GEOTECHNICAL INVESTIGATION

Proposed Development
1260 & 1280 Dundas Street West, Oakville, ON

Client
Delmanor West Oak Inc.
4800 Dufferin Street
Toronto, ON
M3H 5S9

Project Number
BIGC-GEO-185E

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Table of Contents

List of Appendices

1 Introduction

Delmanor West Oak Inc. (the "Client") has retained B.I.G. Consulting Inc. (BIG) to provide updated geotechnical, hydrogeological, infiltration rate and slope stability assessments to support a submission for Zoning By-Law Amendment application to the Town of Oakville for a site located at 1260 and 1280 Dundas Street West, Oakville, Ontario (hereinafter referred to as the "Site").

BIG previously completed a preliminary Geotechnical Investigation at the Site, dated December 4, 2019, a Slope Stability Assessment, dated December 5, 2019, and a Hydrogeological Investigation, dated December 13, 2019 consists of analysis of the pond and central draw and estimation of construction and long-term dewatering rates based on the assumption of a mid-rise retirement residence(s) with potential one (1) level of basement. No building plan was available at the time of the previous studies. Conservation Halton (CH) has also provided development application comments, dated June 21, 2021. An Updated Slope Stability Assessment prepared by BIG under a separate cover will address the comments from CH.

With reference to the drawings prepared by Icke Brochu for Delmanor West Oak Inspired Retirement Living dated September 10, 2021 (Revision No. 2 dated March 2, 2022) at 1280 Dundas Street West, Oakville, Ontario, BIG understands that the Site will be developed to include a 8-storey seniors building with one (1) level underground structure (basement) and four (4) blocks of Independent Living Units (ILU). The proposed scope of development is shown on the Site Plan as Figure 1 included in Appendix A. It is noted that minor adjustments were made to the Site Plan, however, these changes are not significant to the general context of this report.

The subsurface findings from that previous preliminary geotechnical investigation and slope stability assessment in conjunction with the findings from the current investigation will be used in this report as they relate to the geotechnical considerations for the Site.

This report addresses the geotechnical engineering aspects of the proposed project. Reports under separate covers will be provided for the hydrogeological and infiltration rate assessments. The field investigation for the geotechnical assessment was combined with that for the updated slope stability and hydrogeological assessments.

The purpose of this investigation was to obtain information on the soil and groundwater conditions by drilling nine (9) exploratory boreholes (6 boreholes for the current geotechnical investigation and 3 deeper boreholes for the updated slope stability assessment) and from the findings in these boreholes coupled with relevant subsurface information from the previous preliminary geotechnical investigation and slope stability assessment to provide an engineering report commensurate with the details of the proposed development available at the time of preparation of this report.

2 Terms of Reference

This report is provided on the basis of the project scope presented above, and on the assumption that the design will be in accordance with the applicable standards, codes and sound engineering practice. BIG should be contacted for consultation and review, should any changes in the design features relevant to the geotechnical analyses, or any questions arise concerning the geotechnical aspects of the codes and standards. The purpose of this review is to ensure that the recommendations in this report are correctly interpreted and implemented. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The site investigation and recommendations in this report follow generally accepted practice for geotechnical engineering consultants in Ontario. The contents are governed by the amount of data available, both as acquired in this investigation and as supplied by others at the time of preparation of

this report. Laboratory testing is in compliance with ASTM, CSA and similar standards or modifications that have become accepted practice.

3 Site and Geology

The Site is presently vacant of any structures and is located south and west of Fourth Line, south of Dundas Street West, and west of Sixteen Mile Creek in Oakville, Ontario. There are two major slopes adjacent to the Site, i.e. Sixteen Mile Creek Valley, located to the immediate east and the West Valley, located to the immediate west/southwest of the site.

Land use is generally a mixture of residential/commercial with green space.

The soil overburden is primarily composed of Halton Till, predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor (Map 2556 MNDM; Quaternary Geology of Ontario, Southern Sheet).

4 Previous Studies

4.1 Preliminary Geotechnical Investigation

A Preliminary Geotechnical Investigation, on the properties 1260 and 1280 Dundas Street West, Oakville, was conducted by BIG in 2019 (Project No.: BIGC-ENV-185C; Dated: December 4, 2019) that consisted of advancing a total of seven (7) boreholes (BH/MW102, BH/MW103, BH104, BH/MW106, BH107, BH108 and BH/MW110) to depths ranging from 2.1 m to 6.7 m bgs. The boreholes were drilled and sampled to the bedrock surface. BH/MW102, BH/MW103 and BH/MW106 had monitoring wells installed for long term groundwater level observations and for environmental and hydrogeological assessment purposes.

The subsurface conditions from both above noted studies generally consisted of a surficial veneer of topsoil overlying fill/ possible fill materials (reworked native soils), which in turn was underlain by native clayey silt to silty clay glacial tills followed by Shale bedrock.

BIG's slope stability assessment and preliminary geotechnical investigation borehole/corehole locations are shown on Figure 1 in Appendix A, and corresponding Record of Boreholes are included in Appendix B.

4.2 Slope Stability Assessment

A Slope Stability Assessment, on the properties 1260 and 1280 Dundas Street West, Oakville, was conducted by BIG in 2019 (Project No.: BIGC-ENV-185C; Dated: December 5, 2019) that consisted of advancing a total of seven (7) boreholes (BH1, BH/MW2 to BH/MW4, BH5, BH/MW6 and BH/MW7) to depths ranging from 6.2 m to 12.6 m below ground surface (bgs) during the period between May 22 and 24, 2018. BH1, BH3 and BH6 were drilled and sampled to the bedrock surface. BH/MW2, BH/MW3 and BH/MW6 were drilled and sampled to the bedrock surface, i.e. depth of 7.4 m, 6.3 m and 7.6 m bgs, respectively and followed by rock coring. BH/MW2, BH/MW3, BH/MW4, BH/MW6 and BH/MW7 had piezometers installed for long term groundwater level observations. Additionally, two boreholes, BH/MW103 and BH104 were advanced to a depth of 3.5 m and 3.7 m bgs, respectively on November 13, 2019 to obtain further subsurface information at the west slope(s). BH/MW103 was equipped with a monitoring well for long term groundwater level observations.

BIG's preliminary geotechnical investigation and slope stability assessment borehole/corehole locations are shown on Figure 1 in Appendix A, and corresponding Record of Boreholes are included in Appendix B.

5 Current Field Investigation Procedures

Prior to initiating the subsurface investigation activities, the borehole locations were marked at the Site by BIG personnel and all applicable public utility services (Gas, Bell, Rogers, Hydro, Network cables, etc.) were cleared with the assistance of Ontario-One-Call (ON1Call). A Private Utility Locator was also retained to locate underground private utility lines adjacent to the borehole locations to ensure that the lines will not be damaged and safety of the worker during the investigation work.

The field work was carried out on September 16 to 23, 2021 that consisted of advancing a total of nine (9) boreholes.

Six (6) boreholes, designated as BH/MW203 to BH/MW208, were advanced to a depth of approximately 6.2 m below ground surface (bgs). In addition, from auger termination depths of between 7.6 m and 7.7 m bgs at 3-boreholes BH/MW201, BH/MW202 and BH/MW209, bedrock was cored using wire line diamond coring method to the depths of 18.8 m, 19.8 m and 20.3 m bgs, respectively, to confirm the presence and quality of bedrock. These deeper boreholes were advanced for the purpose of the updated slope stability assessment. The approximate borehole/corehole locations established and drilled/cored at the Site are shown on Figure 1 in Appendix A.

The boreholes were advanced by using truck mounted, power operated solid stem continuous flight augers, supplied and operated by a specialized drilling contractor, working under the full-time supervision of experienced BIG geotechnical personnel. Mud rotary drilling method was also applied to advance the boreholes where rock coring was undertaken. Soil samples of the overburden were generally taken at 0.76 m or 1.5 m intervals while performing Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg hammer for a vertical distance of 0.76 m to drive a 51 mm outer diameter split-barrel (split-spoon) sampler into the ground. The number of blows of the hammer required to drive the sampler into the ground by a vertical distance of 0.30 m was recorded as SPT 'N' value of the soil which indicates the consistency of cohesive soils or the relative density/compactness of non-cohesive soils. Record of Boreholes for the current study are included in Appendix C.

The BIG's drilling supervisor examined and logged the overburden soil/rock-core samples as they were obtained from the boreholes/coreholes. The recovered soil samples were sealed in clean, airtight plastic bags and rock-core samples were placed in wooden boxes, and transported to the BIG's Mississauga laboratory for further examination and laboratory testing of selected specimens for index properties (water content and Atterberg limits).

Groundwater observations were made in all boreholes during and immediately upon completion of drilling. In order to obtain the information on stabilized groundwater levels, all boreholes were equipped with monitoring wells, one in each borehole, upon completion of drilling for long term groundwater level observations and for environmental and hydrogeological assessment purposes. Monitoring wells installation details are presented on the Record of Borehole logs, and groundwater observations/measurements are summarized in Section 5.5.

The ground surface geodetic elevations at the current borehole locations were surveyed by BIG personnel and referenced to previously surveyed top of groundwater monitoring wells as Local Benchmarks.

It should be noted that the ground surface elevations at the borehole locations are approximate and should not be used for design and construction purpose. Contractors performing the work should confirm the elevations prior to construction. The borehole locations plotted on the Site Plan are based on the measurements of the Site features and should be considered to be approximate.

6 Subsurface Conditions

The borehole locations are shown on the Site Plan as Figure 1 in Appendix A. Detailed subsurface conditions encountered in the current boreholes are presented on the Record of Boreholes in Appendix C. The soil boundaries indicated on the borehole logs and discussed herein are inferred from visual observations, auger resistance and laboratory test data. They should not be regarded as exact planes of geological change.

The subsurface conditions (strata) encountered in this investigation (2021) was generally consistent with that from the previous preliminary geotechnical investigation and slope stability assessment investigation. The soil conditions encountered at the Site in the current investigation are summarized as follows:

6.1 Topsoil

A surficial veneer of topsoil was encountered at all borehole locations. The thickness of the topsoil ranged from 50 mm to 180 mm. Topsoil across the site is expected to be variable and may vary in thickness. Exact topsoil thicknesses, when required are easily determined with a hand shovel.

6.2 Fill

Fill was encountered below the surficial topsoil in BH/MW201 and BH/MW203 to BH/MW209 and extended to depths of between 0.2 m and 1.5 m below ground surface (bgs). The fill generally consisted of silty clay to clayey silt with inclusions of gravel and trace organic staining or some rootlets.

Standard Penetration Test 'N' values in the fill ranged from 6 to 14 blows/0.3 m indicating a firm to stiff consistency. Water contents are in the order of 12 to 27 percent. The elevated water content results in the fill are likely attributed by the presence of organic matter.

6.3 Clayey Silt to Silty Clay (Glacial) Till

Clayey silt to silty clay (glacial) till was encountered below the surficial topsoil in BH/MW202 or underneath the fill in BH/MW201 and BH/MW203 to BH/MW209. Sand and gravel sized particles, and weathered shale are present throughout the clayey silt to silty clay (glacial) till matrix.

The till extended to a depth ranging from 1.5 to 7.6 m bgs, which turned into a till/shale complex transition zone. This zone is typically present above the shale bedrock and is characterized by a mixture of clayey silt to silty clay till and highly weathered to weathered shale. The deposit is brown to reddish brown in colour and in a dry to damp state.

Standard Penetration Test 'N' values in the clayey silt to silty clay (glacial) till ranged from 8 blows/0.3 m to over 100 blows/0.3 m indicating firm to hard consistency. However, the till was generally very stiff to hard. Water contents were in the order of 9 to 21 percent.

Atterberg limits tests were performed on selected samples recovered from BH/MW202 and BH/MW209. The plasticity charts are provided in Appendix D.

6.4 Shale Bedrock

Shale bedrock was contacted below the till/shale complex deposit in all boreholes. The bedrock was encountered at a depth of approximately 1.5 to 7.7 m below ground surface, which is consistent with the findings from previous investigations on the Site. Coring of the bedrock was carried out for approximately 10.8 m, 10.8 m and 11 m lengths at BH/MW201, BH/MW202 and BH/MW209, respectively.

The shale on the site is of the Queenston Formation of Upper Ordovician Age. It is defined as the rock unit that overlies the bluish grey shales of the Georgian Bay Formation.

The rock can be penetrated by augering for various depths; however, the core recovery was generally very good. The rock quality was variable ranging from very poor to fair, i.e. Rock Quality Designation (RQD) of 10% between 9 m and 9.8 m depth at BH/MW202 to RQD of 71% between 8.1 m and 9.6 m depth at BH/MW201 to good to excellent quality, i.e. RQD ranging from 84% to 100% in the lower levels (below 12 m) of BH/MW201, BH/MW202 and BH/MW209.

The red shale had interbedded grey shale layers, some horizontal fractures along planes, minimal vertical cracking, minimal vertical fractures and some interbedded clayey silt seams at depths between 9.5 m and 9.8 m bgs, 10.6 m and 10.8 m bgs in BH/MW201, between 9.1 m and 9.4 m bgs in BH/MW202; and between 9.5 m and 9.8 m bgs, 9.9 m and 10.2 m bgs in BH/MW209.

Detailed description of the bedrock cores are shown on the applicable Record of Boreholes in Appendix C.

The upper portion of the bedrock is commonly weathered to a depth of 600 to 1000 mm and within this weathered zone hard limestone layers or lenses are common. These hard limestone layers can result in contractual problems for augers, and can provide misleading bedrock elevations. Where the weathering is more extensive a till/shale layer may be found above the bedrock, as was the case on this site. In the sound bedrock, the limestone, sandstone, dolostone inclusions are hard to very hard. Lenses of harder rock can have thicknesses as much as 750 to 900 mm as have been encountered on other site within the Queenston Shale. These lenses can vary significantly in thickness over short distances and should be anticipated on this site. It is also common to encounter closely spaced groupings of thin strong rock layers, which collectively can be as thick as 1.0 m or more.

Shale Characteristics from Previous Slope Stability Investigation

Coring of the bedrock was carried out in the previous slope stability assessment investigation and the core recovery was very good. The rock quality was variable ranging from very poor to poor, i.e. Rock Quality Designation (RQD) of 22 % between 9.1 and 9.6 m depth at BH/MW3 to RQD of 40 % between 7.7 and 8.1 m depth at BH/MW6 from good to excellent quality, i.e. RQD ranging from 84% to 98 % in the lower levels of BH/MW2, BH/MW3 and BH/MW6. The red shale had interbedded grey shale layers, some horizontal fractures along planes, minimal vertical cracking, minimal vertical fractures and some interbedded clayey silt at 9.1 m in BH/MW6.

6.5 Groundwater Conditions

With the exception of BH/MW201, BH/MW202 and BH/MW209 where water was introduced to facilitate mud rotary drilling, groundwater levels were monitored in the remaining open boreholes during and after completion of drilling. BH/MW208 remained dry to a depth of approximately 5.9 m below ground surface (bgs) and groundwater levels were found at a depth of 3.7 m to 5.6 m bgs on completion of drilling.

The groundwater levels in the monitoring wells were noted to be at a depth of 2.0 m to 5.5 m bgs or at about elevation 146.0 m to 149.5 m asl, on September 30, 2021. The screening intervals and depths for monitoring well installations are shown on the appended Record of Boreholes in Appendix C. In addition, the updated hydrogeological assessment provided by BIG under a separate cover should be referred to for groundwater data interpretations.

It should be noted that groundwater levels are subject to seasonal fluctuations and changes in the subsurface drainage domains near any site.

7 Engineering Discussion and Recommendation

It is our understanding that the proposed development of the Site consists of a 8-storey seniors building with one level of underground structure / basement (i.e. L-shaped building at northern portion of Site), four (4) blocks of Independent Living Units (ILU) utilizing slab-on-grade construction (i.e. southern portion of Site), underground services, with the associated at grade paved parking areas and access roads.

Final design drawings of the proposed developments were not available to BIG at the time of preparation of this report. Therefore, additional investigation and analysis may be necessary once the detailed design drawings are available. Once the final design drawings are available, this report should be reviewed by BIG and further recommendations will be provided as appropriate.

The comments and recommendations presented in this report are based on factual information and intended only to use for the design engineers. The report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. The number of boreholes, tests data and their interpretation presented in this report may not be sufficient to determine all the factors that may have effects on the design and construction of the proposed new development.

The following discussion and recommendations should be revised and/or supplemented where necessary, when the conditions of the proposed development are different from the noted conditions/assumptions.

7.1 Site Preparation and Grading

Proper grading and site preparation are very important for the success of any planned development. As parts of effective and efficient design and construction of the proposed development, following items highlight the fundamental and essential geotechnical requirements to be considered during grading and site Preparation. Detailed recommendations are provided in the following sections:

a) All ground surface cover (pavement, topsoil, etc.) should be stripped and removed from the area of the proposed development. Similarly, all existing shrubs, vegetation, trees and scattered debris should be removed from the area of the proposed development.
b) It is our understanding that all-existing buildings at the site will be demolished, and all components of the demolished buildings, e.g., floor slabs, footings, walls and underground infrastructure, etc. should be sub-excavated and removed completely from the area of the proposed developments.
c) Any existing infrastructures (e.g., manholes, catch basins, buried structures, etc.) should be sub-excavated and removed from the area of the proposed development, if they are located in the zone of influence of foundations of the proposed development. The zone of influence of the foundation is defined as an area laterally extending 1 m beyond the bottom edge of the foundation with downward slope of 1H:1V. Similarly, any existing underground services, outside of the foundation influence, should be either removed or abandoned by injecting with non-shrinkable grout.
d) Care must be taken during the excavation near the vicinity of the existing structures and any underground utility services located within or adjacent to the excavation. Foundations of heavily loaded settlement sensitive structures and utilities located within the close proximity to the proposed excavation should be accurately located and supported adequately with the suitable temporary or permanent support system where required, prior to excavation, to preserve the integrity of these structures. Similarly, the excavation near the vicinity of any existing structure should be carried out without disturbing and/or undermining their foundations.

e) Where open excavation is not feasible, a properly designed perimeter shoring system should be installed prior to the mass excavation for the proposed development. For the drilling and installation of shoring system (e.g., caissons, etc.), travel path and working platform areas of the Site for drill rig must be properly prepared, inspected and approved by a geotechnical engineer from BIG prior to starting the installation of shoring system.

f) A provision of temporary groundwater control system should be available during the excavation, and the base of excavation should be kept dry all the time.

g) The base of excavation at design subgrade level should be inspected and approved by a geotechnical engineer from BIG. During inspection, any soft/loose and wet spots identified, should be sub-excavated and replaced with compacted approved material as directed by the geotechnical engineer.

h) Any fill, required to be used, should be used as an engineered fill. Materials used for engineered fill may consist of imported OPSS Granular B, OPSS Select Sub-grade and/or the on-site soils which do not contain organics and deleterious materials. Some reconditioning (i.e., drying) prior to re-use may require, if the materials are found to be too wet. However, any imported soils to the Site for engineered fill must meet the requirements of O. Reg. 153/04 as determined by BIG.

i) To reduce the post-construction settlements, all new fills should be placed in thin lifts, not exceeding 200 mm thick loose lifts, within ±2 % of its optimum moisture content, and thoroughly compacted with suitable heavy compactors to at least 98% of Standard Proctor Maximum Dry Density (SPMDD), before placing the next lift.

j) The existing on-site soils are susceptible to disturbance when exposed to weather and construction traffic. Surface water runoff from the neighboring properties should not be permitted to enter and/or pond within the construction area. This is especially important to the success of the planned construction.

7.2 Foundations

With reference to the drawings titled “Building Elevations” (Drawing No. A401 and A402) and dated September 2021 provided by the Client, we understand that the proposed 8-storey seniors building situated in the northern portion of the Site will consist of one level of basement. Based on the provided drawings, Finished Floor Elevation (FFE) of the basement level is expected to be set at Elev. 148.75 m. Given that the average ground surface elevation is at about Elev. 151 m and based on the available boreholes, foundations for the 8-storey apartment building with 1-level of basement will be founded on the clayey silt to silty clay till overburden soils.

In view of the above, the proposed 8-storey seniors building with 1-level of basement can be supported by conventional spread footings on hard clayey silt / silty clay till at or below Elev. 148± m with a geotechnical reaction of 400 kPa at Serviceability Limit State (SLS) and resistance of 600 kPa at Ultimate Limit State (ULS).

Where significant differential settlements are expected, services into the building(s) or its foundations should be constructed to absorb the movements by the use of flexible joints or telescopic connections at ground/foundation interface.

For the proposed four (4) blocks of Independent Living Units (ILU), adopting a slab-on-grade construction design, conventional spread footings with a geotechnical resistance value of 300 kPa SLS/450 kPa ULS is available on the natural undisturbed clayey silt to silty clay till.

Table 7-0 provides the bearing values and the corresponding founding elevations at the borehole locations. The geotechnical recommendations provided herein are generally consistent with the previous studies conducted by BIG.

Table 7-0: Bearing Resistance Values for Conventional Footings

Borehole	Bearing Soil	Bearing Value (kPa)	Approximate Depth (m)	Approximate Elevation (m)
BH/MW204	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 149.8
BH108*	Clayey Silt Till/Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 149.8
BH/MW205	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 149.8
BH/MW206	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.4	Below 149.5
BH107*	Clayey Silt Till/Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 149.8
BH/MW207	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 150.3
BH/MW208	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.0	Below 150.8
BH/MW209	Clayey Silt to Silty Clay Till	300 SLS/450 ULS	Below 1.5	Below 149.4
BH/MW103*	Clayey Silt Till/Silty Clay Till	300 SLS/450 ULS	Below 1.5	Below 150.1
BH110*	Clayey Silt Till/Silty Clay Till	300 SLS/450 ULS	Below 1.8	Below 148.1

***Note** – Boreholes from previous investigation by BIG

8 Foundations – General Comments

Footings founded on natural undisturbed soils (i.e. glacial till deposits) designed for the above applicable bearing resistance values are expected to limit total and differential settlements to within the normally tolerated limits of 25 mm and 19 mm, respectively.

The soil conditions exposed at the founding subgrade level are recommended to be inspected by qualified geotechnical personnel at the time of construction. Any loose, soft, wet or deleterious materials observed at the exposed bearing soil surface is recommended to be sub-excavated and replaced with approved and compacted engineered fill as described in this report. The recommended geotechnical resistance at ULS and geotechnical reaction at SLS for the design of conventional shallow footings established in engineered fill is 225 kPa and 150 kPa, respectively.

All footings exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection.

Where it is necessary to place footings at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing resistances have been calculated by BIG from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by BIG to validate the information for use during the construction stage**.**

8.1 Floor Slabs and Permanent Drainage

For basement extending to a depth of 3 m± below existing ground surface, conventional slab on grade construction can be used on the glacial till expected at the basement subgrade level of the proposed 8-storey apartment building.

For a building where there is no basement (i.e. ILU), after removal of surficial topsoil, the exposed subgrade should be proof rolled under the guidance of the geotechnical engineer. Any soft spots revealed during proof rolling should be sub-excavated and backfilled with clean inorganic soils placed in

200 mm thick loose lifts and each lift compacted to at least 98 percent Standard Proctor Maximum Dry Density (SPMDD). If required, the site can be raised to final subgrade level in the same manner.

A moisture barrier consisting of at least 200 mm of OPSS Granular A should be installed under the floor slabs. The Granular A layer should be compacted to a minimum of 98% of the material's SPMDD.

Special care should be taken to ensure compaction around columns and adjacent to foundation walls. The floor slab should be structurally separate from the foundation walls and columns. Sawcut control joints should be provided at suitable intervals and along column lines to minimize shrinkage cracking and to allow for differential settlement of the floor slab.

If the floor slab is more than about 300 mm higher than the exterior grade then perimeter drainage is not considered to be necessary.

For a structure with a basement, the perimeter drainage system shown on Drawing 1 in Appendix E is recommended for slab on grade construction at the basement level.

A perimeter drainage system for a timber lagging and soldier pile shoring wall is shown on Drawing 2 in Appendix E.

8.2 Frost Protection

The design frost penetration depth for this site is 1.2 m, or equivalent insulation.

8.3 Earth Pressures

The lateral earth pressures acting on basement walls, etc. may be calculated from the following expression:

$$p = K(g\,h + q)$$

where p	=	lateral earth pressure in kPa acting at depth h
K	=	earth pressure coefficient, assumed equal to 0.40
g	=	unit weight of backfill, a value of 21 kN/ cu.m may be assumed
h	=	depth to point of interest in metres
q	=	equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the buildup of any hydrostatic pressure behind the wall and that granular fill is used.

Earth pressures on soil retention structures will depend on soil type, groundwater conditions, conditions of wall restraint, backfill slope geometry, surcharge conditions and similar factors. If required, appropriate further recommendations can be provided once detailed structure design and construction related retention system details become available.

8.4 Shoring Considerations

Earth retention will likely be required for the proposed 3± m deep excavation. If and where adjacent sensitive structures/services are present, consideration should be given to an unyielding shoring system, possibly consisting of interlocking caissons (secant wall) to minimize water seepage during construction. The upper levels of the secant wall shoring system may require internal bracing with struts.

The shoring system should be designed by a specialized geostructural engineer in accordance with the guidelines provided in the latest edition of the Canadian Foundation Engineering Manual (CFEM).

If an easement for tie-back anchors is available from the adjacent building structures, the lower levels of the secant wall shoring system could be restrained by means of tie-back anchors. Alternatively, lateral support consisting of rakers and / or soil anchors may be required.

A bond resistance of 48 kPa can be used for anchors in the hard glacial till and 600 kPa for the shale.

The shale bedrock is encountered at depths of 1.5 m to 7.7 m below ground surface. Rock excavation is typically nominally self-supporting in a vertical face where bedding is horizontal. Rock bolts may be used in a vertical face to provide support to joint surfaces that may not be readily apparent in the open face. The excavation face should be inspected by geotechnical personnel to ensure that loose rock with the potential for spalling and materials which can slide and fall on workers below are removed. This would also be a requirement of the Occupational Health and Safety Act (OHSA).

Along the other sides of the property where non-sensitive structures exist, shoring may be achieved with traditional soldier piles and timber lagging.

For the more conventional shoring systems, the design values for earth pressure calculations can be provided once further details of shoring system configuration, depth, groundwater control and similar facts become available.

Subject to hydrogeological considerations, construction dewatering or long-term underfloor drainage system may adversely impact nearby structures, it would be best to provide a sufficient depth of shoring system cut-off below the excavation level to avoid piping, uplift and basal heave.

8.5 Excavation and Backfill Considerations

It is anticipated that excavation for the proposed foundations, underground services, etc. will extend through the fill, native clayey silt to silty clay till and into the till / shale complex or shale (south portion of the site). The excavation within the overburden may be undertaken with a mechanical shovel. In the shale bedrock, the limestone inclusions are hard to very hard. Lenses of harder rock can have thicknesses as much as 750 to 900 mm as have been encountered on other site within the Queenston Shale. These lenses can vary significantly in thickness over short distances and should be anticipated on this site. It is also common to encounter closely spaced groupings of thin strong rock layers, which collectively can be as thick as 1.0 m or more. As such, the use of pneumatic hammers, hoe rams, etc. should be anticipated for bedrock excavation.

Cobbles and boulders could be encountered in the till as well as obstructions in the fill, and their presence may influence the progress of excavation. Consequently, provision should be made in the contract documents to cover any delays caused by boulder obstruction or obstruction in the fill.

Excavations may be undertaken as “open-cut”, provided they comply with the requirements of the current Occupational Health and Safety Act (OHSA). For guidance, the fill is considered a Type 3 soil. The very stiff to hard silty clay till is considered to be Type 2. The weakest material in an excavation site will govern.

The OSHA requires that excavation slopes be cut at predetermined inclinations, based on the soil types. Locally, where loose/soft materials are encountered, or within zones of persistent seepage at depth, it may be necessary to flatten the side slopes further. However, as noted in the previous section of this report, earth retention may be required for an excavation extending to a depth of 3 ± m below ground surface.

It is important to note that soils encountered in the construction excavations may vary significantly across the site. Our preliminary soil classifications are based solely on the materials encountered in the boreholes advanced at the site. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are encountered at the time of

construction, we recommend that BIG be contacted immediately to evaluate the conditions encountered.

Backfill used to satisfy underfloor slab requirements, in footings and service trenches, etc., should be compactable fill, i.e. inorganic soil with its moisture content close to its optimum moisture content determined in a Standard Proctor Test. The excavated native soils, which are not mixed with topsoil/organics or other obviously unsuitable materials, may be reused as backfill. Materials found to be wet should be allowed to air dry before reusing.

Any organic, excessively wet, or otherwise deleterious material should not be used for backfilling purposes. Any shortfall of suitable on-site excavated material can be made up with imported granular material such as OPSS Granular 'B' or equivalent. We would recommend that the shale not be used due to the difficulties in adequately pulverizing this material and obtaining adequate moisture contents to facilitate compaction.

In general, the overburden soils are not suitable for use in confined areas. Imported granular material conforming OPSS Granular 'B' Type 1 would be suitable for these purposes as well as in areas where free-draining characteristics are required. Backfill against the foundation walls should also consist of free-draining material such as Granular 'B' Type 1.

Backfill should be placed in lifts not exceeding 200 mm and compacted to the requirements as stated in Section 6 of this report.

Backfill should be placed simultaneously on both sides of the foundation walls. Heavy compactors, which generate large lateral stress, should be kept at a safe distance from walls to avoid structural damage.

All backfill and compaction operations should be monitored by qualified geotechnical personnel to approve material, to evaluate placement operations, and to verify that the specified degree of compaction is being achieved throughout the fill.

8.6 Earthquake Considerations

Given the competent subsurface conditions, the proposed structure may be designed for Site Class C. Upgrading of the site class can be explored with appropriate additional testing (MASW, VSP, etc.), i.e. shear-wave velocity sounding.

8.7 Pavement Construction

Pavement design and pavement thicknesses are highly dependent on the subgrade conditions. The pavement subgrade should, therefore, be adequately prepared to receive the granular bases for the pavement construction noted in Section 7.1.

Following the Site grading and prior to the placement of granular bases, the exposed subgrade should be proof-rolled and approved by the qualified geotechnical personnel from BIG. Any wet/soft areas of subgrade, revealed by this process, should be sub-excavated and replaced with an approved on-site or imported fill compatible to the existing subgrade soils.

All new fills should be placed in a maximum of 200 mm loose lifts, within ±2 % of its optimum moisture content, and each lift should be compacted by a suitable heavy equipment to minimum 95% of SPMDD before placing the next lift. The uppermost 600 mm of the pavement subgrade should be compacted to a minimum 98% of SPMDD.

Construction traffic over exposed subgrade should be minimized, and temporary construction hauling routes should be established. If these routes coincide with future paved areas, hauling roads should be

adequately reinforced with increased thickness of granular bases, geo-grids and / or a combination of both, etc. to reduce the disturbance to the subgrade soils.

Considering the proposed pavement usage, frost susceptibility and assuming adequate drainage, the following minimum pavement structure thicknesses are recommended for the long-term satisfactory performance of the pavement:

Recommended Minimum Pavement Structure Thickness

Particulars	Heavy Duty Driveway (mm)	Standard Duty Driveway (mm)
Asphaltic Concrete: OPSS HL3	40	50
Asphaltic Concrete: OPSS HL8	70	50
Base Course - OPSS Granular A or equivalent	150	150
Sub-base Course - OPSS Granular B or equivalent	350	250

The recommended pavement structure may have to be adjusted according to the local regulations and / or respective Town of Oakville (Region of Halton) standards.

The granular base and subbase materials should conform to the OPSS 1010 and should be compacted to 98% of the ASTM D698 SPMDD within ±2% of the optimum moisture content.

Hot mix asphalt concrete should conform to OPSS 1150 and OPSS 310 and be placed and compacted to at least 92 to 96.5 % of the Marshall Maximum Relative Density (MMRD). It is recommended that the asphalt mix design be reviewed by BIG prior to the start of the paving.

The pavement thickness considers that construction will be carried out during the drier time of the year and that the subgrade is competent. If the subgrade becomes excessively wet or rutted during construction activities, additional sub-base material, geo-grids and / or a combination of both may be required for subgrade stabilization. This requirement is best determined during construction.

9 Construction Monitoring

Qualified Geotechnical personnel should monitor the foundation excavation, subgrade inspection, in-situ density tests and material testing services in all stages of the proposed development, to ensure that the materials and conditions comply with this geotechnical report and project requirements. Should the condition that encountered vary from those described in this report, our office should be informed immediately so that the proper measures are undertaken. The on-Site review of the condition of the foundation soil is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the Ontario Building Code.

All backfilling should be supervised to ensure that proper materials are used, and that adequate compaction is achieved. Strict quality control guidelines should be followed during the placement of fill materials.

10 Closure

The subsoil information and recommendations contained in this report was prepared solely for the purpose to use at the specific project as described in this report and should not be used to any other project or site location. The information contained in this report is for the sole benefit of the Client and his/her Consultants. *In order to properly understand the contents of the report, reference must be made to the whole of the report. BIG cannot be held responsible for the use of portions of the report without reference to the entire report.*

We recommend that BIG be retained to review the recommendations for this specific applicability, once the details of the proposed development are finalized and prior to the final design stage of the project.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Respectfully submitted,

B.I.G. Consulting Inc.

Oswin Li, P.Eng.
Senior Project Manager

Darko Strajin, P.Eng.
Managing Partner

11 Report Limitations

The conclusions and recommendations given in this report are based on information determined at the test hole (borehole, test pit, probe hole, etc.) locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the test hole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is a recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the test holes.

The design recommendations and opinions given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance to the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs. The anticipated construction conditions are also discussed, but only to the extent that they may influence design decisions. Construction methods discussed, however, express BIG's opinion only and are not intended to direct the contractors on how to carry out the construction.

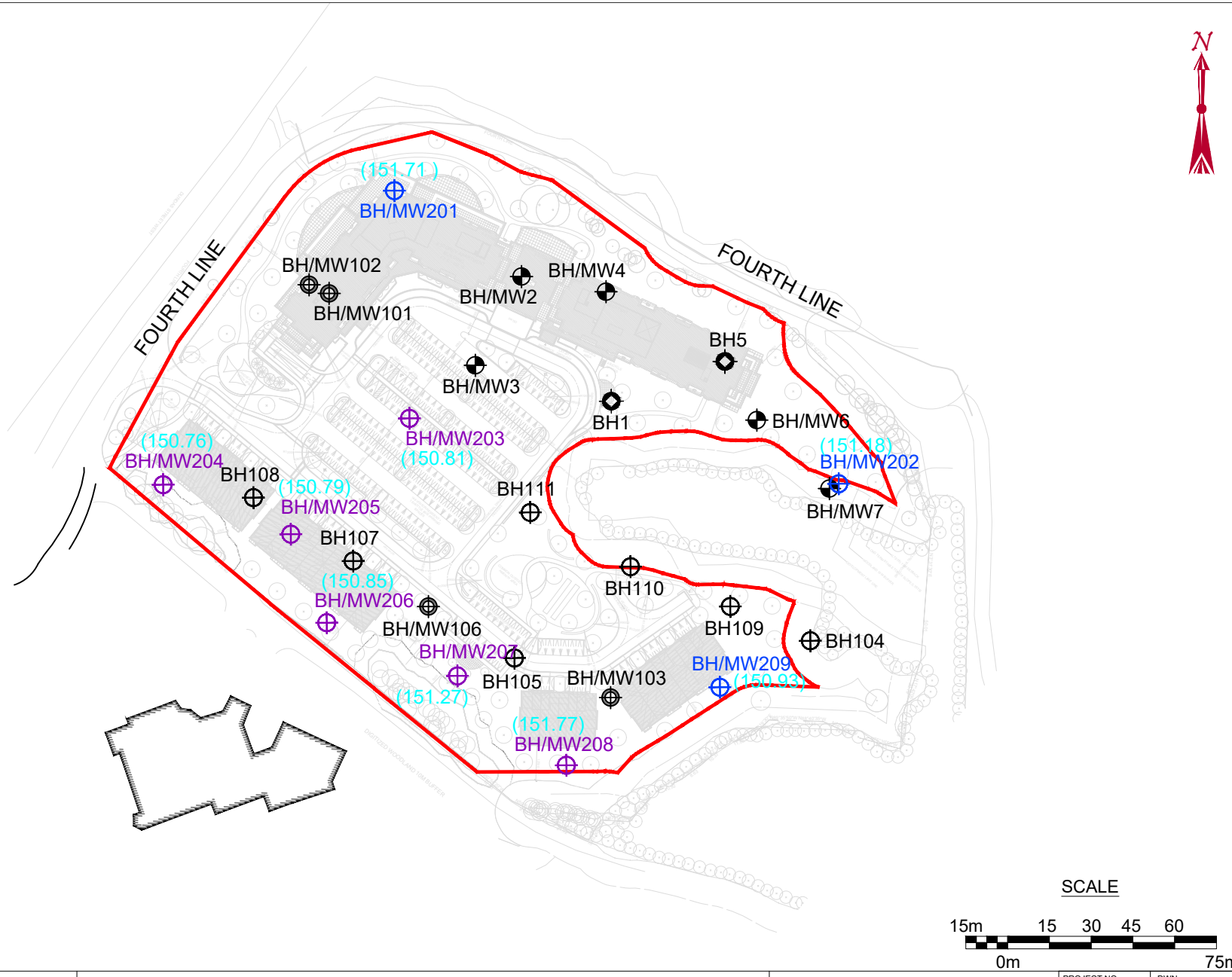
Contractors should also be aware that the data and their interpretation presented in this report may not be sufficient to assess all the factors that may have an effect upon the construction. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably at the site. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice.

The benchmark and elevations mentioned in this report were obtained strictly for use by this office in the geotechnical design of the project. They should not be used by any other party for any other purpose.

This report has been prepared for the account of the Client. The contents of this report reflect our best engineering judgment given the limitations of the site investigation and information on project details. 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. BIG accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Appendix A – Site Plan



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LEGEND

- UPDATED SITE BOUNDARY
- EXISTING BUILDING
- APPROXIMATE BOREHOLE LOCATION (BIG, 2018)
- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION (BIG, 2018)
- APPROXIMATE BOREHOLE LOCATION (BIG, 2019)
- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION (BIG, 2019)
- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION AT 6 MBGS (BIG, 2021)
- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION AT 20 MBGS (BIG, 2021)
- (151.71) GROUND SURFACE ELEVATIONS IN METERS BELOW GROUND SURFACE (MBGS)

NOTE: IMAGERY OBTAINED FROM ICKE BROCHU ARCHITECTS INC., DRAWING NO. A101, REVISION 2, DATED MARCH 02, 2022

TITLE AND LOCATION

BOREHOLE/MONITORING WELL LOCATION PLAN
GEOTECHNICAL INVESTIGATION
1260-1280 DUNDAS STREET WEST, OAKVILLE, ONTARIO

PROJECT NO.	DWN.
BIGC-GEO-185E	O.A.
SCALE	CK.
AS NOTED	O.L.
DATE	FIG NO.
MARCH 2022	1

Appendix B – Record of Boreholes (Previous Investigations)

NOTES TO RECORD OF BOREHOLES

DRILLING METHOD		SAMPLE TYPE		LABORATORT DATA	
SSA	Solid Stem Auger	SS	Split Spoon	W	Water Content
HSA	Hollow Stem Auger	AS	Auger Flight Sample	W_p	Plastic Limit
WB	Wash Boring	TW	Thin Wall Open	W_l	Liquid Limit
RM	Rotary Mud Drilling	TP	Thin Wall Piston	γ	Natural Unit Weight (kN/m^3)
		WS	Washed Sample	C_u	Undrained Shear Strength (kPa)
		VT	Vane Test	PP	Pocket Penetrometer
		GS	Grab Sample	UC	Unconfined Compression
		RC	Rock Core	UU	Unconsolidated Undrained
		PH	Sample Advanced Hydraulically	CU	Consolidated Undrained
		PM	Sample Advanced Manually	CD	Consolidated Drained
		CC	Continuous Core	TOV	Total Organic Vapors

STANDARD PENETRATION TEST (SPT 'N'): The number of blows required to advance a standard 51 mm outer diameter split spoon sampler to penetrate 0.3 m distance into the undisturbed ground in a borehole driven by means of a 63.5 kg hammer falling freely from a distance of 0.76m.

DYNAMIC CONE PENETRATION TEST (DCPT): The number of blows required to advance a 51 mm diameter – 60 degree cone fitted to the end of the drill rods to penetrate 0.3 m distance into the undisturbed ground driven by 475 Joules driving energy per blow.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR RELATIVE DENSITY

CONSISTENCY: Cohesive soils are described on the basis of their undrained shear strength (Cu) or 'N' values as follows:

N (blows/0.3m)	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	>30
Consistency	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
Cu (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200

RELATIVE DENSITY: Cohesionless soils are described on the basis of their relative density as indicated by 'N' values as follows:

N (blows/0.3m)	0 - 4	4 - 10	10 - 30	30 - 50	>50
Relative Density	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH

RECOVERY: Sum of the lengths of all recovered rock core pieces divided by the total length of the core run (expressed as a percent).

ROCK QUALITY DESIGNATION (RQD): Sum of the lengths of intact rock core pieces, 100 mm or more in lengths, divided by the total length of the core run (expressed as a percent). Classifications of a rock based on the RQD value are as follows:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
Quality	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

JOINTING AND BEDDING:

SPACING	50 Millimeters	50 - 300 Millimeters	0.3 – 1.0 Metres	1.0 – 3.0 Metres	> 3.0 Metres
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

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RECORD OF BOREHOLE No BH/MW102 1 OF 1 METRIC

PROJ. NO. BIGC-ENV-185C LOCATION 1260 Dundas Street West, Oakville, ON ORIGINATED BY F.G.

DATUM Geodetic BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations DATE 2019.11.13 - 2019.11.13 CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.1											
151.0 / 0.1	**TOPSOIL:** 125 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed upper 300 mm, rootlets, reddish brown, moist, very stiff to hard (Pocket Penetrometer: > 225 kPa)		1	SS1	9				○		
			2	SS2	32		150		○		
			3	SS3	41		149		○		
			4	SS4	52		148		○		
	- rock fragments below 3.05 m		5	SS5	81	▽	147		○		
	- reddish brown and grey below 4.57 m		6	SS6	36		146		○		
145.0	-shale-till complex below 6.0 m										
6.1	**SHALE:** weathered, red, damp		7	SS7	100		145		○		
144.4											
6.7	**Borehole terminated at 6.7 m**										

Notes:
1. Open to 6.7 m bgs upon completion of drilling.
2. Dry upon completion of drilling.
3. Water level was 4.5 m bgs on November 25, 2019.
4. Water level was 3.9 m bgs on December 2, 2019.

$+^3, \times^3$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW103

1 OF 1

METRIC

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.13 - 2019.11.13 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.6											
151.5 / 0.1	**TOPSOIL:** 125 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed upper 300 mm, brown, moist, very stiff to hard		1	SS1	6		151		○		
			2	SS2	19				○		
			3	SS3	36		150		○		
	- reddish brown, shale inclusions below 2.29 m		4	SS4	46		149		○		
148.6											
3.0 / 148.1	**SHALE:** weathered, red, damp		5	SS5	100				○		
3.5	**Borehole terminated at 3.5 m**										

Notes:
1. Open to 3.5 m bgs upon completion of drilling.
2. Dry upon completion of drilling.
3. Water level was at 3.32 m bgs November 25, 2019.
4. Water level was as 3.09 m bgs on December 2, 2019.

$+^{3}$, $\times^{3}$ Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH104 1 OF 1 METRIC

PROJ. NO. BIGC-ENV-185C LOCATION 1260 Dundas Street West, Oakville, ON ORIGINATED BY F.G.

DATUM Geodetic BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations DATE 2019.11.13 - 2019.11.13 CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.6											
150.0	**TOPSOIL:** 50 mm										
149.9	**FILL:** clayey silt to silty clay, trace organic staining, brown, moist		1	SS1	7						Metals & Inorganics, Pesticides, Herbicides Analysis PAHs Analysis
			2	SS2	8		150				
149.1											
1.5	**CLAYEY SILT TILL/SILTY CLAY TILL:** reddish brown, moist, stiff to hard (Pocket Penetrometer: > 225 kPa)		3	SS3	26		149				
			4	SS4	59		148				
147.7	-weathered shale inclusion below 2.7 m										
2.9	**SHALE:** highly weathered, red, damp		5	SS5	100		147				
146.9											
3.7	**Borehole terminated at 3.7 m**										

Notes:
1. Open to 3.7 m bgs upon completion of drilling.
2. Dry upon completion of drilling.

$+^3$, $\times^3$: Numbers refer to Sensitivity $O^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW106 1 OF 1 METRIC

PROJ. NO. BIGC-ENV-185C LOCATION 1260 Dundas Street West, Oakville, ON ORIGINATED BY F.G.

DATUM Geodetic BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations DATE 2019.11.13 - 2019.11.13 CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.6											
150.5 / 0.1	**TOPSOIL:** 100 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed upper 400 mm, rootlets, cobble, brown, moist, very stiff to hard (Pocket Penetrometer: > 225 kPa)		1	SS1	6		150		○		
			2	SS2	28				○		
			3	SS3	100		149				
148.6	-shale-till complex below 1.9 m										
2.0	**SHALE:** weathered, red, damp - limestone layers between 2 m and 3.1 m						148				
147.5											
3.1	**Borehole terminated at 3.1 m**										

Notes:
1. Open to 3.1 m bgs upon completion of drilling.
2. Dry upon completion of drilling.
3. Water level at 0.69 m bgs on November 25, 2019.
4. Water level at 0.18 m bgs on December 2, 2019.

$+^{3}, \times^{3}$ Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH107

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.13 - 2019.11.13 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.8											
150.7 / 0.1	**TOPSOIL:** 125 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed upper 400 mm, rootlets, brown, moist, very stiff to hard (Pocket Penetrometer: > 225 kPa)		1	SS1	10						Metals & Inorganics, Pesticides, Herbicides Analysis PAHs Analysis
			2	SS2	34		150				
			3	SS3	32		149				
148.5 / 2.3	-shale-till complex below 2.2 m										
	SHALE: weathered, red, damp		4	SS4	100		148				
147.7 / 3.1	**Borehole terminated at 3.1 m**										

Notes:
1. Open to 3.1 m bgs upon completion of drilling.
2. Dry upon completion of drilling.

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity $O^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH108

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.18 - 2019.11.18 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.8											
150.7 / 0.1	**TOPSOIL:** 125 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed above 0.6 m, rootlets, reddish brown, moist, very stiff to hard		1	SS1	6						
			2	SS2	28		150		○		
149.3											
1.5	**SHALE:** weathered, red, damp		3	SS3	100		149		○		
148.7											
2.1	**Borehole terminated at 2.1 m**										

Notes:
1. Open to 2.1 m bgs upon completion of drilling.
2. Dry upon completion of drilling.

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH110

1 OF 1

METRIC

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.18 - 2019.11.18 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
149.9											
149.8	**TOPSOIL:** 150 mm										
0.2	**FILL:** silty clay to clayey silt silt, some rootlets, reddish brown, very moist to moist		1	SS1	7						PAHs, Pesticides, Herbicides Analysis; Metals & Inorganics Analysis
			2	SS2	11		149				
148.4											
1.5	**CLAYEY SILT TILL/SILTY CLAY TILL:** silt pockets, reddish brown, moist, very stiff to hard (Pocket Penetrometer: > 225 kPa)		3	SS3	29		148				
147.6											
2.3	**SHALE-TILL COMPLEX:** red, damp, hard		4	SS4	100						
147.0	-weathered shale at 2.9 m										
2.9	**Borehole terminated at 2.9 m**										
	Notes: 1. Open to 2.9 m bgs upon completion of drilling. 2. Dry upon completion of drilling.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH1

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY A.B.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.22 - 2018.05.22 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.8											
150.7 / 0.1	**TOPSOIL:** 100 mm										
	FILL: clayey silt, trace gravel and organics, mottled reddish brown, moist		1	SS1	10				○		
	- trace rootlets at 0.8 m		2	SS2	4		150		○		
			3	SS3	8		149		○		
148.5	- 75 mm black organic layer at 2.0 m										
2.3	**CLAYEY SILT TILL:** trace gravel, reddish brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		4	SS4	37		148		○		
147.8											
3.1	**CLAYEY SILT TILL:** trace gravel, red shale inclusion, reddish brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		5	SS5	57				○		
			6	SS6	55		147		○		
	- grey and very stiff below 4.6 m (Pocket Penetrometer: 200 kPa)		7	SS7	23		146		○		
145.2	Till/Shale Complex below 5.5 m		8	SS8	100				○		
5.6	**SHALE:** weathered, red, damp						145				
144.7											
6.1	**Borehole terminated at 6.2 m**		9	SS9	100				○		
	Notes: 1. Open to 6.2 m bgs upon completion of drilling 2. Water at 4.1 m bgs upon completion of drilling										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW2

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY A.B./F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.22 - 2018.05.23 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.8											
151.7 / 0.1	**TOPSOIL:** 100 mm										
151.0 / 0.8	**FILL:** clayey silt, trace gravel, some rootlets, topsoil inclusions above 0.3 m, reddish brown, moist - 150 mm topsoil inclusion at 0.15m		1	SS1	6		151				
	CLAYEY SILT TILL: trace gravel, mottled, reddish brown, moist, very stiff, (Pocket Penetrometer: > 225 kPa) - red shale inclusions and hard below 1.5 m		2	SS2	18		150				
			3	SS3	33						
			4	SS4	41		149				
			5	SS5	43	▽	148				
147.2 / 4.6	**CLAYEY SILT TILL:** trace gravel, red shale inclusion, grey, moist, hard, (Pocket Penetrometer: > 225 kPa)		6	SS6	31		147				
			7	SS7	29		146				
144.4 / 7.4	**SHALE:** weathered, red, damp		8	SS8	36		145				
			9	SS9	100		144				
			10	SS10	100		143				
141.1 / 10.7	-----Run #1: 10.7 to 11.2 m RQD=81% Recovery=84% - red shale, interbedded grey shale - fractive along horizontal plane - minimal vertical cracking		1	CORE			142				
140.6 / 11.2	-----Run #2: 11.2 to 12.6 m RQD=92% Recovery=100% - red shale, interbedded grey shale - minimal vertical fractures		2	CORE			141				
139.1 / 12.6	**Borehole terminated at 12.6 m** Notes: 1. Open to 12.6 m upon completion of drilling 2. Water at 3.2 m upon completion of drilling 3. Water level at 3.0 m bgs on June 13, 2018 4. Water level at 4.2 m bgs on December 2, 2019.						140				

$+^3, \times^3$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW3

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY A.B.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.22 - 2018.05.22 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE
151.1							151
150.9 / 0.2	**TOPSOIL:** 150 mm						
	FILL: clayey silt, trace gravel, rootlets, asphalt fragments, brown, moist		1	SS1	11		
149.9			2	SS2	7		150
1.2	**CLAYEY SILT TILL:** trace gravel, mottled, brown, moist, firm to very stiff, (Pocket Penetrometer: 225 kPa) - mottled, red shale inclusions and very stiff to hard below 1.5 m		3	SS3	27		
			4	SS4	33		149
148.1							
3.1	**CLAYEY SILT TILL:** trace gravel, mottled, red shale inclusion, orange-brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		5	SS5	65	▽	148
	- oxidized red and grey at 4.6		6	SS6	60		147
144.8	- Till/Shale Complex below 6.1 m		7	SS7	100		146
6.3	**SHALE:** weathered, red, damp						145
			8	SS8	100		144
142.0							143
9.1 / 141.5	-----Run #1: 9.1 to 9.6 m RQD=22% Recovery=77% - weathered red shale - some mottling - vertical and horizontal fractures		1	CORE			142
9.6	-----Run #2: 11.2 to 12.6 m RQD=92% Recovery=100% - red shale, interbedded grey shale - minimal vertical fractures		2	CORE			141
140.0							140
11.2	**Borehole terminated at 11.2 m** Notes: 1. Open to 11.2 m bgs upon completion of drilling 2. Water at 2.5 m bgs upon completion of drilling 3. Water level at 2.7 m bgs on June 13, 2018. 4. Water level at 3.495 m bgs on December 2, 2019.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH kPa (20 40 60 80 100)
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%) (20 40 60)

UNIT WEIGHT γ kN/m^3

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW4

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.23 - 2018.05.23 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.3											
151.2 / 0.1	**TOPSOIL:** 125 mm		1	SS1	10		151		○		
	FILL: clayey silt, trace gravel, brown, moist										
	- mottled, inclusions of black organics, orange-brown at 0.8 m		2	SS2	6				○		
149.8							150				
1.5	**CLAYEY SILT TILL:** trace gravel, mottled, reddish brown, moist, very stiff to hard, (Pocket Penetrometer: > 225 kPa)		3	SS3	24				○		
			4	SS4	43		149		○		
			5	SS5	51	▽	148		○		
146.8											
4.6	**CLAYEY SILT TILL:** trace gravel, red shale inclusion, oxidized fissures, brown/reddish brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		6	SS6	49		147		○		
	- grey and very stiff to hard at 6.1 m. (Pocket Penetrometer: > 225 kPa)		7	SS7	25		146				
143.7							145		○		
143.6 / 7.6	**SHALE:** weathered, red, damp **Borehole terminated at 7.6 m**		8	SS8	100		144		○		

Notes:
1. Water at 3.0 m bgs upon completion of drilling
2. Open to 7.6 m bgs upon completion of drilling
3. Water level at 2.6 m bgs on June 13, 2018.
4. Water level at 3.295 m bgs on December 2, 2019.

$+^3, \times^3$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH5

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.23 - 2018.05.23 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.2											
151.0 / 0.1	**TOPSOIL:** 125 mm										
	FILL: clayey silt, trace gravel, top soil inclusion, brown, moist		1	SS1	3		151		○		
150.2	- 125 mm granular fill at 0.8 m										
0.9	**CLAYEY SILT TILL:** trace gravel, reddish brown, moist, very stiff to hard, (Pocket Penetrometer: > 225 kPa)		2	SS2	26		150		○		
			3	SS3	44				○		
148.9							149				
2.3	**CLAYEY SILT TILL:** trace gravel, red shale inclusion, reddish brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		4	SS4	54				○		
			5	SS5	54		148		○		
							147				
			6	SS6	42				○		
							146				
	- grey and very stiff below 6.1 m (Pocket Penetrometer 175 kPa)		7	SS7	18		145		○		
143.5							144				
7.6 / 143.3	**SHALE:** weathered, red, damp		8	SS8	100				○		
7.9	**Borehole terminated at 7.9 m** Notes: 1. Open to 7.9 m bgs upon completion of drilling 2. Water not measured upon completion of drilling										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW6

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.24 - 2018.05.24 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.3											
~~150.9~~ 0.1	**TOPSOIL:** 125 mm										
	POSSIBLE FILL: clayey silt, trace gravel, rootlets, organic stains, reddish brown, moist		1	SS1	6		151				
150.6											
0.8	**CLAYEY SILT TILL:** trace gravel, shale inclusion, reddish brown, moist, very stiff to hard (Pocket Penetrometer: > 225 kPa)		2	SS2	28		150				
			3	SS3	26	▽					
	- hard below 2.3 m		4	SS4	31		149				
			5	SS5	43		148				
146.7							147				
4.6	**CLAYEY SILT TILL:** trace gravel, red shale inclusions, brown, moist, very stiff to hard, (Pocket Penetrometer: > 225 kPa) - grey below 5.0 m		6	SS6	29		146				
			7	SS7	15		145				
143.7							144				
~~143.6~~ 7.7	**SHALE:** weathered, red, damp		8	SS8	100						
143.2	-----Run #1: 7.7 to 8.1 m RQD=40% Recovery=78% - weathered red shale, interbedded grey shale - one vertical fracture		1	CORE			143				
8.1	-----Run #2: 8.1 to 9.6 m RQD=94% Recovery=98% - red shale, interbedded grey shale - minimal vertical fractures - some horizontal fractures along planes - some interbedded clayey silt at 9.1 m		2	CORE			142				
141.7											
9.6	**Borehole terminated at 9.6 m**										

Notes:
1. Open to 9.6 m bgs upon completion of drilling
2. Water at 1.09 m bgs upon completion of drilling
3. Water level at 2.8 m bgs on June 13, 2018.
4. Water level at 2.01 m bgs on December 2, 2019.

$+^3, \times^3$: Numbers refer to Sensitivity $\circ^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW7

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1280 Dundas Street West, Oakville, ON | ORIGINATED BY F.C.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.D.

PROJ. NAME Geo/HG/PII Investigations | DATE 2018.05.24 - 2018.05.24 | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.9											
150.8	**TOPSOIL:** 100 mm										
0.1	**POSSIBLE FILL:** clayey silt, reworked and distributed, trace rootlets and organic staining, brown, moist		1	SS1	3	▽			○		
150.1											
0.8	**CLAYEY SILT TILL:** trace gravel, shale inclusions, reddish brown, moist, stiff to very stiff, (Pocket Penetrometer: > 225 kPa)		2	SS2	26		150		○		
	- very stiff below 1.5 m		3	SS3	44		149		○		
	- hard below 2.3 m		4	SS4	54		148		○		
			5	SS5	54		147		○		
146.3											
4.6	**CLAYEY SILT TILL:** red shale inclusions, reddish brown, moist, hard, (Pocket Penetrometer: > 225 kPa)		6	SS6	42		146		○		
144.8							145				
144.7	**SHALE:** weathered, red, damp		7	SS7	18						
6.2	**Borehole terminated at 6.2 m**								○		

Notes:
1. Open to 6.2 m bgs upon completion of drilling
2. Water not measured completion of drilling
3. Water level at 2.0 m bgs on June 13, 2018.
4. Water level at 0.63 m bgs on December 2, 2019.

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH/MW103

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.13 - 2019.11.13 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
151.6								20 40 60 80 100	20 40 60		
151.5 / 0.1	**TOPSOIL:** 125 mm										
	CLAYEY SILT TILL/SILTY CLAY TILL: disturbed upper 300 mm, brown, moist, very stiff to hard		1	SS1	6		151		○		
			2	SS2	19						
			3	SS3	36		150		○		
	- reddish brown, shale inclusions below 2.29 m		4	SS4	46		149		○		
148.6											
3.0 / 148.1	**SHALE:** weathered, red, damp		5	SS5	100				○		
3.5	**Borehole terminated at 3.5 m**										

Notes:
1. Open to 3.5 m bgs upon completion of drilling.
2. Dry upon completion of drilling.
3. Water level was at 3.32 m bgs November 25, 2019.
4. Water level was as 3.09 m bgs on December 2, 2019.

$+^3, \times^3$: Numbers refer to Sensitivity $○^{3\%}$ STRAIN AT FAILURE

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RECORD OF BOREHOLE No BH104

1 OF 1 **METRIC**

PROJ. NO. BIGC-ENV-185C | LOCATION 1260 Dundas Street West, Oakville, ON | ORIGINATED BY F.G.

DATUM Geodetic | BOREHOLE TYPE Continuous flight solid stem auger, split spoon samples and augered core samples | COMPILED BY F.C.

PROJ. NAME Geo/HG/PII Investigations | DATE 2019.11.13 - 2019.11.13 | CHECKED BY F.C.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
150.6											
150.6 / 0.0	**TOPSOIL:** 50 mm										
150.4 / 0.2	**FILL:** clayey silt to silty clay, trace organic staining, brown, moist		1	SS1	7		150				Metals & Inorganics, Pesticides, Herbicides Analysis PAHs Analysis
			2	SS2	8						
149.1 / 1.5	**CLAYEY SILT TILL/SILTY CLAY TILL:** reddish brown, moist, stiff to hard (Pocket Penetrometer: > 225 kPa)		3	SS3	26		149				
			4	SS4	59		148				
147.7 / 2.9	-weathered shale inclusion below 2.7 m										
	SHALE: highly weathered, red, damp		5	SS5	100		147				
146.9 / 3.7	**Borehole terminated at 3.7 m** Notes: 1. Open to 3.7 m bgs upon completion of drilling. 2. Dry upon completion of drilling.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

Appendix C – Record of Boreholes (2021)

NOTES TO RECORD OF BOREHOLES

DRILLING METHOD		SAMPLE TYPE		LABORATORT DATA	
SSA	Solid Stem Auger	SS	Split Spoon	W	Water Content
HSA	Hollow Stem Auger	AS	Auger Flight Sample	W_p	Plastic Limit
WB	Wash Boring	TW	Thin Wall Open	W_l	Liquid Limit
RM	Rotary Mud Drilling	TP	Thin Wall Piston	γ	Natural Unit Weight (kN/m^3)
		WS	Washed Sample	C_u	Undrained Shear Strength (kPa)
		VT	Vane Test	PP	Pocket Penetrometer
		GS	Grab Sample	UC	Unconfined Compression
		RC	Rock Core	UU	Unconsolidated Undrained
		PH	Sample Advanced Hydraulically	CU	Consolidated Undrained
		PM	Sample Advanced Manually	CD	Consolidated Drained
		CC	Continuous Core	TOV	Total Organic Vapors

STANDARD PENETRATION TEST (SPT 'N'): The number of blows required to advance a standard 51 mm outer diameter split spoon sampler to penetrate 0.3 m distance into the undisturbed ground in a borehole driven by means of a 63.5 kg hammer falling freely from a distance of 0.76m.

DYNAMIC CONE PENETRATION TEST (DCPT): The number of blows required to advance a 51 mm diameter – 60 degree cone fitted to the end of the drill rods to penetrate 0.3 m distance into the undisturbed ground driven by 475 Joules driving energy per blow.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR RELATIVE DENSITY

CONSISTENCY: Cohesive soils are described on the basis of their undrained shear strength (Cu) or 'N' values as follows:

N (blows/0.3m)	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	>30
Consistency	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
Cu (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200

RELATIVE DENSITY: Cohesionless soils are described on the basis of their relative density as indicated by 'N' values as follows:

N (blows/0.3m)	0 - 4	4 - 10	10 - 30	30 - 50	>50
Relative Density	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH

RECOVERY: Sum of the lengths of all recovered rock core pieces divided by the total length of the core run (expressed as a percent).

ROCK QUALITY DESIGNATION (RQD): Sum of the lengths of intact rock core pieces, 100 mm or more in lengths, divided by the total length of the core run (expressed as a percent). Classifications of a rock based on the RQD value are as follows:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
Quality	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

JOINTING AND BEDDING:

SPACING	50 Millimeters	50 - 300 Millimeters	0.3 – 1.0 Metres	1.0 – 3.0 Metres	> 3.0 Metres
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

RECORD OF BOREHOLE No. BH/MW201

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	96 mm Mud Rotary/ HQ Core	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	16 Sep 21	Date Completed: 21 Sep 21	Revision No.: 0, 4/11/21

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	INSTRUMENTATION INSTALLATION	COMMENTS
	Geodetic Ground Surface Elevation: 151.71 m										
	TOPSOIL: 50 mm with grass cover 151.66	SS	1	79	8	0	151				
	FILL: clayey silt / silty clay, reddish brown, damp 151.06										
	CLAYEY SILT TO SILTY CLAY TILL: reddish brown, dry to damp	SS	2	92	16	1					
	shale fragments below 1.20 m	SS	3	54	60	2	150				
	trace gravel, damp, stiff below 2.29 m	SS	4	84	11	3	149				
		SS	5	100	47	4	148				
	some oxidised fissures below 4.57 m	SS	6	100	36	5	147				
	grey, moist below 6.10 m	SS	7	100	21	6	146				
	144.09					7	145				
	TILL/SHALE COMPLEX: reddish brown, dry to damp 144.06 7.7	SS	8	50	50/10	8	144				
	SHALE BEDROCK: highly weathered, reddish brown to pale grey, dry	RC	1	97	71	9	143				
	ROCK CORE BEGINS										
	Fair Quality					10	142				
	clay seam from 9.45 to 9.75 m	RC	2	97	57						
	Fair Quality					11	141				
	highly weathered clay seam from 10.56 to 10.75 m	RC	3	99	95	12	140				
	Excellent Quality										
	Excellent Quality	RC	4	100	95	13	139				
	Excellent Quality	RC	5	99	92	14	138				
	highly fractured zones from 15.56 to 15.64 m and 15.7 to 15.78 m	RC	6	99	93	15	137				
	Excellent Quality					16	136				
	Excellent Quality	RC	7	99	93	17	135				
	132.96					18	134				
	End of Borehole 18.75 m 18.8						133				

Notes:
1. Borehole open completion of drilling.
2.Groundwater level reading not measured upon completion of drilling due to introduced drilling water.
3.Groundwater level reading 2.25 m on September 30, 2021.

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Groundwater depth on completion of drilling: Drilling Water m.

Groundwater depth observed on 30/09/2021 at a depth of: 2.25 m.

Cave in depth recorded on completion of drilling: Open m.

RECORD OF BOREHOLE No. BH/MW202

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	96 mm Mud Rotary/ HQ Core	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	21 Sep 21	Date Completed: 22 Sep 21	Revision No.: 0, 4/11/21

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)
	Geodetic Ground Surface Elevation: 151.18 m						
	TOPSOIL: 85 mm with grass cover 151.09	SS	1	16	16	0	151
	CLAYEY SILT TO SILTY CLAY TILL: with some shale fragments, trace gravels, trace organic rootlets at top, brown to mottled brown, damp to dry, hard	SS	2	41	38	1	150
		SS	3	33	80/28	2	149
		SS	4	70	41	3	148
		SS	5	100	57	4	147
	damp to moist below 4.57 m	SS	6	67	59	5	146
	144.63	SS	7	1020	52/5	6	145
	TILL/SHALE COMPLEX: reddish brown, damp to dry 6.6 143.52					7	144
	SHALE BEDROCK: highly weathered, reddish brown to pale grey, moist 7.7	SS	8	8	50	8	143
	ROCK CORE BEGINS at 8.99 m	RC	1	91	10	9	142
	Very Poor Quality very soft clay zones zones from 9.14 to 9.39 m	RC	2	100	68	10	141
	Fair Quality					11	140
	Fair Quality	RC	3	100	84	12	139
	Excellent Quality	RC	4	100	93	13	138
	Excellent Quality	RC	5	100	92	14	137
	Excellent Quality	RC	6	100	100	15	136
	Excellent Quality	RC	7	100	100	16	135
	Poor Quality 131.37	RC	8	99	44	17	134
	End of Borehole 19.81 m 19.8					18	133
						19	132

Notes:
1. Borehole open completion of drilling.
2.Groundwater level reading not measured upon completion of drilling due to introduced drilling water.
3.Groundwater level reading 5.19m on September 30, 2021.

FIELD TESTING

Penetration Testing: ○ SPT ● DCPT

MTO Vane*: △ Intact ▲ Remould

Nilcon Vane*: ◇ Intact ◆ Remould

* Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING

★ Rinse pH Values 2 4 6 8 10 12

Soil Vapour Reading △ parts per million (ppm) 100 200 300 400

▲ Lower Explosive Limit (LEL) W_P W W_L

Plastic Liquid 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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F: 416-551-2633

▽ Groundwater depth on completion of drilling: Drilling Water m.

▼ Groundwater depth observed on 30/09/2021 at a depth of: 5.19 m.

Cave in depth recorded on completion of drilling: Open m.

Scale: 1 : 121

RECORD OF BOREHOLE No. BH/MW203

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	150 mm Solid Stem Augering	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	17 Sep 21	Date Completed: 17 Sep 21	Revision No.: 0, 4/11/21

Geodetic Ground Surface Elevation: 150.81 m

Lithology Plot	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	DEPTH (m)	ELEVATION (m)	FIELD TESTING: Penetration Testing (SPT ○ / DCPT ●); MTO Vane* (Intact △ / Remould ▲); Nilcon Vane* (Intact ◇ / Remould ◆); * Undrained Shear Strength (kPa) 20 40 60 80	LAB TESTING: ★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL) W_P W W_L Plastic Liquid 20 40 60 80	INSTRUMENTATION INSTALLATION	COMMENTS
	TOPSOIL: 80mm with grass cover 150.73 0.1										
	FILL: silty clay to clayey silt, possibly reworked, mottled brown, damp	SS	1	33	6						
	149.29	SS	2	95	14	1	150				
	CLAYEY SILT TO SILTY CLAY TILL: trace gravel, some sandy fissures, greyish brown, dry to damp, hard 1.5	SS	3	95	30	2	149				
	147.46	SS	4	95	39	3	148				
	TILL/SHALE COMPLEX: highly weathered, reddish brown, dry 3.4	SS	5	67	70	4	147				
	146.54										
	SHALE BEDROCK: highly weathered, reddish brown, dry 4.3	SS	6	100	50/5	5	146	50/5	16, 13, 13, 13, 11		
	144.66	SS	7	100	50/5	6	145				
	End of Borehole 6.15m 6.2										

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level reading at 3.66 m bgl upon completion of drilling
3.Groundwater level reading 3.97 m bgl on September 30, 2021.

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▽ Groundwater depth on completion of drilling: Dry m.

▼ Groundwater depth observed on 30/09/2021 at a depth of: 3.97 m.

Cave in depth recorded on completion of drilling: Open m.

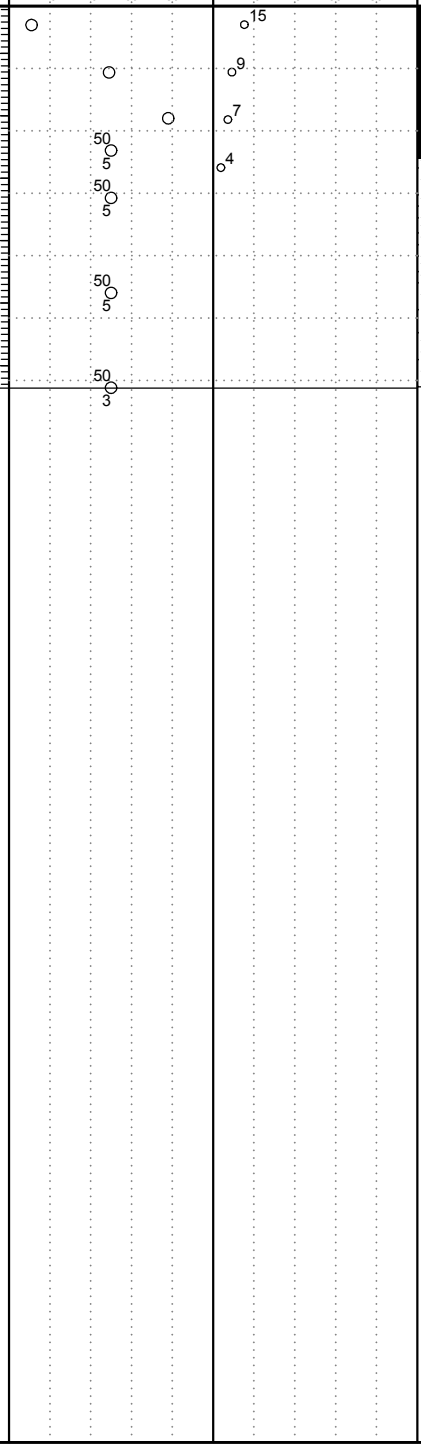
RECORD OF BOREHOLE No. BH/MW204

Project Number:	**BIGC-GEO-185E**	Drilling Location:	**See Borehole Location Plan**	Logged by:	**MV**
Project Client:	**Delmanor West Oak Inc.**	Drilling Method:	**150 mm Solid Stem Augering**	Compiled by:	**MV**
Project Name:	**Geotechnical and Hydrogeological Assessment Update**	Drilling Machine:	**Track Mounted Drill**	Reviewed by:	**OL**
Project Location:	**1280 Dundas Street, Oakville**	Date Started:	**20 Sep 21** Date Completed: **20 Sep 21**	Revision No.:	**0, 4/11/21**

Geodetic Ground Surface Elevation: 150.76 m

DESCRIPTION	Elevation	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
TOPSOIL: 120 mm with grass cover	150.64	0.1	SS	1	59	11
FILL: silty clay to clayey silt, possibly reworked, mottled brown, damp	150.00	0.8	SS	2	100	49
CLAYEY SILT TO SILTY CLAY TILL: trace gravel, reddish brown, hard	149.24	1.5	SS	3	73	78
TILL/SHALE COMPLEX: highly weathered, reddish brown, dry	148.47	2.3	SS	4	100	50/5
SHALE BEDROCK: highly weathered, reddish brown, damp			SS	5	60	50/5
			SS	6	60	50/5
First water strike	144.61	6.2	SS	7	100	50/3
moist to wet below 6.1m						
End of Borehole 6.12m						

Notes:
1. Borehole open upon completion of drilling.
2. Groundwater level reading at 3.66 m bgl upon completion of drilling
3.Groundwater level reading 2.14 bgl on September 30, 2021.



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Groundwater depth on completion of drilling: 3.66 m.

Cave in depth recorded on completion of drilling: Open m.

Groundwater depth observed on 30/09/2021 at a depth of: 2.14 m.

Scale: 1 : 121

RECORD OF BOREHOLE No. BH/MW205

Project Number:	**BIGC-GEO-185E**	Drilling Location:	**See Borehole Location Plan**	Logged by:	**MV**
Project Client:	**Delmanor West Oak Inc.**	Drilling Method:	**150 mm Solid Stem Augers**	Compiled by:	**MV**
Project Name:	**Geotechnical and Hydrogeological Assessment Update**	Drilling Machine:	**Track Mounted Drill**	Reviewed by:	**OL**
Project Location:	**1280 Dundas Street, Oakville**	Date Started:	**20 Sep 21** Date Completed: **20 Sep 21**	Revision No.:	**0, 4/11/21**

Geodetic Ground Surface Elevation: 150.79 m

DESCRIPTION	Elevation	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%	Undrained Shear Strength (kPa)	Soil Vapour Reading (ppm)	Lower Explosive Limit (LEL)
TOPSOIL: 100 mm with grass cover	150.69	0.1							
FILL: silty clay to clayey silt, trace gravel, trace organic rootlets, possibly reworked, brown, damp	150.03	0.8	SS	1	75	12	50	20	
CLAYEY SILT TO SILTY CLAY TILL: trace sand and gravel, mottled brown, damp	149.42	1.4	SS	2	100	43	50	11	
TILL/SHALE COMPLEX: highly weathered, reddish brown, dry	149.27	1.5	SS	3	16	50/10	50	7	
SHALE BEDROCK: highly weathered, reddish brown, dry to damp			SS	4	8	50/8	50		
			SS	5	8	50/5	50		
First water strike		4.57	SS	6	5	50/5	50		
moist to wet below 4.57m	144.64	6.2	SS	7	60	50/5	50		
End of Borehole 6.15m									

Notes:
1. Borehole open to 5.94 m upon completion of drilling.
2. Groundwater level reading at 5.57 m bgl upon completion of drilling
3.Groundwater level reading 1.96 m bgl on September 30, 2021.

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Groundwater depth on completion of drilling: 4.57 m.

Cave in depth recorded on completion of drilling: 5.94 m.

Groundwater depth observed on 30/09/2021 at a depth of: 1.96 m.

RECORD OF BOREHOLE No. BH/MW206

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	100 mm Solid Stem Augering	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	17 Sep 21	Date Completed: 17 Sep 21	Revision No.: 0, 4/11/21

Geodetic Ground Surface Elevation: 150.85 m

Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
0	150.70	**TOPSOIL:** 150 mm with grass cover	SS	1	25	9
0.2		**FILL:** silty clay to clayey silt, possibly reworked, brown, damp				
	149.63		SS	2	100	11
1.22	149.13	**CLAYEY SILT TO SILTY CLAY TILL:** trace gravel, some sandy and oxideised fissures, brown, damp, hard	SS	3	89	50/13
1.7		**TILL/SHALE COMPLEX:** highly weathered, reddish brown, dry	SS	4	100	50/5
		SHALE BEDROCK: highly weathered, reddish brown, dry	SS	5	100	50/5
			SS	6	100	50/5
	144.70	First water strike	SS	7	100	50/5
6.2		moist to wet below 6.1m				
		End of Borehole 6.15m				

Notes:
1. Borehole open to 5.94 m upon completion of drilling.
2. Groundwater level reading at 5.64 m bgl upon completion of drilling
3.Groundwater level reading 2.30 m bgl on September 30, 2021.

FIELD TESTING: Penetration Testing (SPT, DCPT); MTO Vane* (Intact, Remould); Nilcon Vane* (Intact, Remould); * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading, parts per million (ppm) 100 200 300 400; Lower Explosive Limit (LEL) W_P W W_L; Plastic Liquid 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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Groundwater depth on completion of drilling: 5.64 m.

Cave in depth recorded on completion of drilling: 5.94 m.

Groundwater depth observed on 30/09/2021 at a depth of: 2.3 m.

RECORD OF BOREHOLE No. BH/MW207

Project Number:	**BIGC-GEO-185E**	Drilling Location:	**See Borehole Location Plan**	Logged by:	**MV**
Project Client:	**Delmanor West Oak Inc.**	Drilling Method:	**150 mm Solid Stem Augering**	Compiled by:	**MV**
Project Name:	**Geotechnical and Hydrogeological Assessment Update**	Drilling Machine:	**Track Mounted Drill**	Reviewed by:	**OL**
Project Location:	**1280 Dundas Street, Oakville**	Date Started:	**17 Sep 21** Date Completed: **17 Sep 21**	Revision No.:	**0, 4/11/21**

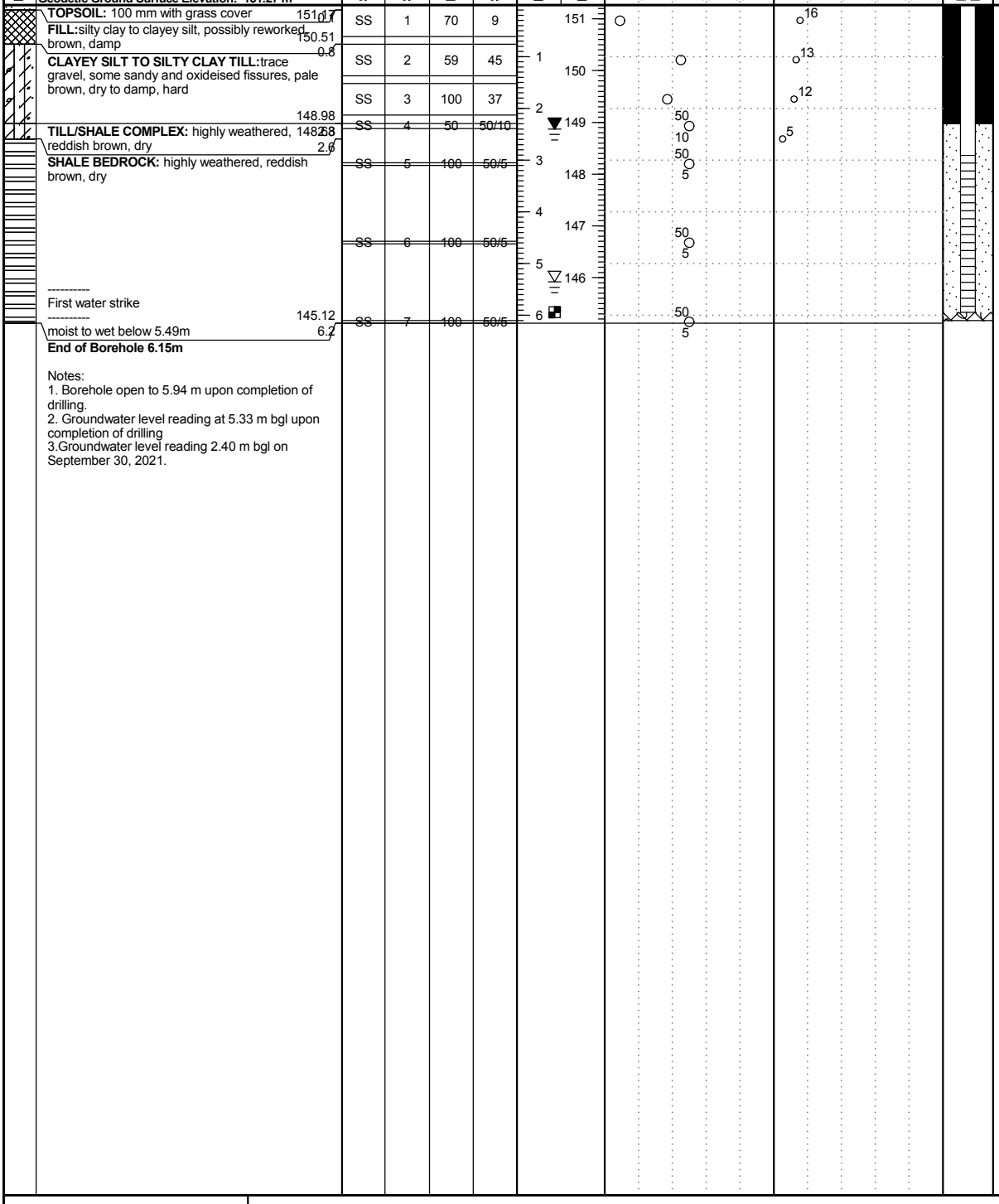
Geodetic Ground Surface Elevation: 151.27 m

DESCRIPTION	Elevation	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
TOPSOIL: 100 mm with grass cover	151.17	0.1	SS	1	70	9
FILL: silty clay to clayey silt, possibly reworked, brown, damp	150.51	0.8	SS	2	59	45
CLAYEY SILT TO SILTY CLAY TILL: trace gravel, some sandy and oxideised fissures, pale brown, dry to damp, hard			SS	3	100	37
	148.98	2.3	SS	4	50	50/10
TILL/SHALE COMPLEX: highly weathered, reddish brown, dry	148.8	2.6	SS	5	100	50/5
SHALE BEDROCK: highly weathered, reddish brown, dry			SS	6	100	50/5
---------- First water strike ----------	145.12	6.2	SS	7	100	50/5
moist to wet below 5.49m						
End of Borehole 6.15m						

Notes:
1. Borehole open to 5.94 m upon completion of drilling.
2. Groundwater level reading at 5.33 m bgl upon completion of drilling
3.Groundwater level reading 2.40 m bgl on September 30, 2021.

FIELD TESTING
Penetration Testing: ○ SPT ● DCPT
MTO Vane*: △ Intact ▲ Remould
Nilcon Vane*: ◇ Intact ◆ Remould
* Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING
★ Rinse pH Values 2 4 6 8 10 12
Soil Vapour Reading △ parts per million (ppm) 100 200 300 400
▲ Lower Explosive Limit (LEL) W_P W W_L
Plastic Liquid 20 40 60 80



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▽ Groundwater depth on completion of drilling: 5.33 m.
▼ Groundwater depth observed on 30/09/2021 at a depth of: 2.4 m.
■ Cave in depth recorded on completion of drilling: 5.94 m.

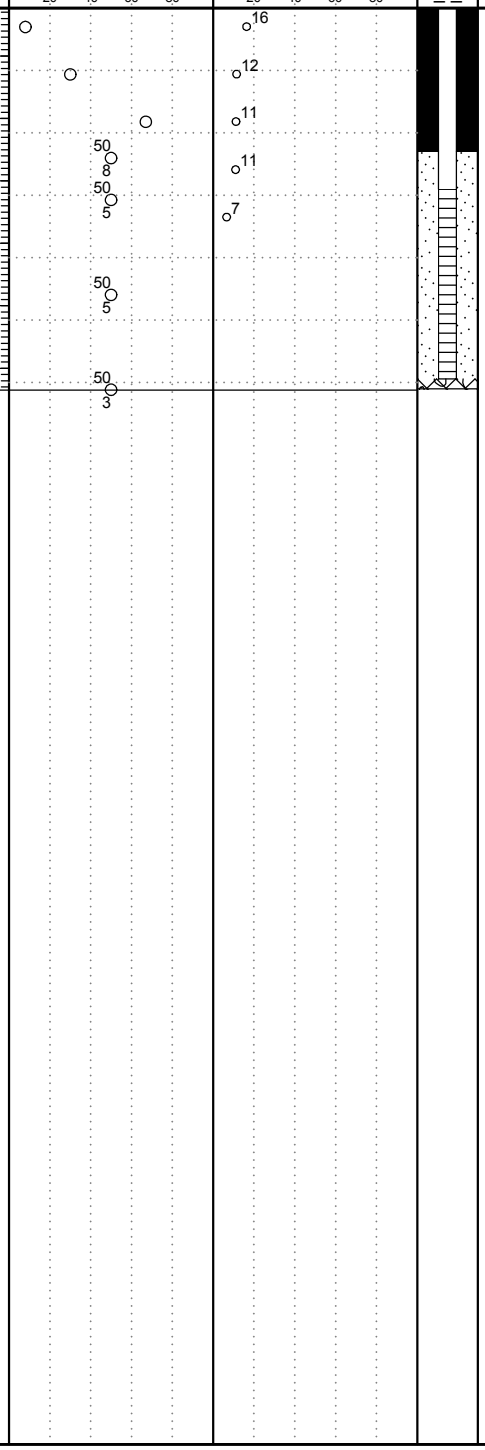
RECORD OF BOREHOLE No. BH/MW208

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	100 mm Solid Stem Augering	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	17 Sep 21	Date Completed: 17 Sep 21	Revision No.: 0, 4/11/21

Geodetic Ground Surface Elevation: 151.77 m

DESCRIPTION	Elevation	Depth	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
TOPSOIL: 180 mm with grass cover	151.59	0.2	SS	1	67	8
FILL: silty clay to clayey silt, possibly reworked, pale brown, damp	151.01	0.8	SS	2	95	30
CLAYEY SILT TO SILTY CLAY TILL: trace gravel, some shale fragments, reddish brown, dry to damp, hard			SS	3	70	67
Pale grey below 1.52 m	149.48	2.3	SS	4	100	50/8
TILL/SHALE COMPLEX: highly weathered, reddish brown, dry	149.33	2.4	SS	5	100	50/5
SHALE BEDROCK: highly weathered, reddish brown, dry			SS	6	100	50/5
First water strike	145.62	6.2	SS	7	100	50/3
moist to wet below 6.1m						
End of Borehole 6.12m						

Notes:
1. Borehole open to 5.94 m upon completion of drilling.
2. Dry upon completion of drilling
3.Groundwater level reading 5.54 m bgl on September 30, 2021.



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Groundwater depth on completion of drilling: Dry m.

Cave in depth recorded on completion of drilling: 5.94 m.

Groundwater depth observed on 30/09/2021 at a depth of: 5.54 m.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commisioned and the accompanying'Notes to Record of Boreholes'.

Scale: 1 : 121

RECORD OF BOREHOLE No. BH/MW209

Project Number:	BIGC-GEO-185E	Drilling Location:	See Borehole Location Plan	Logged by:	MV
Project Client:	Delmanor West Oak Inc.	Drilling Method:	96 mm Mud Rotary/ HQ Core	Compiled by:	MV
Project Name:	Geotechnical and Hydrogeological Assessment Update	Drilling Machine:	Track Mounted Drill	Reviewed by:	OL
Project Location:	1280 Dundas Street, Oakville	Date Started:	22 Sep 21	Date Completed: 23 Sep 21	Revision No.: 0, 4/11/21

Geodetic Ground Surface Elevation: 150.93 m

Depth (m)	Elevation (m)	Description	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value/RQD%
0	150.93	**TOPSOIL:** 85 mm with grass cover	SS	1	79	14
	150.17	**POSSIBLE FILL:** trace gravel, trace rootlets, mottled brown, damp				
0.8		**CLAYEY SILT TO SILTY CLAY TILL:** with some shale fragments, trace gravels, trace organic rootlets at top, brown to mottled brown, damp to dry, hard	SS	2	75	8
1	150		SS	3	84	18
2	149		SS	4	100	27
3	148		SS	5	95	38
	147.42					
3.5		**TILL/SHALE COMPLEX:** reddish brown, damp to dry	SS	6	63	50/8
4	147					
5	146					
			SS	7	60	50/5
6	145					
7	144					
	143.31		SS	8	100	50/3
7.6		**SHALE BEDROCK:** highly weathered, reddish brown to pale grey, moist				
8	143					
9	142					
		ROCK CORE BEGINS at 9.30 m	RC	1	98	46
10	141	Poor Quality very soft clay zones zones from 9.53 - 9.75 m				
		Fair Quality very soft clay zones zones from 9.91 - 10.21 m	RC	2	91	59
11	140					
12	139	Excellent Quality	RC	3	107	86
13	138	Excellent Quality	RC	4	97	87
14	137					
15	136	Excellent Quality	RC	5	101	91
16	135					
17	134	Excellent Quality	RC	6	101	97
18	133	Good Quality	RC	7	86	86
19	132					
		Good Quality	RC	8	100	88
20	131					
	130.66					
20.3		**End of Borehole 20.27 m**				

Notes:
1. Borehole open completion of drilling.
2. Groundwater level reading not measured upon completion of drilling due to introduced drilling water.
3. Groundwater level reading 3.50 m bgl on September 30, 2021.

FIELD TESTING: Penetration Testing (SPT, DCPT); MTO Vane* (Intact, Remould); Nilcon Vane* (Intact, Remould); * Undrained Shear Strength (kPa) 20 40 60 80

LAB TESTING: Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading, parts per million (ppm) 100 200 300 400; Lower Explosive Limit (LEL); W_P W W_L; Plastic Liquid; 20 40 60 80

INSTRUMENTATION INSTALLATION

COMMENTS

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Groundwater depth on completion of drilling: Drilling Water m.

Cave in depth recorded on completion of drilling: Open m.

Groundwater depth observed on 30/09/2021 at a depth of: 3.50 m.

Appendix D – Geotechnical Laboratory Testing Results

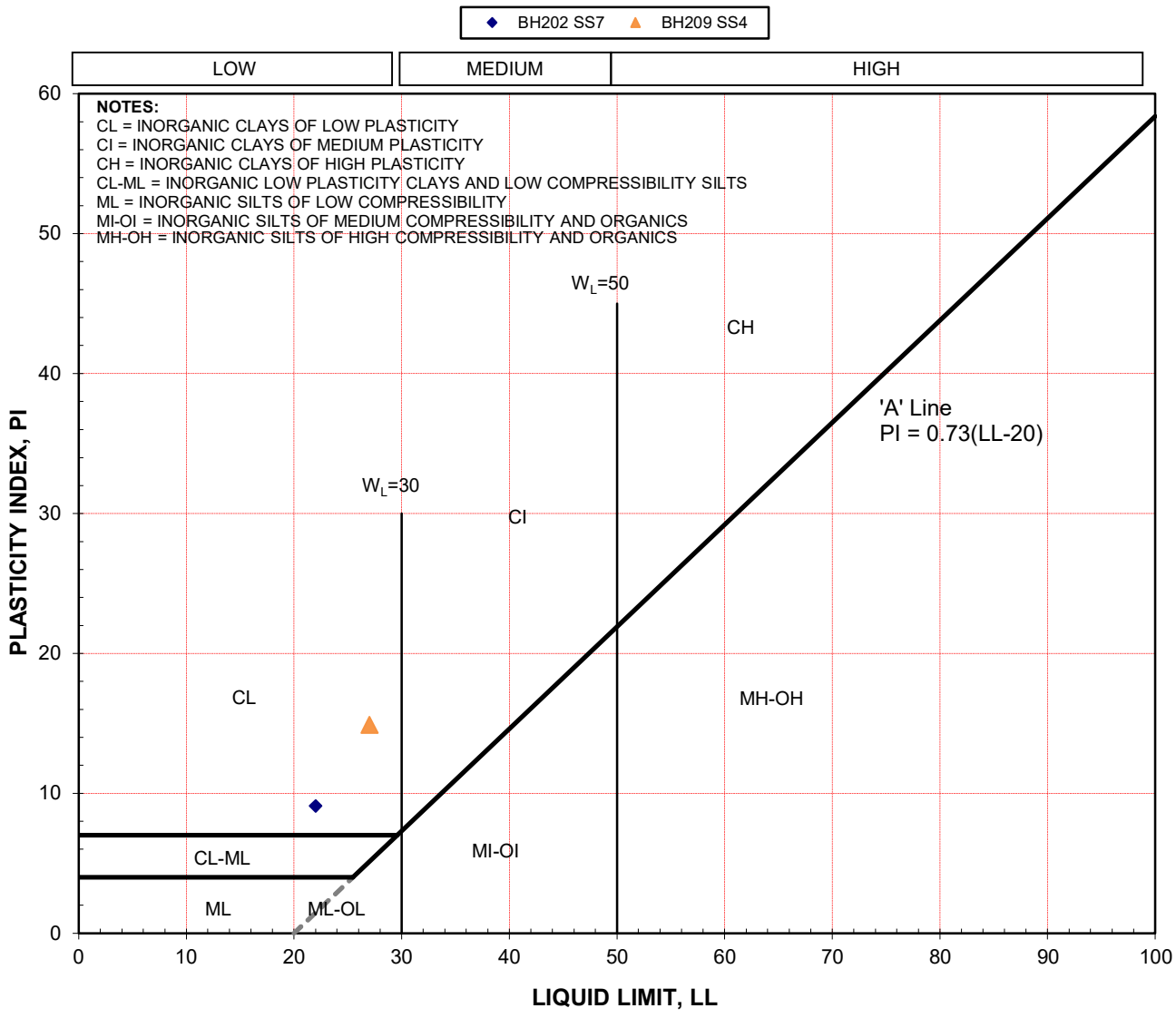
B.I.G CONSULTING INC.

PLASTICITY CHART

Job # :	BIGC-GEO-185E	**Lab #** :	40-2021
Project Client:	Delmanor West Oak Inc.	**Technician** :	SM
Project :	Geotechnical Investigation	**Supervisor** :	SS
Location :	1260 & 1280 Dundas Street West, Oakville, ON	**Date** :	10/19/2021

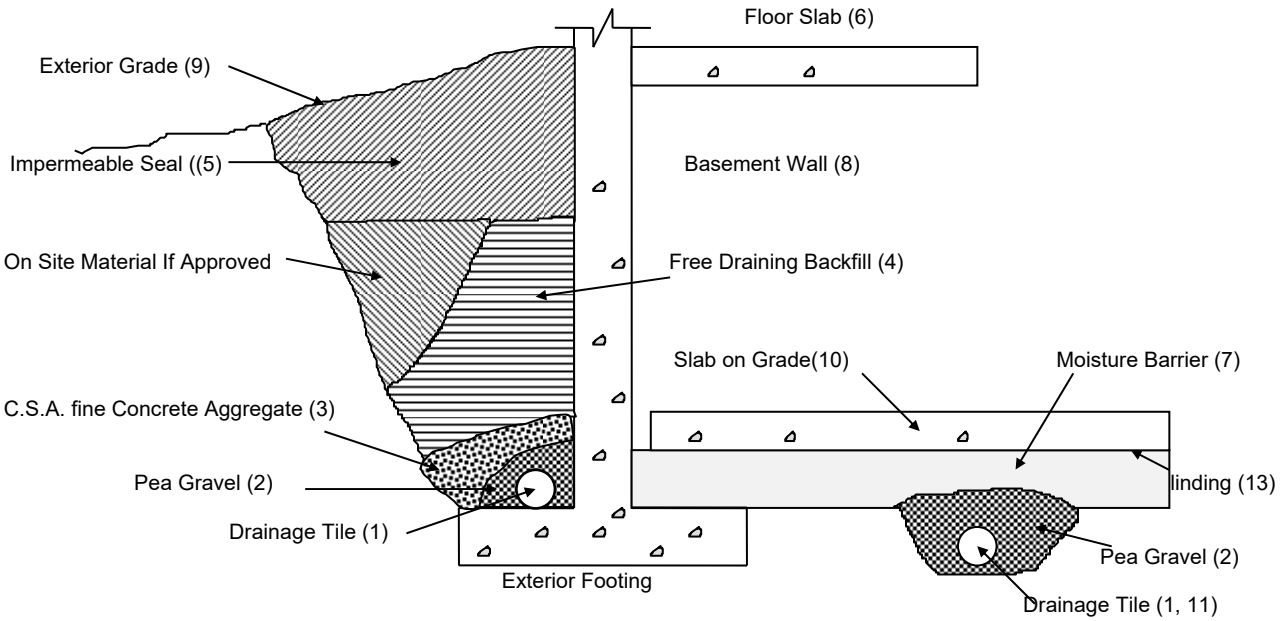
TEST RESULTS

Specimen #	Sample #	Depth (m)	LL%	PL%	PI	Fines%	W%	Classification	Remarks
BH202	SS7	6.1	22	13	9			CL	Silty CLAY TILL
BH209	SS4	2.3	27	15	12			CL	Silty CLAY TILL



Appendix E - Drainage and Backfill Recommendations

Project: BIGC-GEO-185E **Drawing No. 1**



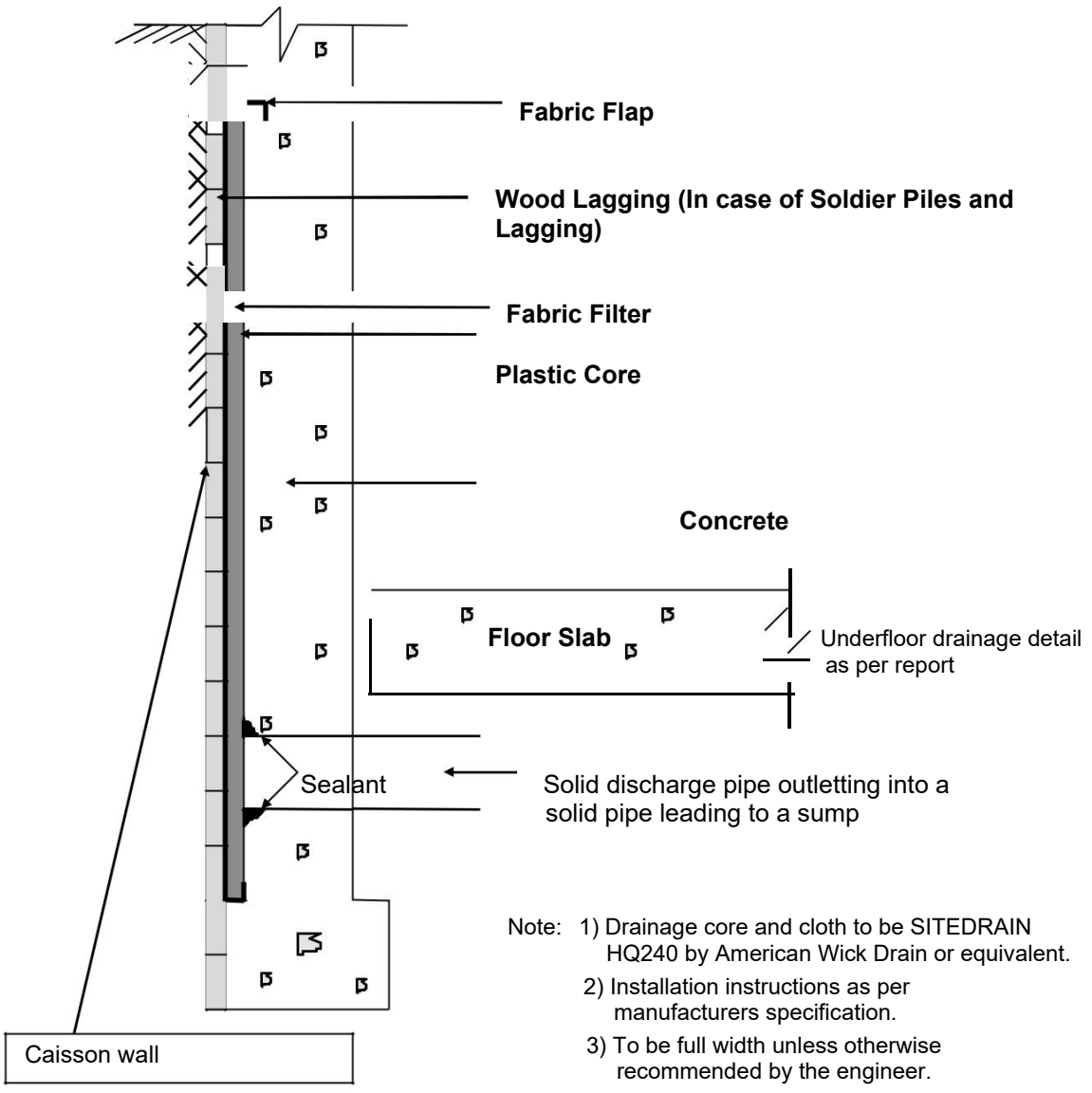
Notes

1. Drainage tile to consist of 100 mm (4”) diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6”) below underside of floor slab.
2. Pea gravel - 150 mm (6”) top and side of drain. If drain is not on footing, place 100 mm (4 inches) of pea gravel below drain. 20 mm (3/4”) clear stone is an alternative provided it is surrounded by an approved porous plastic membrane (Terrafix 270R or equivalent).
3. C.S.A. fine concrete aggregate to act as filter material. Minimum 300 mm (12”) top and side of tile drain. This may be replaced by an approved porous plastic membrane as indicated in (2).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18”) of the wall. Use hand controlled light compaction equipment within 1.8 m (6’) of wall.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8”) of compacted clear 20 mm (3/4”) stone or equivalent free draining material.
8. Basement wall to be water-proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12”) below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25’) centres one way or a minimum of one row per column bay. Place drain on 100 m (4”) pea gravel with 150 mm (6”) of pea gravel on top and sides. Provide filter material as noted in (3) if moisture barrier is not clear crushed stone.
12. Do not connect the underfloor drains to perimeter drains.
13. If the 20 mm (3/4”) stone requires surface blinding, use 6 mm (1/4”) clear stone chips.

DRAINAGE AND BACKFILL RECOMMENDATIONS

(not to scale)

Project: BIGC-GEO-185E **Drawing No. 2**



Note: 1) Drainage core and cloth to be SITEDRAIN HQ240 by American Wick Drain or equivalent.

2) Installation instructions as per manufacturers specification.

3) To be full width unless otherwise recommended by the engineer.

4) Final detail must be approved before system is considered acceptable.

5) SITEDRAIN HQ240 should be kept a minimum of 1.2 m below exterior finished grade.

SUGGESTED EXTERIOR DRAINAGE AGAINST SHORING SYSTEM