalt and concrete slab at all borehole locations except borehole BH19-04, this material ranged in thickness from approximately 0.2 to 1.1 m in thickness. A sand layer was encountered directly underlying a sandy silt fill layer at boreholes BH19-03 and BH19-04, at an approximate depth of 0.6 mBGS, and ranged in thickness from approximately 0.2 m to 0.6 m. The coarse-grained soils contained gravelly to trace amounts of gravel, some to trace amounts of silt and clay, occasional cobbles, and some to trace amounts of brick and asphalt debris. A slight hydrocarbon odour was noted from coarse-grained samples obtained from boreholes BH19-08 and BH19-09, however PID did not detect VOCs in obtained soil samples. The gravel and sand to sand soils was described as generally moist to saturated at the time of the investigation based on laboratory moisture contents ranging from 12 % to 21 %. SPT N values for the coarse-grained soils ranged from 3 to 22 blows per 305 mm of penetration and based on these results the material is considered to be very loose to compact.

Two (2) laboratory particle size distribution analyses were completed on selected soil samples. The test results are attached in **Appendix B** and are summarized as follows, as per the Unified Soils Classification System (USCS):

Table 3: Summary of Laboratory Particle Size Analysis

BOREHOLE ID	SAMPLE NO.	DEPTH (mBGS)	GRAVEL*	SAND**	SILT AND CLAY ***
BH19-01	SS2	0.5	48 %	36 %	16 %
MW19-11	SS2	0.5	1 %	77 %	22 %

***Material passing 3-inch sieve opening and retained by No. 4 sieve.**

****Material passing No. 4 sieve and retained by No. 200 sieve.**

*****Material passing No. 200 sieve.**

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4.1.4 Silty Sand to Sandy Silt to Clayey Sandy Silt

Light Brown to brown to silty sand to sandy silt to clayey sandy silt soils were encountered directly underlying the coarse-grained soils noted above at all borehole locations, at depths ranging from approximately 0.8 mBGS to 1.2 mBGS, extending down to borehole refusal upon presumed bedrock (depths ranging from approximately 2.7 mBGS to 4.6 mBGS). A sandy silt fill layer interbedded within the coarse-grained soils was encountered at boreholes BH19-03 and BH19-04, at depths of approximately 0.3 mBGS and 0.1 mBGS, respectively, ranging from approximately 0.3 to 0.5 m in thickness. These soils were described as clayey to containing trace amounts of clay and gravelly to trace amounts of gravel. Several samples obtained had a slightly plastic consistency and is attributed to having a higher clay content. PID did not detect VOCs in obtained soil samples. The silty sand to sandy silt to clayey sandy silt soils was described as generally moist at the time of the investigation based on laboratory moisture contents ranging from 11 % to 27 %. SPT N values for these soils ranged from 3 to 46 blows per 305 mm of penetration and based on these results the material is considered to be very loose to dense.

Three (3) laboratory particle size distribution analyses were completed on selected soil samples. The test results are attached in **Appendix B** and are summarized as follows, as per USCS:

Table 4: Summary of Laboratory Particle Size Analysis

BOREHOLE ID	SAMPLE No.	DEPTH (mBGS)	GRAVEL*	SAND**	SILT AND CLAY ***
BH19-02	SS4	2.1	0 %	53 %	47 %
BH19-03	SS6	3.4	7 %	32 %	61 %
BH19-04	SS4	2.1	5 %	22 %	73 %

***Material passing 3-inch sieve opening and retained by No. 4 sieve.**
****Material passing No. 4 sieve and retained by No. 200 sieve.**
*****Material passing No. 200 sieve.**

Two (2) Atterberg Limit tests were completed on selected soils samples with slightly plastic consistency. The test results are attached in **Appendix B** and are summarized as follows, as per USCS.

Table 5: Summary of Atterberg Limits Tests

BOREHOLE ID	SAMPLE No.	DEPTH (mBGS)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION
BH19-03	SS6	3.4	26	18	8	CL
BH19-04	SS4	2.1	30	20	10	CL

4.2 Shale/Limestone Bedrock

Prior to mobilization to site, a desktop site review was completed on relevant background information. Based on bedrock geological mapping (Ontario Geological Survey), it is anticipated that the site is underlain by shale with interbedded limestone, dolostone and siltstone of the Georgian Bay Formation, and is Ordovician in age.

All boreholes were advanced to refusal on presumed bedrock. Approximately 5.6 m and 5.2 m of rock coring was completed on boreholes BH19-02 and MW19-10, respectively, to confirm the bedrock type and general quality. Additional, boreholes were advanced into bedrock at boreholes BH19-01, BH19-05 and MW19-11 for monitoring well installation to depths ranging from 9.6 mBGS to 10.6 mBGS.

A summary of bedrock depths, based on borehole and penetration data, is provided in **Table 6** below.

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Table 6: Summary of Bedrock Surface Elevation and Additional Observations

BOREHOLE ID	SURFACE ELEVATION (mASL)	ENCOUNTERED BEDROCK		ADDITIONAL OBSERVATIONS
		DEPTH (mBGS)	ELEVATION (mASL)	
BH19-01	89.0	3.7	85.3	- Auger refusal on presumed cobbles was observed within overburden material at approximately 0.9 mBGS
BH19-02	88.8	2.7	86.1	- Poor quality RQD was observed at 3.5 mBGS to 5.2 mBGS
BH19-03	89.0	4.1	84.9	-
BH19-04	88.9	3.7	85.2	-
BH19-05	88.7	4.0	84.7	-
BH19-06	88.1	3.4	84.7	-
BH19-07	89.0	4.7	84.3	-
BH19-08	88.4	2.7	85.7	-
BH19-09	88.2	3.8	84.4	-
MW19-10	88.7	4.2	84.5	- Poor quality RQD was observed at 4.3 mBGS to 5.0 mBGS - Very poor quality RQD was observed at 5.0 mBGS to 6.5 mBGS; void space was noted during drill advancement
MW19-11	88.8	3.7	85.1	-

In general, bedrock was encountered at elevations ranging from approximately 84.4 mASL to 86.1 mASL. Bedrock cored at BH19-02 and MW19-10 was described as dark grey shale/limestone. The shale and limestone were interbedded and laminated to thinly bedded, with fresh to moderate weathering. Clayey inclusions, approximately 20 mm in thickness, were observed in borehole MW19-10 between depths ranging from 4.3 mBGS to 5.1 mBGS. The bedrock was described in general as having a very weak to strong hardness, being poor quality to good quality, based on Rock Quality Designation (RQD) ranging from 25 % to 79 %, except at borehole MW19-10 where it was described as having a very poor quality, with an RQD value of 0 %, at depths ranging from 5.0 mBGS to 6.5 mBGS (82.2 mASL to 83.8 mASL).

Point Load Index (PLI) tests of bedrock samples were completed on both parallel and perpendicular to the observed plane of weakness in the core samples. It is noted that the plane of weakness is primarily associated with the sedimentary bedding structure (e.g. lamination) of the rock. Bedding was generally parallel with the topography of the site (i.e. no dip observed).

PLI test results were incorporated into the borehole logs in **Appendix A**. Copies of the geotechnical laboratory test results are provided in **Appendix B** and summarized as the following:

Point Load Index in Parallel (Diametral) Direction

→ $I_{s(50)}$ Range: 0.1 MPa to 7.1 MPa; Mean: 1.3 MPa; Median: 0.1 MPa

Point Load Index in Perpendicular (Axial) Direction

→ $I_{s(50)}$ Range: 0.4 MPa to 5.7 MPa; Mean: 2.2 MPa; Median: 1.3 MPa

A conversion factor of approximately 20 to 25 may be considered to estimate unconfined compressive strength (USC) for PLI tests in the subject material; however, this conversion is not always reliable (Franklin, 1989). Based on the attached data, the median USC for the submitted samples range from approximately 2.0 to 2.5 MPa (parallel) to 25 to 30 MPa (perpendicular).

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4.3 Groundwater Observations

Groundwater monitoring wells were installed at all borehole locations, excluding borehole BH19-06, with groundwater being observed at all exterior borehole locations upon completion of monitoring well installation. Monitoring wells were measured on July 2, 2019, with groundwater depths measurements ranging from approximately 0.9 mBGS to 4.1 mBGS (84.9 mASL to 87.6 mASL).

Observed groundwater observations are summarized in **Table 7** below.

Table 7: Summary of Groundwater Elevation

BOREHOLE ID	SURFACE ELEVATION (mASL)	GROUNDWATER LEVEL MEASUREMENTS (at time of drilling - May 27 to 30, 2019)		GROUNDWATER LEVEL MEASUREMENTS (July 2, 2019)	
		DEPTH (mBGS)	ELEVATION (mASL)	DEPTH (mBGS)	ELEVATION (mASL)
BH19-01	89.0	4.6	84.4	2.4	86.6
BH19-02	88.8	3.5	85.3	2.7	86.1
BH19-03	89.0	1.0	88.0	4.1	84.9
BH19-04	88.9	1.6	87.3	3.0	85.9
BH19-05	88.7	1.5	87.2	1.6	87.1
BH19-07	89.0	DRY	-	1.4	87.6
BH19-08	88.4	DRY	-	0.9	87.5
BH19-09	88.2	DRY	-	1.2	87.0
MW19-10	88.7	2.1	86.6	2.6	86.6
MW19-11	88.8	2.0	86.8	4.1	84.7

It should be noted that groundwater levels may fluctuate seasonally and in response to major precipitation events.

4.4 Infiltration Characteristics

Soil has a finite capacity to absorb and transmit water, and infiltration capacity varies in different soils, but also for dry to moist conditions. Hydraulic conductivity may be measured using falling or rising head tests in slotted groundwater monitors and the test is an indicator of infiltration potential.

Hazen's Approximation is applicable for sands with effective particle size (D10) between 0.1 mm and 3 mm. Similarly, Hazen's Approximation is based on the laboratory grain analysis of disturbed soils samples and therefore does not consider soil structure, density, and varying soil stratigraphy as generally accomplished with in-situ testing. For future design, PRI recommended that greater weight should be given to infiltration test values, particularly for finer-grained soils.

PRI is completing a hydrogeological investigation which includes static groundwater monitoring over a period of three (3) months, as well as falling and/or rising head tests at the site. Recommendations and comments regarding hydrogeological soil and bedrock properties will be summarized in a separate report. For preliminary consideration only, estimated hydraulic conductivity values are summarized in **Table 8** below.

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Table 8: Hydraulic Conductivity Estimate of Subsurface Soils

BOREHOLE ID	SAMPLE No.	SOIL TYPE	HYDRAULIC CONDUCTIVITY ESTIMATE (m/s)	
			LABORATORY GRAIN SIZE (HAZEN'S APPROXIMATION)	APPROXIMATION BASED ON SOIL TYPE
BH19-01	SS2	GRAVEL AND SAND trace silt and clay, occasional cobble	1.6×10^{-5}	1.0×10^{-2}
BH19-02	SS4	SILTY SAND some clay, trace gravel	$<1.0 \times 10^{-8}$	1.0×10^{-5}
BH19-03	SS6	CLAYEY SANDY SILT trace gravel	$<1.0 \times 10^{-8}$	$<1.0 \times 10^{-8}$
BH19-04	SS4	CLAYEY SANDY SILT trace gravel	$<1.0 \times 10^{-8}$	$<1.0 \times 10^{-8}$
MW19-11	SS2	SAND some silt, travel gravel and clay	8.1×10^{-7}	1.0×10^{-3}

4.5 Corrosivity Analysis

Three (3) samples were analyzed for chloride, sulphate, sulphide concentrations, pH, electrical conductivity/resistivity, and redox potential at the site. Laboratory data were compared to the ANSI/AWWA corrosivity rating system (Attached in **Appendix C**) to determine the corrosive nature of the tested materials. A sample scoring greater than 10 points is considered to represent a corrosive environment with respect to grey or cast-iron alloys, other considerations including use of deicing salts or stray electrical currents, to name a few have not been considered. Additional analysis or testing may be required for alternative material types (i.e. Copper, aluminum, etc.). **Table 9** below summarizes the results for the subject site and the total allotted points based on the rating system.

Table 9: Corrosivity Analytical Result Summary

Parameter	BH19-01 SS8 @ 4.4 m	ANSI/AWWA Point Rating	BH19-04 SS3 @ 1.5 m	ANSI/AWWA Point Rating	BH19-05 SS5 @ 2.7 m	ANSI/AWWA Point Rating
Resistivity (Ω.cm)	2,040	0	3,580	0	4,420	0
pH	8.63	3	8.05	0	8.08	0
Redox Potential (mV)	138	0	284	0	436	0
Sulphides (%)	0.25	3.5	Trace	2	Trace	2
Moisture Content (%)	5.7	1	13.7	1	12.2	1
Total Points		**7.5**		**3**		**3**

Based on the test results, corrosion conditions at the site do not appear to be significant. It is noted that there may be overriding factors in assessments of corrosion potential, such as the application and leaching of de-icing salts and stray electrical currents, to name a few. PRI recommends that the structural engineer should consider corrosivity potential for the site based on final design and provide considerations for buried utilities and reinforcement rebar.

Laboratory test results for water-soluble sulphate concentration were less than 160 µg/g. Results were compared to Table 3 of CSA A23.1-09 to determine the risk of sulphate attack on cementitious materials. Type GU cement should be appropriate for most structural components used in concrete mix designs, with final design considerations to be determined by the structural engineer.

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5 Geotechnical Recommendations

The following recommendations are intended for design and construction of the proposed multi-storey mixed-use development. Recommendations are based on the borehole information provided in **Section 4**. While we believe our findings are representative, conditions may vary beyond the investigated locations. If significant differences in the subsurface conditions described above are found later, particularly during construction or as more information becomes available, PRI should be contacted immediately to revise our findings and recommendations, as necessary.

Recommendations are intended for Designers and are not intended as instructions to Contractors, who should perform their own investigations to confirm any conditions that may affect construction schedules, costs and selected methodologies. Recommendations in this report must not be used by third parties without the express written consent of PRI.

5.1 Summary of Structural Information and Assumptions

The following is our current understanding of the proposed multi-storey mix-used development, as provided by Apria.

- → Above grade:
  - o The development consists of a (6) storey residential structure;
  - o A pavement access road connected to Lakeshore Blvd. W. at the northwest corner of the property is to extend along the west side of the property to the parking lot ramp that runs along the south side of the property which then leads to the underground parking level;
  - o The second-floor level and overlying stories are to extend above the access road, supported by the ground floor to the east and structural columns to the west of the access road; and
  - o An outdoor amenities area is to overlie the parking lot ramp and underground parking level at the southeast corner of the property.
- → Below grade:
  - o One (1) underground parking area with a GFA of approximately 1,313 m^2; and
  - o The lowest elevation for top of the underground parking floor slab is approximately 83.8 mASL, at an approximate depth of 5.8 mBGS.

Based on the above information and an assumed founding elevation of approximate 83.2 to 83.7 mASL, it is assumed the majority of the site will be excavated down to this elevation, with the development to be supported by shallow foundations and/or raft mat foundations upon shale/limestone bedrock, encountered at this depth. It is assumed that temporary and/or permanent structural shoring will be required for the construction of this development along the property boundaries. It is assumed that all landscaping features, including the outdoor amenities area and access road, will be supported directly upon the underground parking garage, or upon engineered fill where needed.

The following recommendations are based on the above noted information and assumptions. PRI can provide additional geotechnical recommendations and comments upon written request.

5.2 General

5.2.1 Site Preparation

Prior to grading and earthworks operations, it is anticipated that the existing structures and buried structural components will be removed from site. Buried utilities should be decommissioned and removed prior to mass excavation down to the proposed subgrade level which is inferred to be shale/limestone bedrock. The exposed bedrock is to be visual inspected by qualified Geotechnical Engineer to confirm no loose or weathered debris is present at the surface prior to placement of structural foundations. If loose or weathered debris is to be subexcavated or if voids are present at the exposed bedrock subgrade elevation, the use of unshrinkable fill (i.e. U-fill or approved equivalent) should be considered to establish a uniform subgrade. PRI should be contacted if unshrinkable fill is to be used, to confirm suitability prior to placement.

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5.2.2 Excavations

Excavations should be constructed in accordance with the most recent version of the Occupational Health and Safety Act (OHSA). The existing overburden soils above the groundwater table can be classified as Type 3 material in accordance with OHSA. Thus, temporary excavation side-slopes within the soils should be sloped at 1 Horizontal to 1 Vertical (1H:1V) from the base of the excavation, or they must be properly supported (shored). It is anticipated that the property boundaries will need to be shored.

Based on anticipated excavation depths, it is assumed dewatering of the site will be completed prior to construction, however if encountered, soils below the groundwater table are considered Type 4 and should be sloped at a minimum grade of 3H:1V from the excavation bottom.

Excavations 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 excavation, or if wet conditions are encountered, side slopes should be flattened or supported, as required by regulations, to maintain safe working conditions. All excavations should comply with applicable local, state and federal safety regulations, including the current OHSA Excavation and Trench Safety Standards.

Excavation within the overburden can be carried out with a heavy hydraulic backhoe and should be relatively straightforward. Excavation of the shale can be carried out with a heavy single tooth ripper equipment. Limestone interbedded layers were observed within the shale bedrock and may be present become more prominent in localized areas throughout the site. It may be necessary to utilize mechanical breakers or other types of equipment to “open” the limestone layers for the ripper. The deeper limestone deposits with a higher RQD may require blasting for the purpose of excavation, alternatively predrilling of the rock may be utilized to accommodate the required excavation depths.

It is assumed temporary shoring and/or permanent structure shoring (e.g. secant pile wall) will be required when excavating close to utilities, and in particular along property boundaries and any constructed features, to prevent sloughing and undermining these features. A qualified shoring professional should be consulted to design such shoring and staging requirements. The Contractor shall be responsible to maintain stable excavations for the project.

5.2.3 Groundwater Control

Groundwater was observed at all monitoring wells on July 2, 2019, at depths ranging from approximately 0.9 mBGS to 4.1 mBGS (84.9 mASL to 87.6 mASL). Based on the expected excavation depth of approximately 6.4 mBGS (83.2 mASL), it is anticipated that groundwater seepage is expected, with preliminary calculation indicating short-term dewatering rates of approximately 120,000 L/day. It is anticipated that dewatering of the site is required to manage groundwater seepage prior to excavating to subgrade depth. Hydrogeological considerations and recommendations are to be summarized in a separate Hydrogeological Investigation Report, to be prepared by PRI. A Permit to Take Water (PTTW) is not anticipated for the Project, provided the Project is registered and prescribed by the Environmental Activity and Sector Registry (EASR). This will be commented upon further in the Hydrogeological Investigation Report.

Water levels should be verified at the time of construction, and PRI should be contacted to review construction and dewatering methodology, and permitting requirements.

5.2.4 Material Reuse, Backfill and Compaction

Fill materials containing deleterious material (e.g. topsoil, rootlets, etc.) are not considered suitable for reuse as backfill or for supporting foundations.

If consideration is given to reuse excavated soils at the time of construction, it is recommended that all materials designated for reuse be inspected by the Geotechnical Engineer prior to and/or during construction, to confirm that no deleterious material are present. Cobbles and boulders content within reused material should be less than 5 percent by mass. If cobble and boulder content exceed this limit the material should be screened to remove all material greater than 60 mm, or an approved equivalent must be used.

Prior to placing any fill, all subgrade surfaces must be approved by the Geotechnical Engineer as noted in **Section 5.2.1** above. Materials used for fill should be placed in maximum 200 mm loose lifts and compacted to 100 % of the Standard Proctor Maximum Dry Density (SPMDD) below foundations and structural components, 98 % of the SPMDD beneath access roads, and 95 % of the SPMDD in general fill areas. Compaction operations should be completed using a self-propelled vibratory compactor or jumping-jack plate tamper where access is limited. Backfill loose lift thicknesses may need to be reduced to achieve the above noted compaction values based on compaction equipment utilized (i.e. small tampers or jumping-jack).

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It is recommended that foundation backfill consist of free-draining, non-frost susceptible granular fill material, such as Ontario Provincial Standard and Specifications (OPSS) 1010 Granular 'B' Type I materials or approved equivalent.

If soils are to be exported from the site, confirmatory field screening and chemical soil analyses should be completed at the time of export to verify acceptance to the standards of the receiving Site. DMW completed an environmental sampling program and preparing a Phase Two ESA Report for the subject site. The Phase Two ESA Report should be considered when determining the re-use and export of subsurface materials and groundwater from the site.

5.2.5 Frost Considerations

Based on OPSD 3090.101, the frost penetration depth for the site area is 1.2 m below final exterior grades. High density Styrofoam insulation, or an approved equivalent, should be considered to provide equivalent frost protection where sufficient soil cover does not exist of foundation elements or adequate resistance to frost heave is not anticipated.

5.3 Seismic Site Class

Section 4.1.8.4 of the 2012 Ontario Building Code (OBC 2012) summarizes site classifications with respect to seismic site response. Based on the encountered ground conditions, bedrock and average SPT N values, a seismic Site Class "C" (Very dense soil and soft rock) may be considered for site designs. MASW testing or Refraction-Microtremor Survey is required to justify higher classifications and is beyond the scope of the current program.

5.4 Foundation Design

Based on the available information for the site, a shallow spread and/or raft mat foundation design is recommended for the multi-storey development. Based on conditions encountered in the boreholes, it is anticipated that the foundation subgrade would consist of native shale with interbedded limestone in very poor to poor quality at an anticipated elevation of approximately 83.2 to 83.7 mASL. Provided the subgrade is prepared as per **Section 5.2.1**., spread / strip / raft mat foundations constructed on the approved shale/limestone may be designed for a geotechnical resistance of 750 kPa at Ultimate Limit States (ULS) and 500 kPa at Serviceability Limit States (SLS). Total maximum settlement under the allowable SLS loading is expected to be less than 25 mm.

If the underground parking level is not adequately protected against groundwater pore pressure, or if groundwater is a significant structural concern, it is recommended that perimeter foundation drainage, consisting of 100 mm diameter geotextile wrapped perforated pipe, embedded in 19 mm clear stone wrapped in geotextile, be installed along the bottom perimeter of all foundation walls. Also, subdrains should be installed below the parking garage floor slab to address groundwater conditions. In areas, where gravity drainage is not feasible, foundation subdrains should be connected to ta basement sump. Basement sumps or other outlets from the subdrains should not discharge directly to the municipal sanitary or storm sewers but be directed to onsite Low Impact Development (LID) stormwater storage systems, if available. All subdrain outlets must connect to a frost-free outlet.

5.5 Temporary and Permanent Shoring

Due to the proximity of existing structures adjacent to the site, a caisson or secant pile wall will be required to support the proposed excavation. The shoring system must be designed in accordance with the Canadian Foundation Engineering Manual, 4th Edition (CFEM). The surcharge loading from adjacent structures must be considered and is to be determined by the shoring contractor; Section 26.16 of the CFEM provides commentary on the support of adjacent structures. A qualified shoring professional should be consulted to design such shoring, or an approved equivalent, and staging requirements.

A bond stress of 600 kPa may be considered in sound bedrock for design of rock anchors. The contractor must decide the anchor capacity and confirm its availability for the site. All anchors must be tested to confirm capacity as indicated in the CFEM.

Movement of the shoring system is inevitable. Vertical movements will result from vertical load resulting from inclined tieback anchors and surcharge loadings and inward horizontal movement results from earth and water pressure. The magnitude of the movement can be controlled by sound construction practices and is anticipated that the horizontal movement will range from approximately 0.1 % to 0.25 % of the shoring height.

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A monitoring program should be utilized to confirm shoring movement is within an acceptable range. Vertical and horizontal positions of the shoring system should be surveyed prior to the start of excavation. Periodic readings during excavation should take place to ensure movements do not vary outside of the predicted range.

5.6 Soil and Rock Retaining Structures

The lateral earth pressures acting on the rigid walls of the buried structures or retaining walls within the overburden and bedrock over the groundwater table may be calculated from the following expression.

→ In soil: $P = K_1(\gamma_1 h_1 + q)$

→ In rock: $P = K_2(\gamma_1 H_1 + q + \gamma_2 h_2)$

Where:

→ P = lateral earth pressure acting at depth h in kPa
→ K_1 = earth pressure coefficient for overburden soils = 0.55; for granular fills = 0.50
→ K_2 = earth pressure coefficient for rock = 0.20
→ γ_1 = bulk unit weight of overburden soils = 20.0 kN/m^3; granular fills = 22.5 kN/m^3 (Granular 'A' or Granular 'B' Type I)
→ γ_2 = bulk unit weight of rock = 25.0 kN/m^3
→ h_1 = depth to point of interest in overburden in metres
→ H_1 = thickness of overburden above rock in metres
→ h_2 = depth to point of interest in rock in metres
→ q = equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build-up of any hydrostatic pressure behind the wall. If groundwater is not drained then rigid walls should be designed for hydrostatic pressure, assuming water table is at approximately 87.6 mASL. If the foundation wall is poured against the caisson wall, then the foundation wall as well as the caisson wall should be designed for hydrostatic pressure.

5.7 Access Road Design

Provided that preparation of the site is completed in accordance with recommendations stated above, the following pavement structure should be suitable for the proposed asphalt access road construction.

→ 40 mm OPSS HL4 (SP 12.5) Surface Course Compacted to 92.5 % to 97.5% MRD
→ 50 mm OPSS HL8 (SP 19) Binder Course Compacted to 92.5 % to 97.5% MRD
→ 150 mm OPSS 1010 Granular 'A' Base Compacted to 98 % of SPMDD
→ 300 mm OPSS 1010 Granular 'B' Type II Subbase Compacted to 98 % of SPMDD

It is recommended that a heavy-duty asphalt (increasing the Binder Course increase an additional 50 mm in thickness) be used in the area of the loading area and truck turnaround locations or where other heavy equipment is anticipated (ie. fire trucks and delivery trucks). Alternatively, a concrete slab may be consisted to support truck delivery loadings.

The thickness of the granular base material could be increased at the discretion of the Engineer, or granular subbase layers could be added, to accommodate site conditions at the time of the construction.

It is notable that a relatively high groundwater table was observed at the site which may aggravate the potential for frost heaving. As such, maintenance requirements for pavements may increase and/or life expectancy could be reduced. Good drainage is key and considerations should be made to install subdrains below the proposed subbase layer, and radially outwards form all catch basin areas. Subdrains should consist of 150 mm diameter geotextile-wrapped perforated pipe backfilled with a free draining Granular 'B' material and should outlet to storm sewer catch basins or other suitable frost-free outlets. Annual maintenance inspections should be done, and cracks should be sealed regularly.

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The existing fill materials on site are not suitable for the proposed base or subbase construction and should be disposed or appropriately or placed beneath an approved granular material as outlined above. The surface of access roads and parking areas should be sloped at 2 percent or greater to promote runoff to designated surface drainage features. Furthermore, the final asphalt profile should match existing catch basin grade elevations, curb lines, adjacent pavements and outlets to maintain positive drainage throughout the site.

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6 Construction Supervision and Limitations

The data, conclusions and recommendations which are presented in this geotechnical report, and the quality thereof, are based on a scope of work authorized by the Client. While we believe the borehole information to be representative of Site conditions in the investigated areas, subsurface conditions between and beyond sampled locations may vary. If significant differences in any of the subsurface conditions described in this report are found, PRI should be contacted immediately to revise our findings and recommendations, if necessary.

Our comments on construction considerations are provided, but are not intended as instructions to Contractors, nor shall they be interpreted as specifications for construction. Contractors bidding shall make their own interpretations of factual information to determine how subsurface conditions may affect their methods, costs and schedules.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. PRI accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this meets your current requirement, please don't hesitate to contact the undersigned if you have any questions.

Yours truly,
PRI Engineering Inc.

Greg Kuepfer, P.Eng.
Geotechnical Engineer

Reviewed by:

Arash Yazdani, P.Eng.
Director of Engineering Services

LICENSED PROFESSIONAL ENGINEER
A YAZDANI
100173202
Nov. 19 2019
PROVINCE OF ONTARIO

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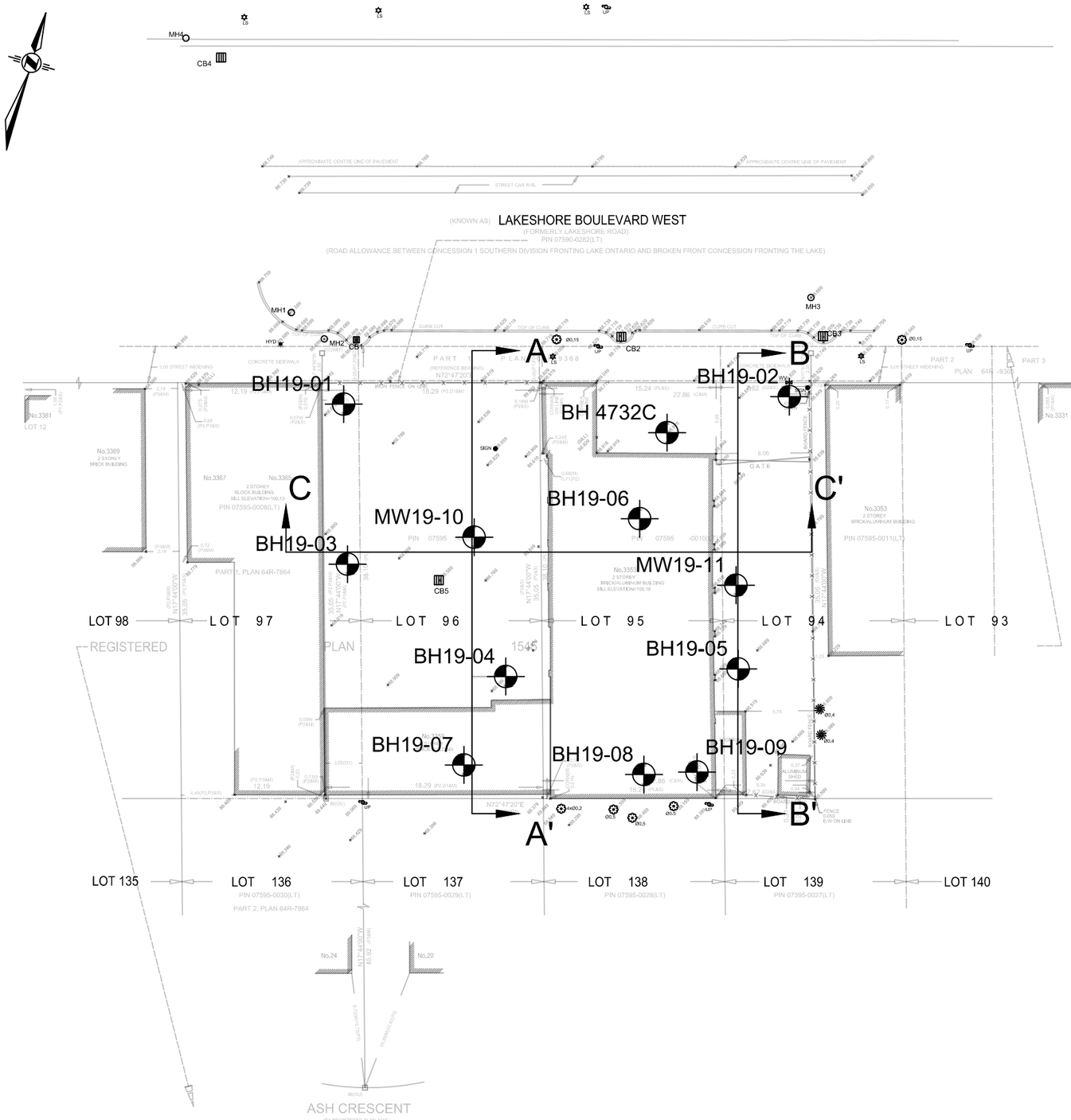
Figures



LEGEND

□	DENOTES SURVEY MONUMENT PLANTED
▨	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES STANDARD IRON BAR
CC	DENOTES CUT CROSS
IB	DENOTES IRON BAR
IP	DENOTES IRON PIPE
M	DENOTES MEASURED
S	DENOTES SET
C	DENOTES CALCULATED
WIT	DENOTES WITNESS
PL	DENOTES REGISTERED PLAN 1545
P1	DENOTES PLAN 64R-9368
P2	DENOTES PLAN BY DUNNING AND TAYLOR LTD., O.L.S. DATED NOVEMBER 3, 1993
P3	DENOTES 64R-7864
D1	DENOTES INST. No.TB469971
D2	DENOTES INST. No.TB371082
OU	DENOTES ORIGIN UNKNOWN
SIGN	DENOTES SIGN POLE
UP	DENOTES UTILITY POLE
LS	DENOTES LAMP STANDARD
WV	DENOTES WATER VSLVE
CB	DENOTES CATCH BASIN
MH	DENOTES MANHOLE
HYD	DENOTES FIRE HYDRANT
SIGN	DENOTES SIGN POLE
Ø	DENOTES DIAMETER
100.10	DENOTES EXISTING ELEVATION
	DENOTES TREE
	DENOTES PINE TREE
BH19-##	DENOTES APPROXIMATE BOREHOLE LOCATION AND DESIGNATION

NOTES:

1. PROPERTY PARCEL DEVELOPED FROM *SURVEYOR'S REAL PROPERTY REPORT* PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545, CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: *VLADIMIR DOSEN SURVEYING.*
2. SURVEY PLAN WAS UPDATED TO GEODETIC AND UTM ZONE NAD 83 17 NORTH, BY PRI ENGINEERING INC, SURVEY COMPLETED JULY 23,2019.
3. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY *TANKTEK ENVIRONMENTAL SERVICES LTD.* ON OCTOBER 5, 2015.

BOREHOLE LOCATION			
ID	NORTHING	EASTING	ELEVATION
BH19-01	4828052.391	618953.93	89.0
BH19-02	4828064.614	618989.273	88.8
BH19-03	4828039.571	618958.379	89.0
BH19-04	4828034.572	618974.089	88.9
BH19-05	4828041.364	618992.228	88.7
BH19-06	4828050.9	618980.2	88.1
BH19-07	4828026.5	618973.0	89.0
BH19-08	4828029.8	618989.7	88.4
BH19-09	4828031.5	618992.8	88.2
MW19-10	4828045.058	618967.846	88.7
MW19-11	4828048.015	618989.928	88.8
BH 4732C	4828058.474	618980.441	88.8

STRUCTURE INVERTS					
ID	ELEVATION	NORTH	EAST	SOUTH	WEST
MH1	88.599	-	86.66	-	86.60
MH2	88.699	-	86.10	-	86.05
MH3	88.699	-	-	87.30	87.30
MH4	88.625	-	-	-	-
CB1	88.549	87.65	87.85	-	87.85
CB2	88.579	-	87.93 87.53	-	87.93
CB3	88.609	87.56	87.91	-	87.91
CB4	88.548	-	-	-	-
CB5	88.589	-	88.58	-	-

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www.apria.ca

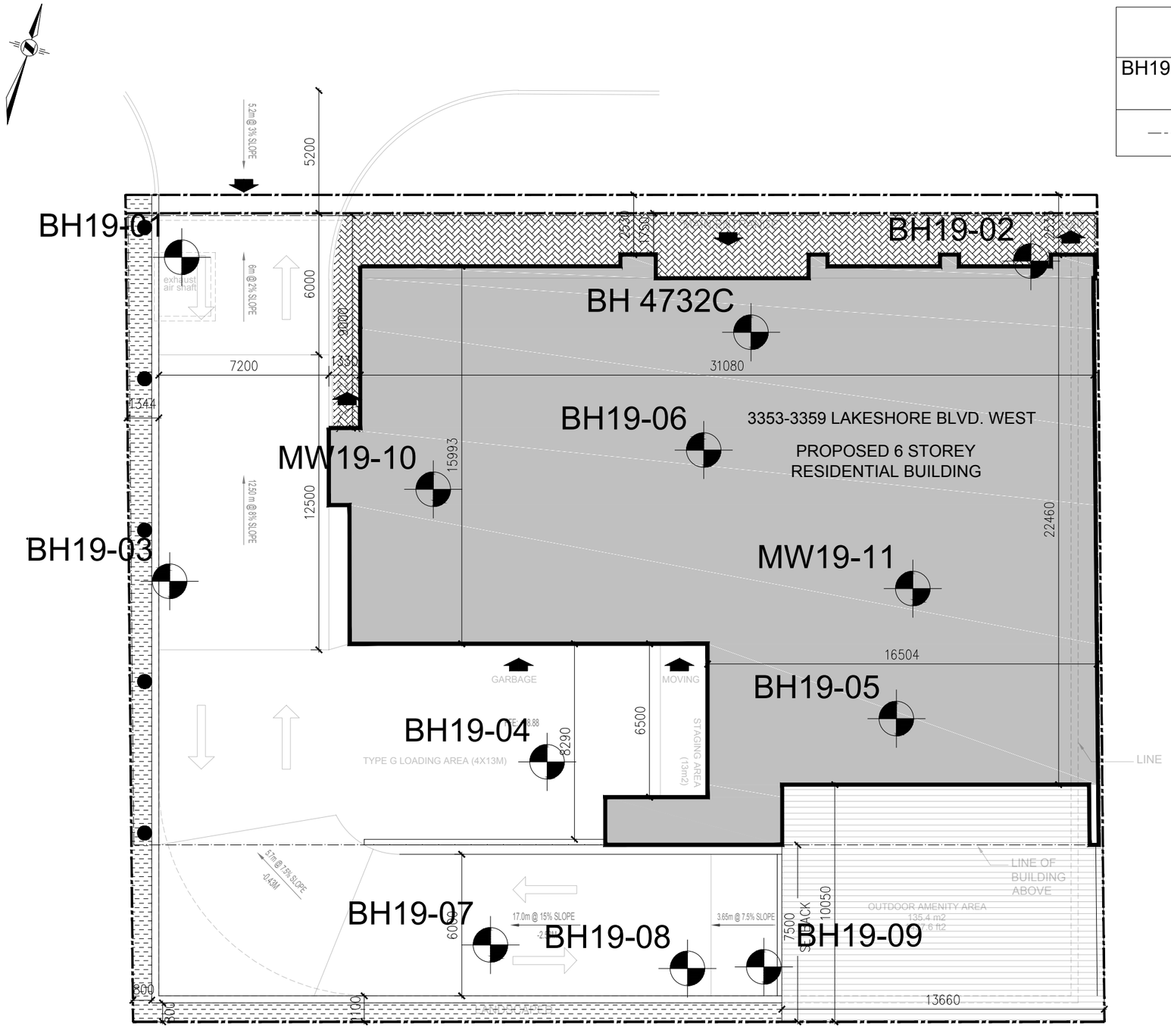
REV NO.	ISSUANCE	DATE
0	ISSUED FOR REPORT	16SEP19

PROJECT NAME:
PROPOSED MULTI STOREY MIXED USE DEVELOPMENT
3353-3359 LAKSHORE BLVD W

DRAWING NAME:
EXISTING CONDITIONS BOREHOLE LOCATION SITE PLAN

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 1



LEGEND

BH19-##	DENOTES APPROXIMATE BOREHOLE LOCATION AND DESIGNATION
—·—·—	PROPERTY LINE

1. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY *TANKTEK ENVIRONMENTAL SERVICES LTD.* ON OCTOBER 5, 2015.
2. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE, PREPARED BY *ICON ARCHITECTS*, DATED NOVEMBER 11,2019.
3. ALL DIMENSIONS IN mm, UNLESS OTHERWISE NOTED.

BOREHOLE LOCATION

ID	NORTHING	EASTING	ELEVATION
BH19-01	4828052.391	618953.93	89.0
BH19-02	4828064.614	618989.273	88.8
BH19-03	4828039.571	618958.379	89.0
BH19-04	4828034.572	618974.089	88.9
BH19-05	4828041.364	618992.228	88.7
BH19-06	4828050.9	618980.2	88.1
BH19-07	4828026.5	618973.0	89.0
BH19-08	4828029.8	618989.7	88.4
BH19-09	4828031.5	618992.8	88.2
MW19-10	4828045.058	618967.846	88.7
MW19-11	4828048.015	618989.928	88.8
BH 4732C	4828058.474	618980.441	88.8

DRAWING IS NOT TO SCALE

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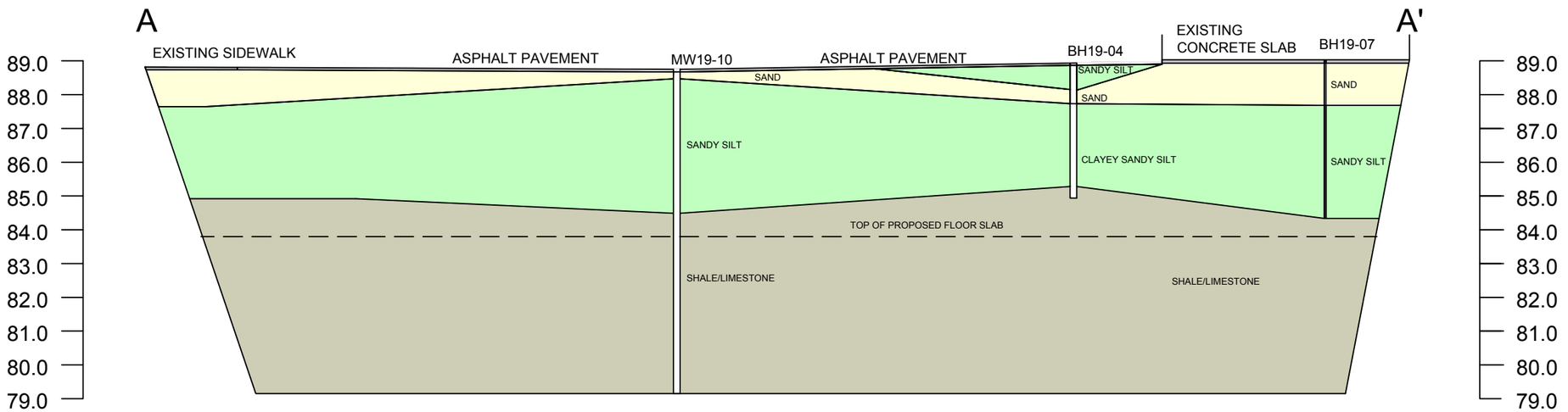
REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
0	ISSUED FOR REPORT	16SEP19

PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

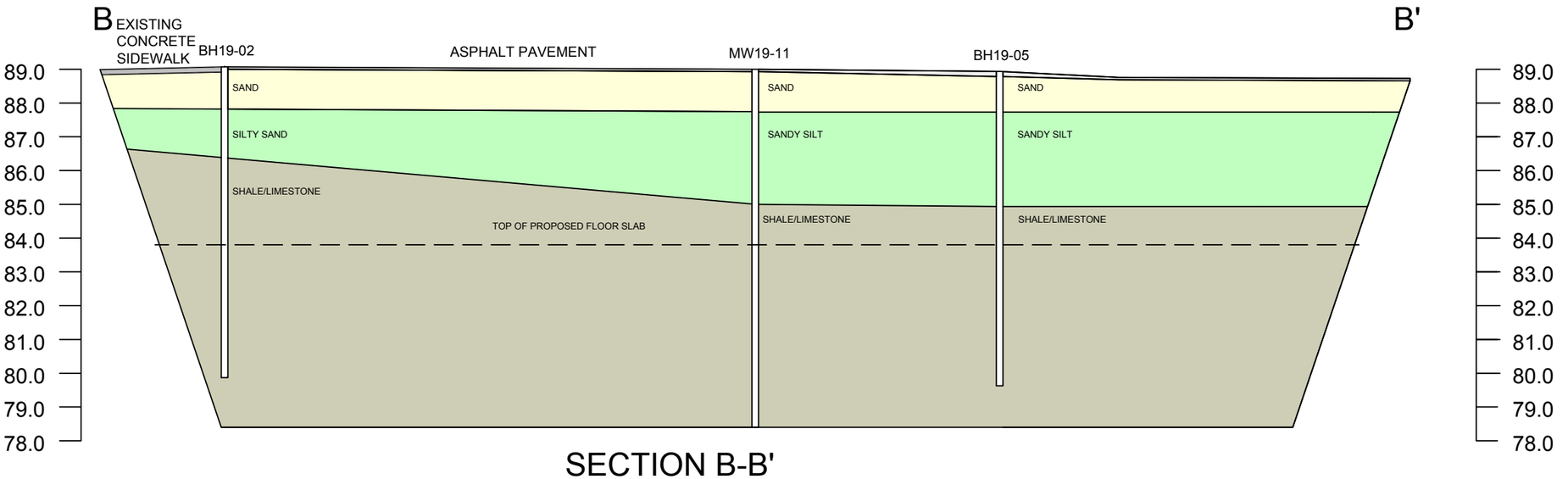
DRAWING NAME:
PROPOSED CONDITIONS
BOREHOLE LOCATION
SITE PLAN

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 2



SECTION A-A'
SCALE 1:150



SECTION B-B'
SCALE 1:150

LEGEND

- GRAVEL AND SAND TO SAND
- SILTY SAND TO CLAYEY SANDY SILT
- SHALE/LIMESTONE
- CONCRETE
- ASPHALT
- TOP OF PROPOSED FLOOR SLAB

NOTES:
1. PROPERTY PARCEL DEVELOPMENT FROM SURVEYOR'S REAL PROPERTY REPORT PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545,CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: VLADIMIR DOSEN SURVEYING.
2. SURVEY PLAN WAS UPDATED TO GEODETIC AND UTM ZONE NAD 83 17 NORTH, BY PRI ENGINEERING INC, SURVEY COMPLETED JULY 23,2019.
3. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY TANKTER ENVIRONMENTAL SERVICES LTD. ON OCTOBER 5, 2015.
4. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE, PREPARED BY ICON ARCHITECTS, DATED JULY 8,2019.

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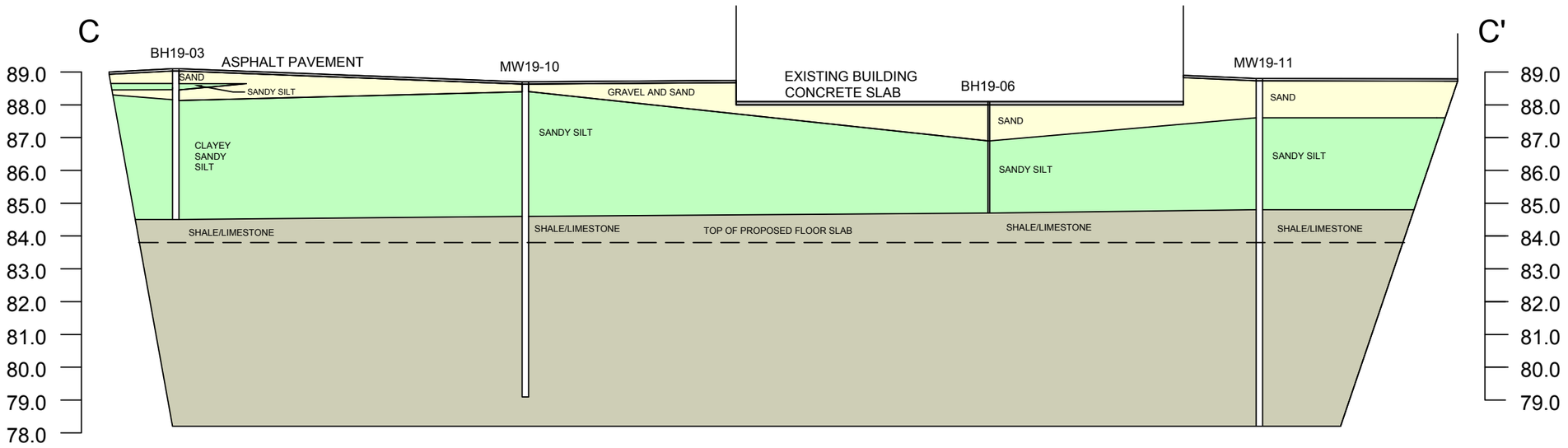
REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
0	ISSUED FOR REPORT	17SEP19

PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
EXISTING CONDTIONS
CROSS SECTIONS

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 3



SECTION C-C'

SCALE 1:150

LEGEND

- GRAVEL AND SAND TO SAND
- SILTY SAND TO CLAYEY SANDY SILT
- SHALE/LIMESTONE
- CONCRETE
- ASPHALT
- TOP OF PROPOSED FLOOR SLAB

NOTES:

1. PROPERTY PARCEL DEVELOPMENT FROM SURVEYOR'S REAL PROPERTY REPORT PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545,CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: VLADIMIR DOSEN SURVEYING.
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REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
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PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
EXISTING CONDTIONS
CROSS SECTIONS

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 4

Appendix A

Borehole Location Plan,
Borehole Explanation Form,
Borehole Logs

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Silt & Clay	< 0.075 mm	"trace" (e.g. trace sand)	<10%
Sand	0.075 to 4.75 mm	"some" (e.g. some sand)	10% - 20%
Gravel	4.75 to 75 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	75 to 300 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>300 mm	noun (e.g. sand)	>50%

* Extension of USCS Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

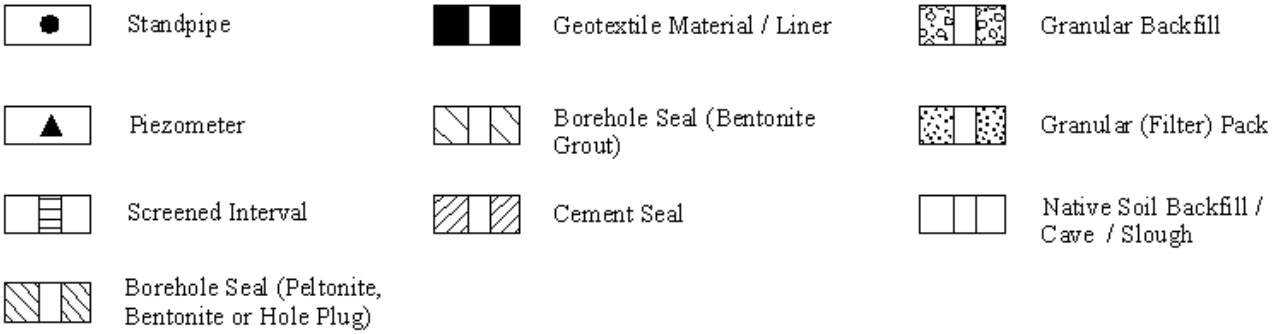
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BORING NUMBER BH19-01

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-27-19 **COMPLETED** 5-27-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING 4.6 m / Elev 84.4 mASL upon completion of MW installation

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	89.0										
0.1	88.9		ASPHALT (70 mm)								
			Brown to grey GRAVEL AND SAND, trace silt, trace clay, occasional cobbles, moist, compact to loose		SS 1	79	3-10-12-10 (22)		13		Borehole was open upon completion of drilling.
					SS 2	42	1-3-3-4 (6)		12		GSA SS2 Gravel: 48% Sand: 36% Silt & Clay:16%
1.2	87.8		Light brown to grey SANDY SILT, some gravel, trace clay, moist, compact		SS 3	63	2-7-9-12 (16)		14		
2.0	87.0				SS 4	100	3-9-12-15 (21)		16		Auger refusal at 0.91 mBGS due to presumed cobble/boulder, borehole moved approximately 0.7 m to avoid obstruction.
					SS 5	79	3-10-11-8 (21)		11		
					SS 6	63	4-8-9-10 (17)		12		
3.7	85.3				SS 7	50	50/102			>>	
4.0	85.0		Dark grey SHALE/LIMESTONE bedrock, moderate to high weathering, very weak, laminated to thinly bedded								
4.5	84.5		Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.5 mBGS, to install monitoring well.		SS 8	100	37-50/127			>>	
6.0	83.0										
8.0	81.0		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.6 mBGS.								

BORING NUMBER BH19-02

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-28-19 **COMPLETED** 5-28-19
GROUND ELEVATION 88.8 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/96 mm O.D. HQ Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 3.1 m / Elev 85.7 mASL
AFTER DRILLING 3.5 m / Elev 85.3 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	88.8									20 40 60 80	
0.1	88.7		ASPHALT (70 mm)								
			Greyish brown to brown SAND, some gravel, silty to some silt, trace clay, some red brick and asphalt debris, moist, loose		SS 1	71	7-4-4-6 (8)		15		Borehole was open upon completion of drilling.
					SS 2	33	2-6-5-4 (11)		16		
1.2	87.6		Brown to light brown SILTY SAND, some clay, trace gravel, moist, compact to very loose		SS 3	63	2-2-2-2 (4)		27		UW SS3 19.0 kN/m3
					SS 4	63	1-2-1-3 (3)				GSA SS4 Gravel: 0% Sand: 53% Silt & Clay: 47%
2.0	86.8				SS 5	91	5-6-22-50/102			>>	
2.7	86.1		Dark grey SHALE/LIMESTONE bedrock, fresh to moderate weathering, very weak to strong, laminated to thinly bedded		SS 6	63	5-25-50/102			>>	
					RC 1	100 (38)					PLI (Is(50)) RC2 Axial: 5.7 MPa Diametral: 0.1 MPa
4.0	84.8				RC 2	100 (41)					
					RC 3	100 (55)					PLI (Is(50)) RC3 Axial: 0.4 MPa Diametral: 0.1 MPa
6.0	82.8				RC 4	100 (79)					PLI (Is(50)) RC4 Axial: 0.5 MPa Diametral: 0.1 MPa
8.0	80.8				RC 5	100 (59)					PLI (Is(50)) RC5 Axial: 1.6 MPa Diametral: 0.1 MPa
9.1	79.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.1 mBGS.								

BORING NUMBER BH19-03

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.6 m / Elev 87.4 mASL
AFTER DRILLING 1.0 m / Elev 88.0 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	89.0						
0.1	88.9	ASPHALT (70 mm)					
0.3	88.7	Black to dark brown SAND, some gravel, some silt, moist, loose	SS 1	92	4-2-4-5 (6)	17	Borehole was open upon completion of drilling.
0.6	88.4						
0.8	88.2	Brown SANDY SILT, some gravel, trace clay, some asphalt debris, moist, loose	SS 2	67	2-2-2-3 (4)	16	
		Greyish brown SAND, some gravel, some silt, moist, loose	SS 3	100	3-7-12-21 (19)	15	
2.0	87.0	Light brown to grey CLAYEY SANDY SILT, trace gravel, slightly plastic, moist, loose to dense	SS 4	100	6-12-22-22 (34)	16	UW SS4 22.2 kN/m3
			SS 5	58	7-13-18-18 (31)		GSA SS6 Gravel: 7% Sand: 32% Silt & Clay: 61%
			SS 6	67	7-7-7-9 (14)	15	AL SS6 Liquid Limit: 26% Plastic Limit: 18% Plasticity Index: 8%
4.0	85.0		SS 7		26-21-14-50/0	13	>>
4.6	84.4	Dark grey SHALE/LIMESTONE bedrock, moderate weathering, very weak, laminated to thinly bedded					
		Borehole terminated upon on auger refusal SHALE/LIMESTONE bedrock at 4.6 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER BH19-04

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.9 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.6 m / Elev 87.3 mASL upon completion of MW installation

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	88.9										
0.1	88.8		ASPHALT (70 mm)								
0.6	88.3		Light brown SANDY SILT, some gravel, trace clay, some asphalt debris, moist, loose		SS 1	75	5-5-3-4 (8)		16		Borehole was open upon completion of drilling.
1.2	87.7		Light brown SAND, some gravel, trace silt, moist, loose		SS 2	71	1-2-2-3 (4)		21		
2.0	86.9		Light brown to gray CLAYEY SANDY SILT, trace gravel, slightly plastic, moist, loose to dense		SS 3	50	2-2-7-2 (9)		20		
					SS 4	58	5-7-11-16 (18)		14		GSA SS4 Gravel: 5% Sand: 22% Silt & Clay:73%
					SS 5	4	10-15-15-17 (30)				
3.7	85.2				SS 6	50	15-11-24-33 (35)		14		AL SS4 Liquid Limit: 30% Plastic Limit: 20% Plasticity Index: 10%
4.1	84.8		Dark grey SHALE/LIMESTONE, fresh to moderate weathering, very weak to strong, laminated to thinly bedded		SS 7	29	17-20-50/127			>>	
			Borehole terminated upon SHALE/LIMESTONE bedrock at 4.1 mBGS.								

BORING NUMBER BH19-05

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 88.7 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 2.0 m / Elev 86.7 mASL
AFTER DRILLING 1.5 m / Elev 87.2 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.7						
0.2	88.5	ASPHALT (150 mm)					
		Brown SAND, some gravel, some silt, moist, loose	SS 1	100	4-4-4-4 (8)	17	Borehole was open upon completion of drilling.
1.2	87.5		SS 2	63	7-3-3-6 (6)	18	
		Brown to grey SANDY SILT, some gravel, trace clay, moist, compact to dense	SS 3	0	7-9-5-15 (14)		
2.0	86.7		SS 4	88	8-8-12-15 (20)	16	
			SS 5	63	4-8-11-13 (19)	13	
			SS 6	83	5-20-21-17 (41)		UW SS6 24.1 kN/m3
4.0	84.7						
		Auger Refusal on SHALE/LIMESTONE bedrock at 4.0 mBGS Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.0 m BGS, to install monitoring well.					
6.0	82.7						
8.0	80.7						
		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.3 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER BH19-06

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.1 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.1										
0.1	88.0		CONCRETE SLAB (100 mm)								
			Grey to orangey brown SAND, some gravel, some silt, moist		UD 1	25					Borehole was open and dry upon completion of drilling.
1.2	86.9										
			Greyish brown SANDY SILT, some clay, trace gravel, slightly plastic, moist		UD 2	100					
2.0	86.1										
					UD 3	100					
3.4	84.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 3.4 mBGS.								

BORING NUMBER BH19-07

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	89.0										
0.1	88.9		CONCRETE SLAB (100 mm)								
			Orangey brown SAND, some silt, some gravel, moist		UD 1	25					Borehole was open and dry upon completion of drilling.
1.2	87.8		Orangey grey SANDY SILT, some clay, trace gravel, slightly plastic, moist		UD 2	21					
2.0	87.0				UD 3	100					
4.0	85.0				UD 4	100					
4.7	84.3		Borehole terminated upon SHALE/LIMESTONE bedrock at 4.7 mBGS.		UD 5	100					

BORING NUMBER BH19-08

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.4 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.4										
0.1	88.3		CONCRETE SLAB (100 mm)								
			Dark grey to orangey brown SAND, some gravel, some silt, slight hydrocarbon odour, wet to saturated		UD 1	40					Borehole was open and dry upon completion of drilling.
1.2	87.2		Orangey brown SANDY SILT, some clay, trace gravel, slightly plastic, moist								
					UD 2	100					
2.0	86.4										
					UD 3	100					
2.7	85.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 2.7 mBGS.								

BORING NUMBER BH19-09

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.2 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.2										
0.1	88.1		CONCRETE SLAB (100 mm)								
			Grey to brown SAND, some gravel, trace silt, slight hydrocarbon odour, saturated to moist		UD 1	31					Borehole was open and dry upon completion of drilling.
1.2	87.0		Grey to brown SANDY SILT, some clay, trace gravel to gravelly, slightly plastic, moist		UD 2	100					
2.0	86.2				UD 3	100					
3.8	84.4		Borehole terminated in SHALE/LIMESTONE bedrock at 3.8 mBGS.		UD 4						

BORING NUMBER MW19-10

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.7 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/96 mm O.D. HQ Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.9 m / Elev 86.8 mASL
AFTER DRILLING 2.1 m / Elev 86.6 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.7						
0.1	88.6	ASPHALT (70 mm)					
0.2	88.5	Black GRAVEL and SAND, some silt, some asphalt debris, moist					
		Brown to grey SANDY SILT, some gravel, trace clay, moist, loose to dense	SS 1	67	4-2-2-3 (4)	22	Borehole was open upon completion of drilling.
			SS 2	50	2-10-23-12 (33)	21	
			SS 3	33	21-10-11-11 (21)	16	
2.0	86.7		SS 4	54	17-14-12-14 (26)	15	
			SS 5	0	9-13-23-14 (36)		
			SS 6	33	17-28-18-15 (46)	11	
			SS 7	100	37-50/51	14	>>
4.1	84.6	Dark grey SHALE/LIMESTONE bedrock, fresh to moderately weathered, very weak to strong, laminated to thinly bedded - 20 mm thick clay inclusions encountered at 4.3, 4.7 and 5.1 mBGS	RC 1	69 (25)			PLI (Is(50)) RC1 Diametral: 7.1 MPa
			RC 2	46 (0)			Void space encountered during advancement of drilling for RC2. PLI (Is(50)) RC2 Axial: 5.3 MPa Diametral: 2.9 MPa
6.0	82.7		RC 3	67 (56)			PLI (Is(50)) RC3 Axial: 0.6 MPa Diametral: 0.1 MPa
8.0	80.7	- Below 7.9 mBGS, moderate to strong	RC 4	86 (51)			PLI (Is(50)) RC4 Axial: 1.0 MPa Diametral: 0.2 MPa
9.6	79.1	Borehole terminated upon SHALE/LIMESTONE bedrock at 9.6 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER MW19-11

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 88.8 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.9 m / Elev 86.9 mASL
AFTER DRILLING 2.0 m / Elev 86.8 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.8							
0.1	88.7	ASPHALT (70 mm)						
		Brown SAND, some silt, trace gravel, trace clay, some asphalt debris, moist, loose to very loose	SS 1	92	4-4-3-4 (7)		17	Borehole was open upon completion of drilling.
			SS 2	83	2-2-1-1 (3)			
1.2	87.6	Light grey to brown SANDY SILT, some gravel, trace clay, moist, compact	SS 3	83	2-8-8-26 (16)		19	GSA SS2 Gravel: 1% Sand: 77% Silt & Clay: 22%
2.0	86.8		SS 4	79	6-8-9-14 (17)		15	
			SS 5	79	7-14-16-19 (30)		12	
3.7	85.2		SS 6	63	14-10-11-10 (21)		12	
4.0	84.8	Dark grey, SHALE/LIMESTONE bedrock, moderate weathering, very weak, laminated to thinly bedded	SS 7	67	17-50			
		- Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.5 m BGS, to install monitoring well.						
6.0	82.8							
8.0	80.8							
10.0	78.8	Borehole terminated upon SHALE/LIMESTONE bedrock at 10.6 mBGS.						

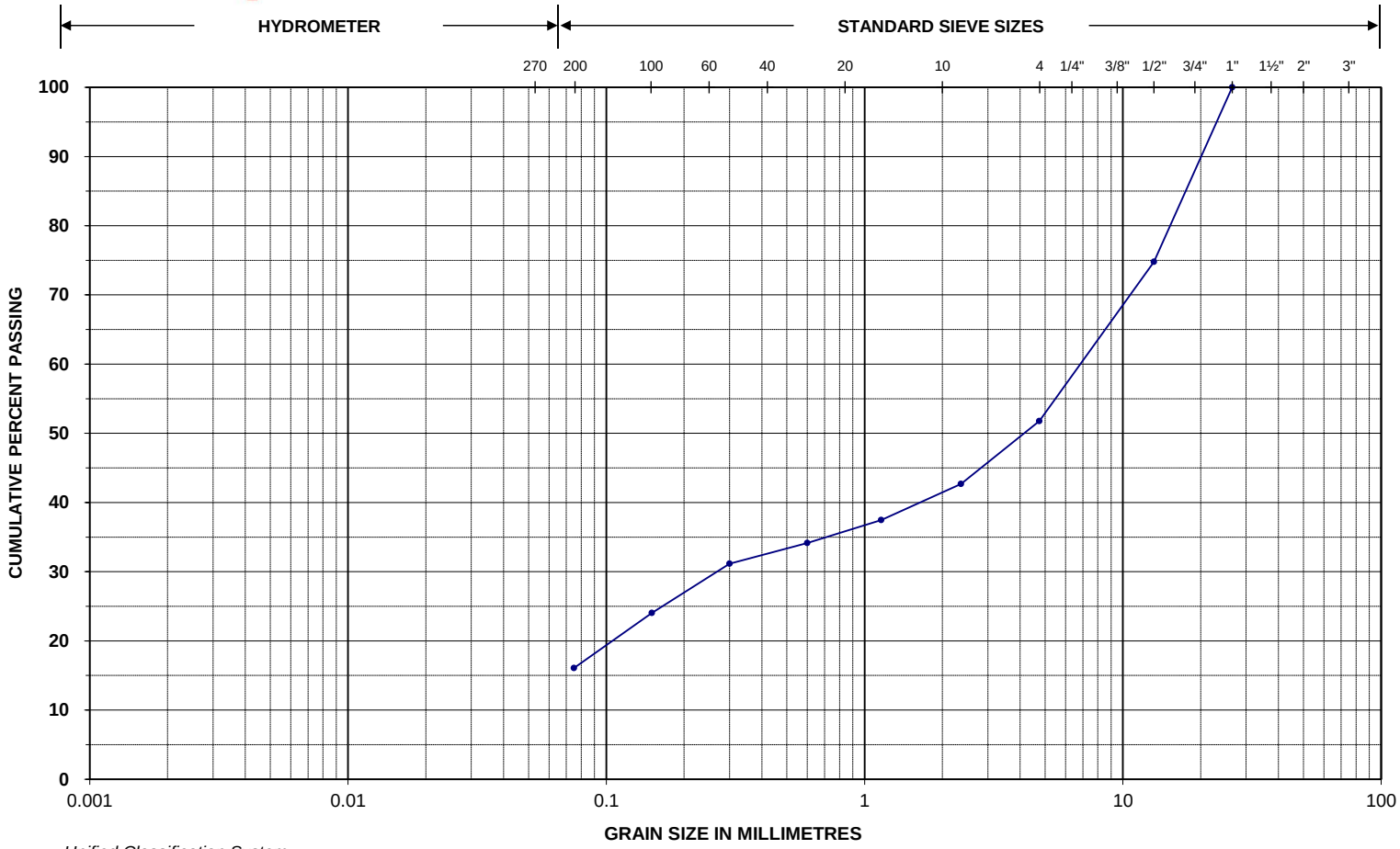
SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

GENERAL BH - POLAR WITH MW (METRIC) 19-0026 LOGS - AC WITH MW.GPJ GINT STD CANADA LAB.GDT 9-16-19

Appendix B

Laboratory Results

PARTICLE SIZE DISTRIBUTION



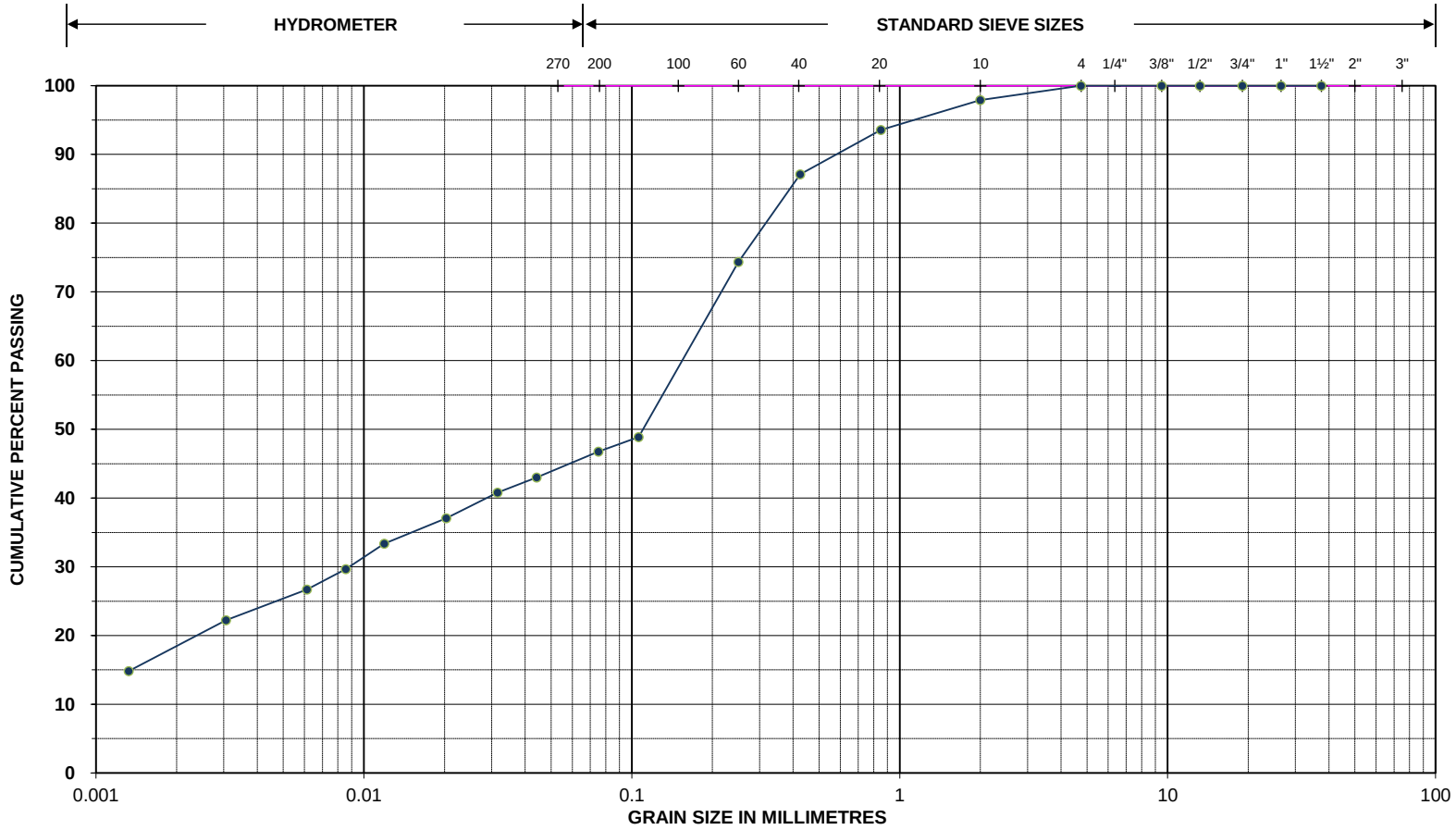
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Polar Racking - Lakeshore Boulevard West Development	**Project No.:**	181-06951-00
Location ID.:	BH19-01	**Sample No./Depth:**	SS2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	**1.16 mm**	37.5
26.5 mm	100.0	**0.60 mm**	34.1
13.2 mm	74.8	**0.30 mm**	31.2
4.75 mm	51.7	**0.15 mm**	24.0
2.36 mm	42.7	**0.075 mm**	16.1

PARTICLE SIZE DISTRIBUTION ASTM D422



Unified Classification System

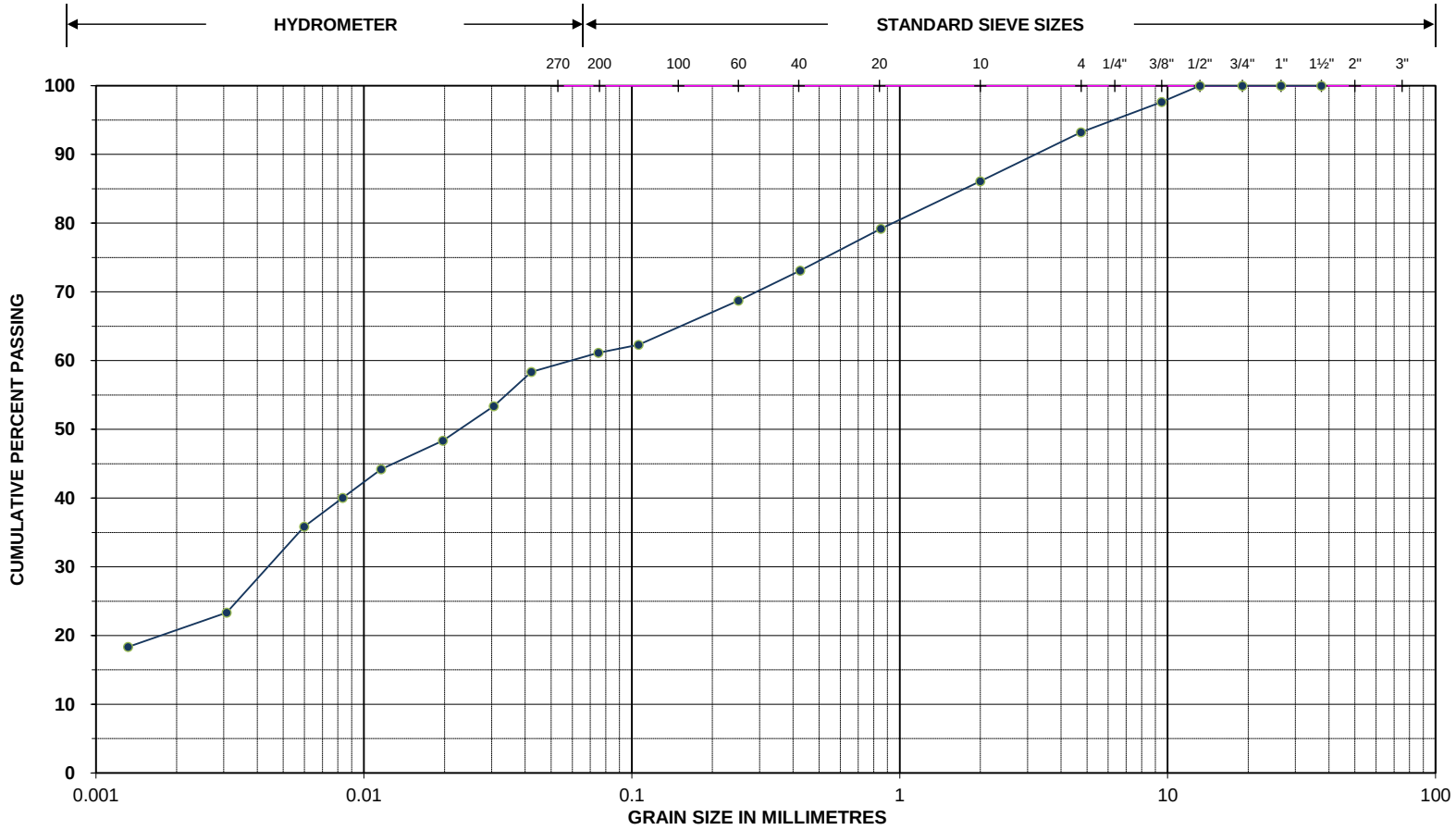
SILT AND CLAY	SAND	GRAVEL

Project Name: Polar Racking - Lakeshore Boulevard West Development **Project No.:** 181-06951-00

Location ID.: BH19-02 **Sample No./Depth:** SS4

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	**2.00 mm**	97.9	**0.044**	43.0
26.5 mm	100.0	**0.850 mm**	93.6	**0.020**	37.1
19.0 mm	100.0	**0.425 mm**	87.1	**0.009**	29.7
13.2 mm	100.0	**0.250 mm**	74.4	**0.003**	22.2
9.50 mm	100.0	**0.106 mm**	48.9	**0.001**	14.8
4.75 mm	100.0	**0.075 mm**	46.8		

PARTICLE SIZE DISTRIBUTION ASTM D422



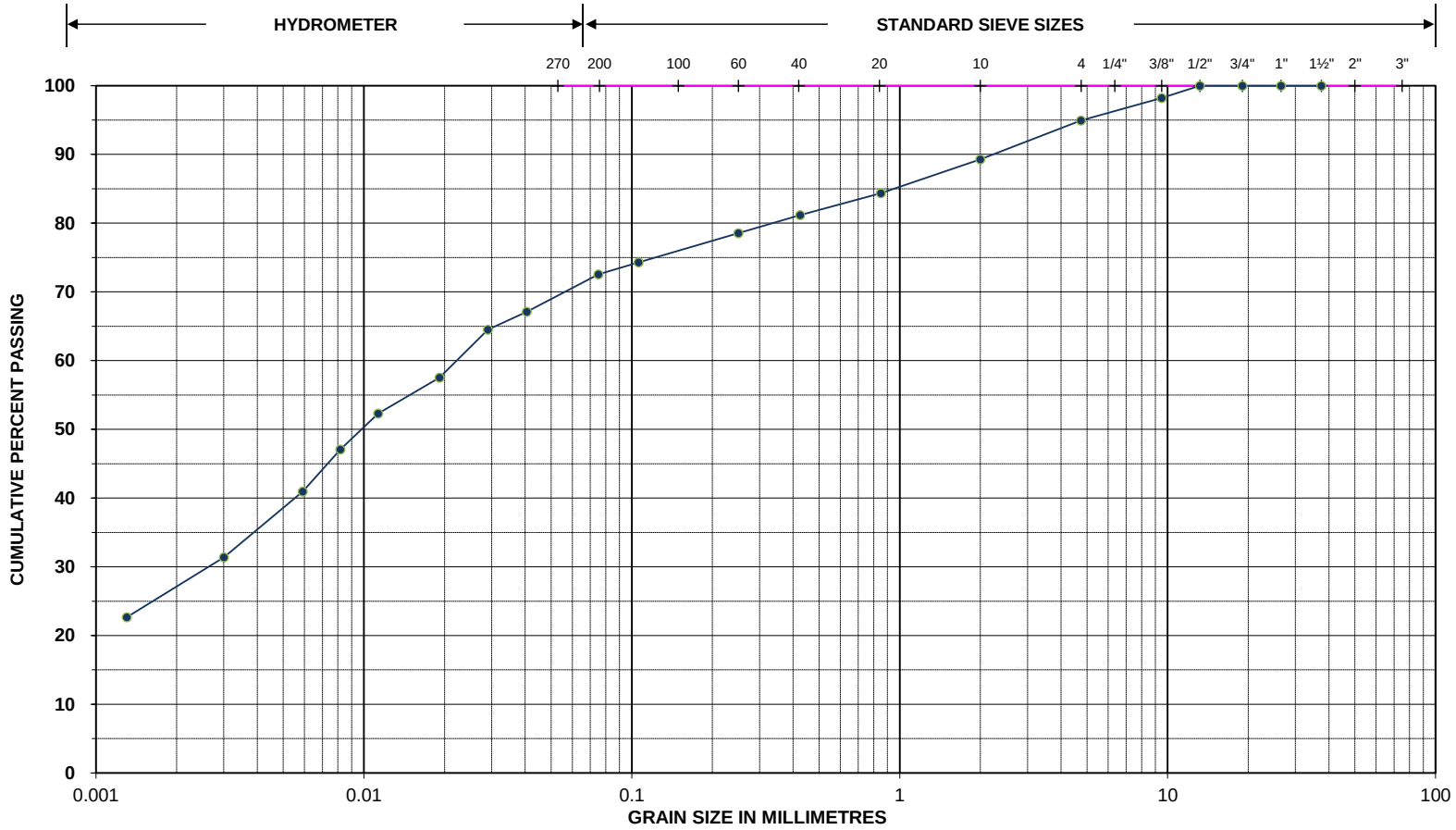
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Polar Racking - Lakeshore Boulevard West Development	**Project No.:**	181-06951-00
Location ID.:	BH19-03	**Sample No./Depth:**	SS6

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	**2.00 mm**	86.1	**0.042**	58.4
26.5 mm	100.0	**0.850 mm**	79.2	**0.020**	48.4
19.0 mm	100.0	**0.425 mm**	73.1	**0.008**	40.0
13.2 mm	100.0	**0.250 mm**	68.7	**0.003**	23.3
9.50 mm	97.6	**0.106 mm**	62.3	**0.001**	18.3
4.75 mm	93.2	**0.075 mm**	61.1		

PARTICLE SIZE DISTRIBUTION ASTM D422



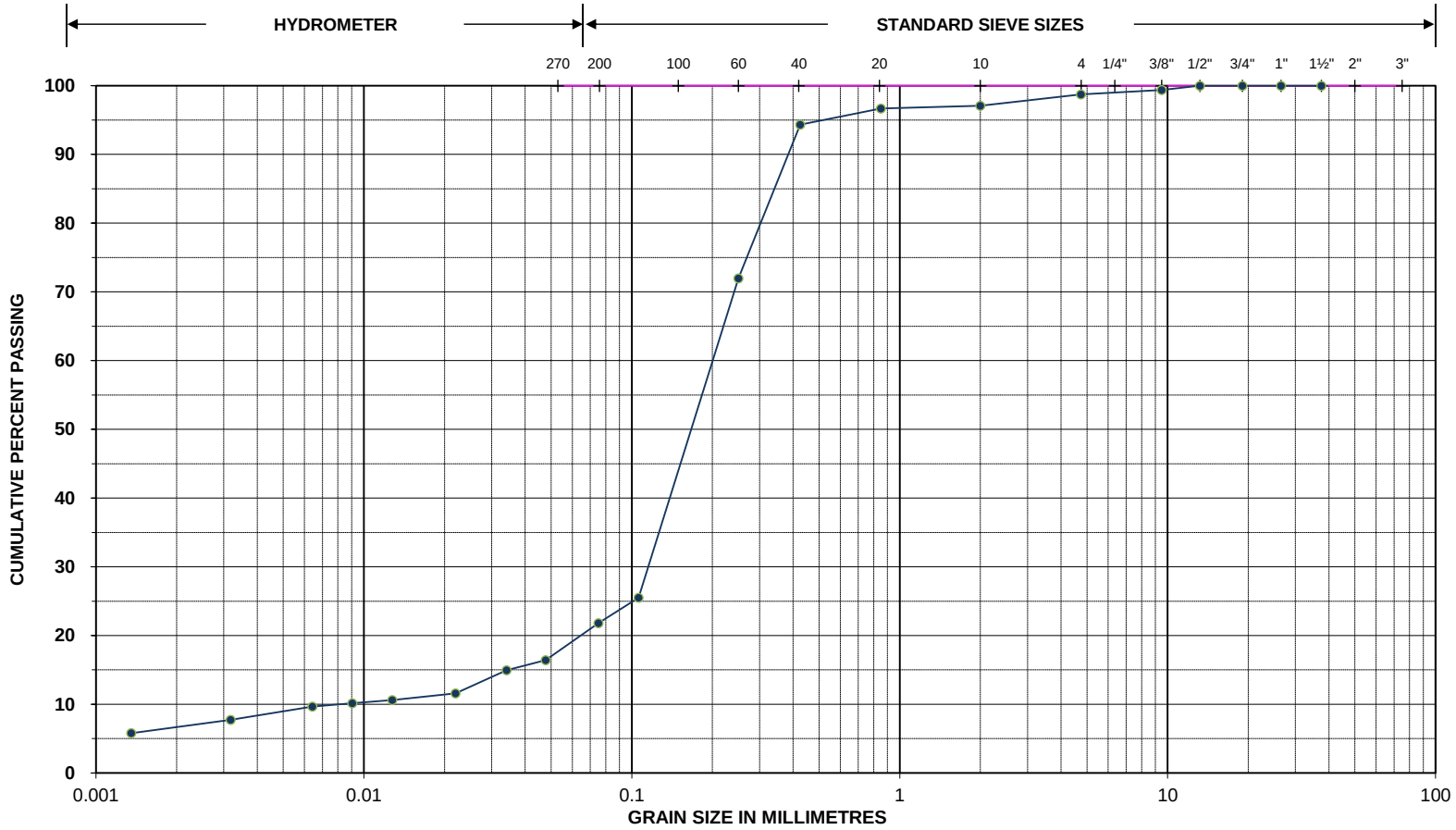
Unified Classification System

SILT AND CLAY	SAND	GRAVEL

Project Name:	Polar Racking - Lakeshore Boulevard West Development	**Project No.:**	181-06951-00
Location ID.:	BH19-04	**Sample No./Depth:**	SS4

Sieve Size	% Passing Coarse	**Sieve Size**	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	**2.00 mm**	89.3	**0.041**	67.1
26.5 mm	100.0	**0.850 mm**	84.4	**0.019**	57.5
19.0 mm	100.0	**0.425 mm**	81.2	**0.008**	47.1
13.2 mm	100.0	**0.250 mm**	78.5	**0.003**	31.4
9.50 mm	98.2	**0.106 mm**	74.3	**0.001**	22.7
4.75 mm	94.9	**0.075 mm**	72.5		

PARTICLE SIZE DISTRIBUTION ASTM D422



Unified Classification System

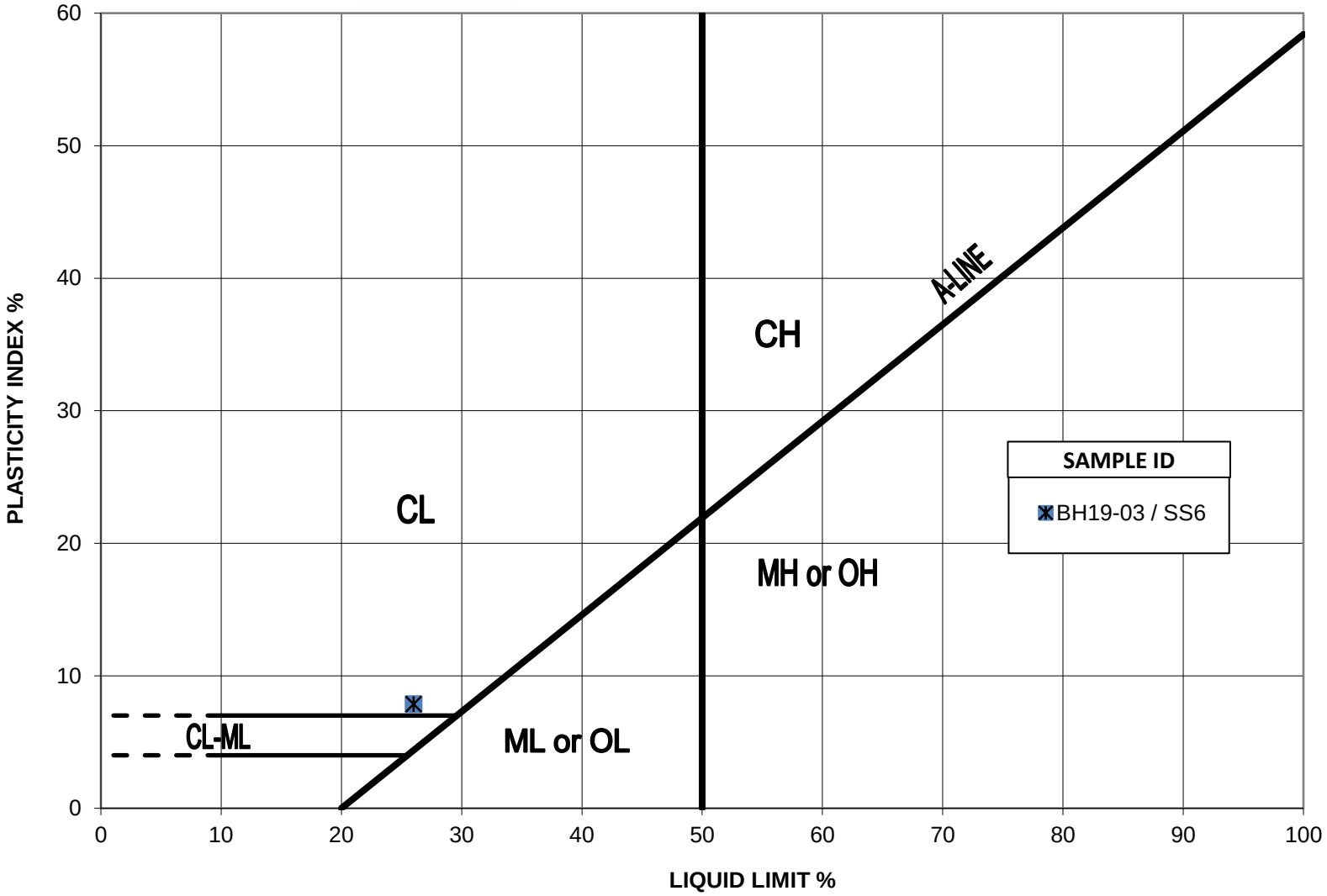
SILT AND CLAY	SAND	GRAVEL

Project Name: Polar Racking - Lakeshore Boulevard West Development **Project No.:** 181-06951-00

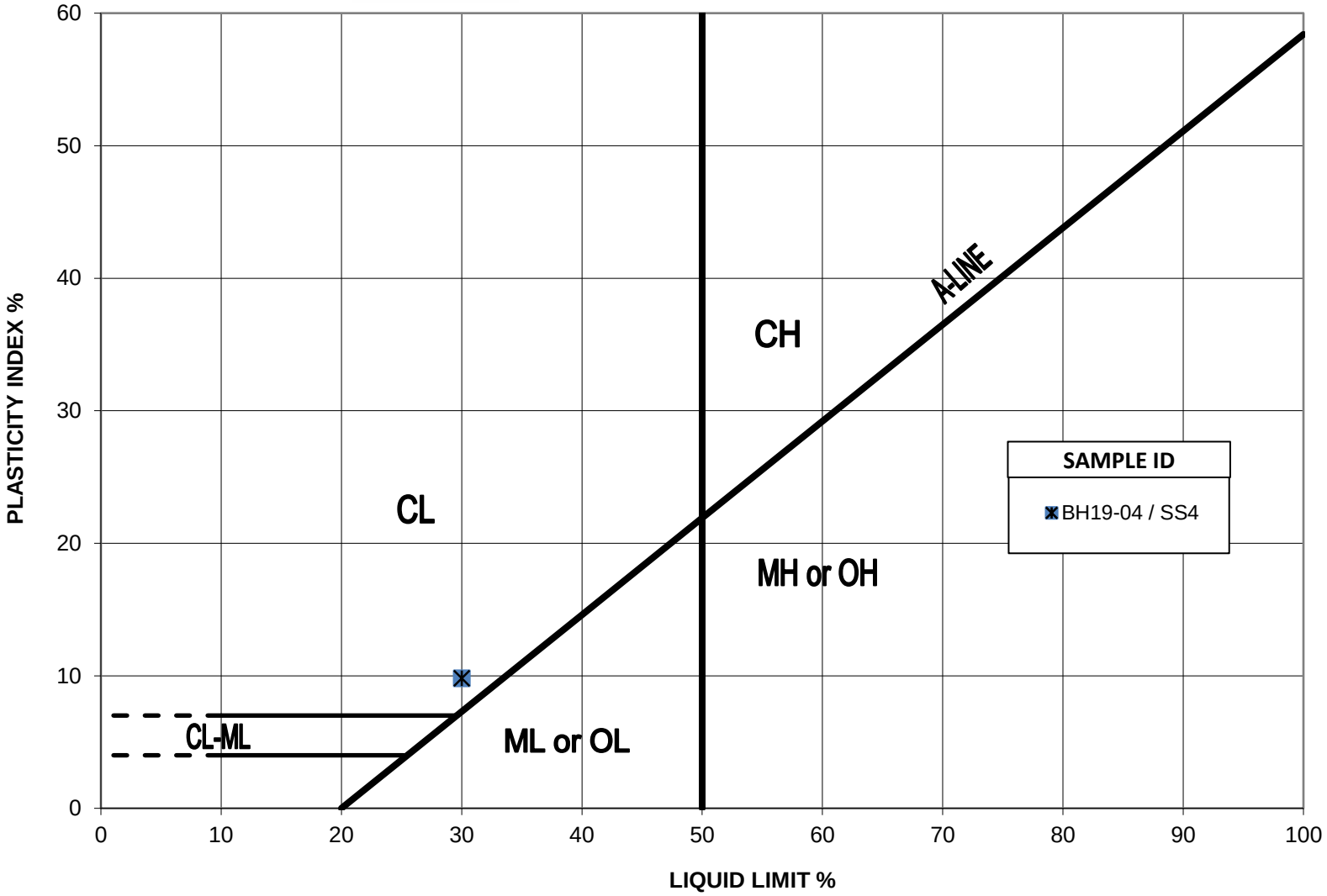
Location ID.: MW19-11 **Sample No./Depth:** SS2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	**2.00 mm**	97.1	**0.048**	16.4
26.5 mm	100.0	**0.850 mm**	96.7	**0.022**	11.6
19.0 mm	100.0	**0.425 mm**	94.3	**0.009**	10.1
13.2 mm	100.0	**0.250 mm**	72.0	**0.003**	7.7
9.50 mm	99.4	**0.106 mm**	25.5	**0.001**	5.8
4.75 mm	98.7	**0.075 mm**	21.8		

Atterberg Limits Plasticity Chart
181-06951-00



Atterberg Limits Plasticity Chart
181-06951-00



Project No.: 181-06951-00
Date 10-Jul-19

Sample ID					Data			Calculation	
Borehole Number	BH Depth Start (m)	BH Depth End (m)	Bedrock Type	Test Type	Core Length, *(mm)*	Diameter (D' at failure) *(mm)*	Max Pressure (kPa)	$I_{s(50)}$ *(MPa)*	Approximate UCS (MPa)
BH19-2 R2	4.34	4.41	Shale	D	71.00	60.23	220	0.1	1.5
BH19-2 R3	5.05	5.10	Shale	D	42.29	59.67	200	0.1	1.4
BH19-2 R4	6.93	6.98	Shale	D	50.35	60.35	320	0.1	2.2
BH19-2 R5	8.59	8.64	Shale	D	53.85	60.54	320	0.1	2.2
MW19-10 R1	4.72	4.84	Limestone/shale	D	110.77	60.72	25280	7.1	173.8
MW19-10 R2	5.23	5.29	Limestone/shale	D	55.27	60.54	10260	2.9	70.9
MW19-10 R3	7.80	7.86	Shale	D	58.74	60.60	240	0.1	1.7
MW19-10 R4	8.59	8.62	Shale	D	30.22	60.64	860	0.2	5.9

Sample ID					Data			Calculation	
Borehole Number	BH Depth Start (m)	BH Depth End (m)	Bedrock Type	Test Type	Core Length, *(mm)*	Diameter (D' at failure) *(mm)*	Max Pressure (kPa)	$I_{s(50)}$ *(MPa)*	Approximate UCS (MPa)
BH19-2 R2	4.52	4.57	Limestone/shale	A	47.75	60.89	20380	5.7	139.7
BH19-2 R3	5.61	5.67	Shale	A	57.99	60.33	1720	0.4	10.2
BH19-2 R4	7.01	7.06	Shale	A	52.23	60.42	2000	0.5	12.9
BH19-2 R5	8.56	8.6	Shale	A	48.47	60.69	5800	1.6	39.4
MW19-10 R2	5.31	5.36	Limestone/shale	A	50.14	60.54	19520	5.3	129.4
MW19-10 R3	7.87	7.92	Shale	A	43.49	60.17	2020	0.6	15.0
MW19-10 R4	8.53	8.58	Shale	A	46.3	60.62	3500	1.0	24.7

Appendix C

Corrosivity Laboratory Results, ANSI/AWWA Soil Corrosivity Scoring System

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : Lakeshore

24-June-2019

Polar Racking Inc
Attn : Arman Yazdani

6889 Rexwood Road, Unit 5
Mississauga, ON
L4V 1R2, Canada

Phone: 705-328-5387
Fax:

Date Rec. : 06 June 2019
LR Report: **CA14248-JUN19**
Reference: Lakeshore Arman Yazdani

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: BH19-01/SS8	6: BH19-04/SS3	7: BH19-05/SS5
Sample Date & Time					27-May-19	30-May-19	29-May-19
Corrosivity Index [none]	13-Jun-19	14:18	13-Jun-19	14:18	12.5	1	1
Redox Potential Soil [mV]	07-Jun-19	15:08	13-Jun-19	13:21	138	284	436
Sulphide1 [%]	10-Jun-19	14:25	10-Jun-19	16:37	0.25	< 0.02	< 0.02
Moisture Content [%]	07-Jun-19	13:15	09-Jun-19	19:13	5.7	13.7	12.2
pH [pH Units]	07-Jun-19	08:42	10-Jun-19	21:08	8.63	8.05	8.08
Cl [µg/g]	12-Jun-19	11:50	13-Jun-19	14:07	51	57	32
SO4 [µg/g]	12-Jun-19	11:50	13-Jun-19	14:07	160	26	45
Conductivity [uS/cm]	07-Jun-19	08:42	10-Jun-19	21:08	489	279	226
Resistivity (calc) [ohms.cm]	07-Jun-19	08:42	10-Jun-19	21:09	2040	3580	4420

Temperature of Sample upon Receipt: 30 degrees C
Cooling Agent Present:No
Custody Seal Present:No

Chain of Custody Number:006739

Corrosivity Index is based on the American Water Works Corrosivity Scale according to AWWA C-105. An index greater than 10 indicates the soil matrix may be corrosive to cast iron alloys.

Catharine Arnold

Catharine Arnold, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

OnLine LIMS

0001796497

AWWA Soil Corrosiveness Scoring System

Soil characteristics	Points*
Resistivity† **(Ω·cm)**	
<700	10
700–1000	8
1000–1200	5
1200–1500	2
1500–2000	1
>2000	0
pH	
0–2	5
2–4	3
4–6.5	0
6.5–7.5	0‡
7.5–8.5	0
>8.5	3
Redox potential	
> +100 mV	0
+50 to +100 mV	3.5
0 to +50 mV	4
Negative	5
Sulphides	
Positive	3.5
Trace	2
Negative	0
Moisture	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

*Ten points means that soil is corrosive to grey or ductile cast iron pipe; protection is indicated.

†Based on single-probe at pipe depth or water-saturated soil box.

‡If sulphides are present and low or negative redox-potential results are obtained, give three points for this range.