REPORT

Geotechnical Investigation

Proposed Residential Building - Adelaide Tower Extension 333 Preston Street, Ottawa, Ontario

Submitted to:

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Ottawa, Ontario
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Submitted by:

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1658054-2000 (3000)

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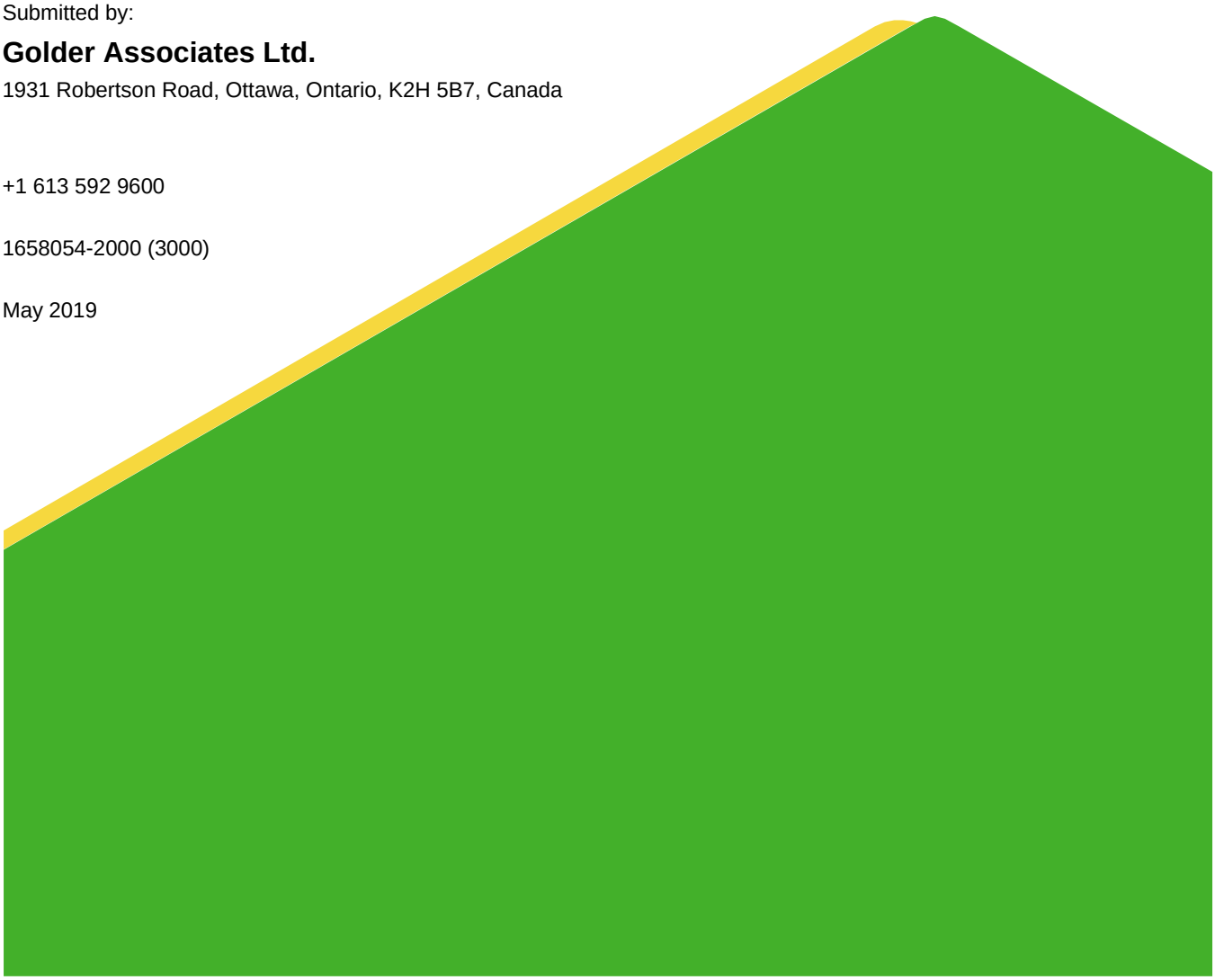

Distribution List

2 Copies - Sakto Corporation

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APPENDICES

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out for a proposed 30-storey residential building, referred to as the Adelaide Tower, which is an expansion of the existing 8-storey Adelaide apartment building located at 333 Preston Street in Ottawa, Ontario.

The purpose of this geotechnical investigation was to assess the general subsurface conditions in the area of the proposed expansion on the site by means of three boreholes, two horizontal boreholes through the wall of the existing parking garage, laboratory testing, and a review of existing subsurface information available for the site. Based on an interpretation of the factual information obtained, a general description of the subsurface conditions is presented. These interpreted subsurface conditions and available project details were used to prepare engineering guidelines on the geotechnical design aspects of the project, including construction considerations which could influence design decisions.

The reader is referred to the "Important Information and Limitations of This Report" which follows the text but forms an integral part of this document.

2.0 DESCRIPTION OF PROJECT AND SITE

Plans are being prepared for the construction of a 30-storey residential building, referred to as the Adelaide Tower Expansion, which is an addition to the existing 8-storey Adelaide apartment building located at 333 Preston Street in Ottawa, Ontario. The approximate location of the site is shown on the Key Map inset on the attached Site Plan (Figure 1).

The following is understood about the project and site:

- The overall site is a mixed-use commercial and residential development bounded to the north by Highway 417, to the west by Preston Street, to the east by Rochester Street and to the south by Aberdeen Street.
- The site is currently developed with two 11-storey office buildings, a 4-storey mixed-use building, and an 8- storey residential apartment building (The Adelaide).
- An underground parking garage currently exists beneath a large portion of the site, which connects all the existing buildings. The underground parking is 2-storey deep on the south side and 4-storey deep on the north side of the site.
- The proposed Adelaide Tower will be 30-storeys in height and will be located on the north side of the existing Adelaide building, above the existing parking garage (above portions of both the 2-storey and 4-storey underground parking garages). The proposed expansion measures about 16 metres wide by 38 metres long in plan area.
- The foundations for the proposed new building will consist of shallow spread footings bearing on the bedrock surface beneath the existing parking garage. New columns will be built within the parking garages to transfer the building loads to the new footings.

Initial geotechnical investigations have been completed at the site by others. The results of the initial investigations are provided in the following reports:

- Report by Fondex Ontario Ltd. to Sakto Development Corporation titled "*Geotechnical Investigation, Proposed Commercial Development, Tower B, 333 Preston Street, Ottawa, Ontario*" dated January 2005 (Report Number F2741); and,
- Report by Fondex Ontario Ltd. to Sakto Development Corporation titled "*Geotechnical Investigation, Proposed Residential Development, 333 Preston Street, Ottawa, Ontario*" dated January 2003 (Report Number F2232).

Based on published geological mapping and records of boreholes previously advanced at the site, the pre-development subsurface conditions at the site are indicated to consist of fill and a thin deposit of glacial till over shallow limestone bedrock. The depth to bedrock is indicated to be 2 to 5 metres. However, the fill, glacial till, and the upper portions of the bedrock were excavated to construct the existing parking garage. As such, the subsurface conditions within the footprint of the proposed building are expected to consist solely of limestone bedrock beneath the existing parking garage. The geological mapping indicates that the underlying bedrock consists of limestone of the Verulam Formation.

3.0 PROCEDURE

The fieldwork for the initial investigation was carried out on September 22 and 26, 2016. During that time, three boreholes (numbered 16-1, 16-2, and 16-2A) were put down at the approximate locations shown on the attached Site Plan (Figure 1) and Figure 2. Borehole 16-1 is located on the P4 parking level and boreholes 16-2 and 16-2A are located on the P2 parking level, which are the lowest parking levels on the north and south sides of the site, respectively.

The boreholes for the initial investigation were advanced to depths ranging from about 0.7 to 6.8 metres below the finished floor level of the existing parking garage floor slabs (either on the P2 or P4 parking level, as indicated).

Additional geotechnical investigation was carried out for the design of the new concrete shear walls (No. S7 and S8) for the proposed expansion. As part of the new Tower construction, a concrete shear wall at the P2 level (along Gridline 6 on structural drawing No. S102; See Appendix G), will need to be constructed adjacent to the existing concrete wall of the 4-storey underground parking garage of the Tower Block “A”. The purpose of the additional investigation was to assess the founding conditions for the new shear wall, which are planned to be placed either at the P2 level (i.e., below about elevation 58.0 metres) on the existing rock ledge; or at P4 level (i.e., about elevation 52.90 metres), as shown in attached Figure 3.

The fieldwork for the additional investigation was carried out between April 8 and 10, 2019. During that time, two horizontal boreholes (numbered 19-S7/P4 and 19-S8/P4) were advanced through the existing concrete wall of the parking garage at the approximate locations shown on the attached Figure 2. Boreholes 19-S7/P4 and 19-S8s/P4 were advanced on the P4 parking level, approximately at the centre lines of the proposed new shear walls, S7 and S8, respectively (See Figures 2 and 3).

All the boreholes of the initial and additional investigations were advanced using portable drilling equipment supplied and operated by CCC Geotechnical and Environmental Drilling of Ottawa, Ontario. Below the concrete floor, standard penetration tests were carried out within the granular base materials and samples of the soils encountered were recovered using split spoon sampling equipment. Upon reaching refusal to split spoon sampler advancement, the boreholes were advanced using rotary diamond drilling techniques while collecting NQ sized core. Borehole 16-2 was terminated at a depth of about 0.7 metres in a buried layer of Portland cement concrete, which was unexpected. Due to the possibility of the unexpected concrete being a buried utility, this borehole was terminated and re-drilled at a new location as borehole 16-2A. Boreholes 16-1 and 16-2A were advanced into the bedrock for drilled lengths of about 3.0 and 4.4 metres, respectively (i.e., to total depths of about 3.5 and 6.8 metres, respectively).

The boreholes for the additional investigation were advanced through the walls and into the bedrock using NQ size coring equipment.

The fieldwork was supervised by personnel from our staff who located the boreholes, directed the drilling and in situ testing operations, logged the boreholes and samples, and took custody of the soil and bedrock samples retrieved.

On completion of the drilling operations, the soil and bedrock samples were transported to our laboratory for further examination by the project engineer and for laboratory testing, which included unconfined compressive strength (UCS) testing on selected samples of the bedrock core.

The borehole locations were selected in the field in consultation with Sakto Corporation. The locations were measured relative to existing site features. The elevations of the boreholes are based on the finished floor elevations provided on the Structural Drawings for the project (i.e., 58.66 metres for P2 and 53.4 metres for P4).

4.0 SUBSURFACE CONDITIONS

4.1 General

Information on the subsurface conditions is provided as follows:

- Record of Borehole and Drillhole Sheets from the initial investigation (November 2016) are provided in Appendix A.
- Record of Borehole and Drillhole Sheets from the additional investigation (April 2019) are provided in Appendix B.
- Borehole and test pit logs from the previous investigations by others are provided in Appendix C.
- Photographs of the bedrock core from the initial and additional investigations are provided in Appendix D.
- Results of the unconfined compressive strength (UCS) testing from the initial investigation are provided in Appendix E.
- Vertical Seismic Profile (VSP) shear wave velocity testing for a nearby site on Preston Street is provided in Appendix F.
- Structural Drawing No. S102 is provided in Appendix G.

In general, the subsurface conditions at the site consist of a Portland cement concrete floor and a thin layer of granular base fill overlying limestone bedrock.

The following sections present a more detailed overview of the subsurface conditions encountered in the boreholes advanced during the additional investigation, as well as relevant information on the bedrock from initial investigations.

4.2 Portland Cement Concrete and Fill

Boreholes 16-1, 16-2, and 16-2A were advanced through the Portland cement concrete floor slabs of the existing parking garage. The thickness of the floor slabs ranges from about 100 to 410 millimetres.

The Portland cement concrete is underlain by a granular base layer consisting of sandy gravel to gravelly sand fill with a thickness that ranges from about 70 to 410 millimetres. Two standard penetration tests carried out within the fill gave SPT ‘N’ values of greater than 50 blows per 0.3 metres of penetration; however, the high blows counts represent sampler refusal on the bedrock surface or buried Portland cement concrete, rather than the state of packing of the soil matrix.

A buried layer of Portland cement concrete was encountered beneath the fill at boreholes 16-2 and 16-2A. Some grinding noted during drilling may indicate the presence of steel reinforcement within the concrete; however, steel was not recovered from the core samples to confirm its presence. Based on correspondence with a representative of Sakto Corporation, this buried layer of concrete represents a foundation for a tower crane used during previous construction on the site. The location and size of the existing crane base was assessed using Ground Penetration Radar (GPR) scanning technique. The results of the GPR scanning are presented in a separate technical memorandum.

At borehole 16-2, the buried concrete was encountered at a depth of about 0.5 metres and was not fully penetrated, but proven to a depth of about 0.7 metres below the floor slab. At borehole 16-2A, the buried concrete has a thickness of about 1.9 metres and extends to a depth of about 2.3 metres below the existing parking garage floor slab.

The existing concrete walls at P4 level were measured to be about 255 and 355 millimetres in thickness at the locations of boreholes 19-S7/P4 and 19-S8/P8, respectively.

Fill was encountered behind the concrete wall at both borehole locations. The fill consists of coarse gravels with varying amounts of sands, cobbles and boulders. The fill extended to lengths of about 1.9 metres behind the existing concrete wall surfaces.

4.3 Auger Refusal and Bedrock

Bedrock exists beneath the concrete floor and granular base materials at the boreholes advanced during the initial investigations. Bedrock was also encountered beneath the overburden in the boreholes and test pits from the previous investigations by others. However, it should be noted that the surface of the bedrock from the previous investigations was pre-development (i.e., before construction of the parking garage). The bedrock surface depths and elevations encountered in the test holes is summarized in the following table.

Borehole/Test Pit Number	Ground Surface Elevation	Bedrock Depth (metres)	Bedrock Elevation (metres)	Post or Pre-Development
16-1	58.64	0.58	58.06	Post-development
16-2A	53.46	2.34	51.12	Post-development
BH 01-79	60.65	3.65	57.00	Pre-development
TP 03-02	61.50	3.50	58.00	Pre-development
TP 06-02	61.00	4.50	56.50	Pre-development
MW 05-00	60.65	2.38	58.27	Pre-development
16-1	58.64	0.58	58.06	Post-development
16-2A	53.46	2.34	51.12	Post-development
BH 01-79	60.65	3.65	57.00	Pre-development

Bedrock exists behind the fill materials at the boreholes advanced during the additional investigation at the P4 level. The bedrock was cored to a length of about 3.0 metres behind the existing concrete wall surface.

The bedrock encountered during the initial investigation consists of slightly weathered to fresh, thinly to medium bedded, grey, fine grained limestone with black shale interbeds. The Rock Quality Designation (RQD) values measured on pieces of the bedrock core ranged from 0 to 93 percent, but more generally between 38 and 87 percent indicating poor to good quality rock. In general, the bedrock is of poor quality in the upper metre of borehole 16-1; elsewhere, the bedrock is of good quality.

Limestone bedrock was encountered behind the fill material during the additional investigation. The RQD values measured on the bedrock cores retrieved from boreholes 19-S7/P4 and 19-S8/P8 ranged from 0 to 85 percent. In general, the bedrock has a very poor quality in the first half metre, while has a fair to good quality for along the remaining lengths of the retrieved rock samples.

Photographs of the bedrock core of the initial and additional investigations are provided in Appendix D.

The results of two UCS tests carried out on samples of the bedrock core were about 96 and 214 megapascals. The results of the UCS testing are provided in Appendix E.

4.4 Groundwater

As part of the previous investigations by others, monitoring wells were sealed into boreholes MW 05-00 and MW 12-00. The groundwater levels were measured in these wells on January 24, 2002. At that time, the pre-development groundwater levels were measured to be about 3.0 and 3.2 metres below the ground surface, (i.e., about elevations 57.7 and 57.4 metres), respectively. However, construction of the parking garage (which is a drained structure) would have since lowered the groundwater table to a level that is lower than the present finished floor slab of the lowest parking level (P4), which is at or below an elevation of about 53.5 metres.

Groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

5.0 DISCUSSION

This section of the report provides engineering guidelines on the geotechnical design aspects of the project based on our interpretation of the available information described herein and project requirements. Reference should be made to the “Important Information and Limitations of this Report” which follows the text of this report but forms an integral part of this document.

The foundation engineering guidelines presented in this section have been developed in a manner consistent with the procedures outlined in Part 4 of the 2012 Ontario Building Code (OBC) for Limit States Design.

5.1 Excavations

Excavations for the proposed new footings will be through the existing concrete floor slabs of the parking garage and into the underlying granular fill. Some limited amount of bedrock removal may also be required. No unusual problems are anticipated in excavating these materials using concrete cutting techniques and small hydraulic excavators equipped with hoe-ramming equipment. If space/clearance prohibits the use of small excavators, jack hammers and manual excavation may be required.

The Occupational Health and Safety Act of Ontario requires that excavations for the soils encountered on this site be provided with side slopes no steeper than 1 horizontal to 1 vertical (1H:1V) from the bottom of the excavation (i.e., Type 3 soil). Excavations in the bedrock, if required, can likely be carried out using near-vertical side slopes. However, the exposed bedrock should be inspected by qualified geotechnical personnel at the time of excavation to confirm this assessment.

It is anticipated that the footings of the proposed Adelaide Tower Expansion will not extend below the founding elevation of the existing footings. However, if this is not the case, additional excavation guidelines will need to be provided to ensure that the integrity of the exiting footings are no compromised. Further details in this regard can be provided if and when required.

It is anticipated that the groundwater level will not be encountered for the relatively shallow excavations required for this project. However, some groundwater inflow into the excavations should still be expected. It should be possible to handle the groundwater inflow by pumping from well filtered sumps established in the floor of the excavations. Under the new regulations, a Permit-To-Take-Water (PTTW) is required from the Ministry of the Environment and Climate Change (MOECC) if a volume of water greater than 400,000 litres per day is pumped from the excavations. If the volume of water to be pumped will be less than 400,000 litres per day, but more than 50,000 litres per day, the water taking will not require a PTTW, but will need to be registered on the Environmental Activity and Sector Registry (EASR) as a prescribed activity. Since the excavations are expected to be above the groundwater level, neither a PTTW nor an EASR are likely to be required.

5.2 Foundations

In general, the subsurface conditions encountered during the initial investigation consist of up to about 0.6 to 2.3 metres of granular fill and Portland cement concrete overlying limestone bedrock. It is considered that the foundations for the proposed Adelaide Tower expansion can be supported on conventional shallow spread footings placed on or within the bedrock.

The factored bearing resistance at Ultimate Limit States (ULS) for spread footing foundations founded on or within the competent bedrock may be taken as:

- 3,500 kilopascals for the P2 parking level; and,
- 5,000 kilopascals for the P4 parking level.

These values are applicable provided that the bedrock surface is acceptably cleaned of soil and loose bedrock (i.e., any bedrock that can easily be removed with a hydraulic excavator). The settlement of footings at the corresponding service (unfactored) load levels will be less than 25 millimetres and therefore Serviceability Limit States (SLS) need not be considered in the foundation design. Accordingly, the post construction settlement of structural elements which derive their support from footings bearing on bedrock should be negligible.

A layer of buried Portland cement concrete was encountered at boreholes 16-2 and 16-2A. In general, the bearing resistance values given above can also be used for footings placed on a mat of mass concrete that extends to the bedrock surface; however, this would need to be confirmed at the time of construction by means of probeholes. Otherwise, the existing concrete may need to be removed to allow for construction of the new footings.

5.2.1. Shear Wall Foundation

Based on the available structural drawing (see Appendix G), the proposed founding elevation of the new strip footings for shear walls S7 and S8 are at about the P2 level (i.e., below about elevation 58.0 metres) as shown on attached Figure 3. Based on the existing subsurface conditions behind the concrete wall at P4 level, the footings of the shear walls would be founded on granular fill and limestone bedrock at the proposed P2 level. the fill material and poor quality rock below the footings would not be able to support the shear wall foundation loading without undergoing excessive settlement which would likely also result in rotation of the shear wall footings. Therefore, to support the shear wall footings, it is recommended to excavate the existing rock ledge as well as the granular fills down to the P4 level (i.e., elevation 52.9 metres). The footings would therefore be founded at the P4 foundation level adjacent to the existing footings of Tower Block “A”.

The factored bearing resistance at Ultimate Limit States (ULS) for strip footings for the new shear walls founded on or within the bedrock at P4 level may be considered as 5,000 kilopascals. The post construction settlement of shear wall footings should be negligible under ULS (and SLS) loadings.

5.3 Seismic Site Classification

The seismic design provisions of the 2012 OBC depend, in part, on the shear wave velocity of the upper 30 metres of soil and/or rock below founding level. To support a Site Class designation, reference has been made to a Vertical Seismic Profile (VSP) shear wave velocity test that was carried out at a nearby site on Preston Street. The results of that testing are provided in Appendix F. The previous VSP test was carried out about 470 metres south of the site within the same bedrock formation that underlies 333 Preston Street.

The results of the shear wave velocity testing indicate that that the average shear wave velocity to 30 metres depth is about 1,790 metres per second (interpreted from the top of the bedrock surface). Accordingly, a Site Class A designation is appropriate for footings placed directly on the bedrock surface at this site.

5.4 Frost Protection

The new foundations are expected to be located within the existing heated parking garage. In addition, the bedrock is likely not frost susceptible. As such, frost protection is not required for the proposed footings.

5.5 Floor Slab Reinstatement

The fill required to backfill the excavations should consist of Ontario Provincial Standard Specification (OPSS) Granular A. The underslab fill should be placed in maximum 300 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

The existing granular fill beneath the floor slabs may be suitable for re-use as backfill; however, this would need to be confirmed by the geotechnical engineer at the time of construction.

6.0 ADDITIONAL CONSIDERATIONS

All footing and subgrade areas should be inspected by experienced geotechnical personnel prior to filling or concreting to ensure that bedrock having adequate bearing capacity has been reached and that the bearing surfaces have been properly prepared. The placing and compaction of any engineered fill should be inspected to ensure that the materials used conform to the specifications from both a grading and compaction view point.

At the time of the writing of this report, only preliminary details for the proposed building were available. Golder Associates should be retained to review the final drawings and specifications for this project prior to tendering to ensure that the guidelines in this report have been adequately interpreted.

7.0 CLOSURE

We trust that this report contains sufficient information for your present purposes. If you have any questions regarding this report, or if we can be of further service to you on this project, please call us.

GOLDER ASSOCIATES LTD.

Ali Ghirian, P.Eng.
Geotechnical Engineer

Bill Cavers, P.Eng.
Associate, Senior Geotechnical Engineer

AG/WC/ca

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IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client, **CIMA+**. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder cannot be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then the client may authorize the use of this report for such purpose by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process, provided this report is not noted to be a draft or preliminary report, and is specifically relevant to the project for which the application is being made. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder cannot be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. **The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

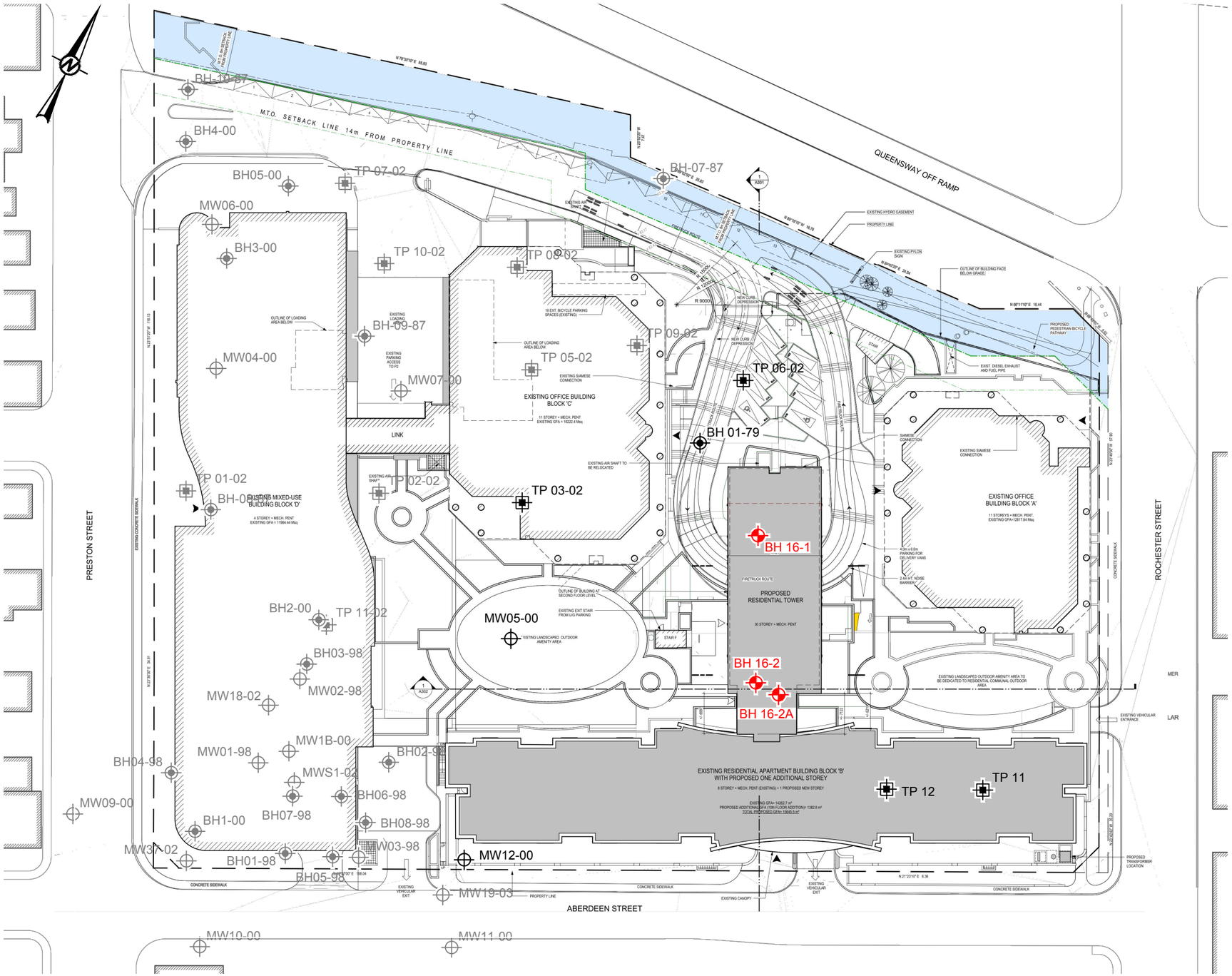
Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

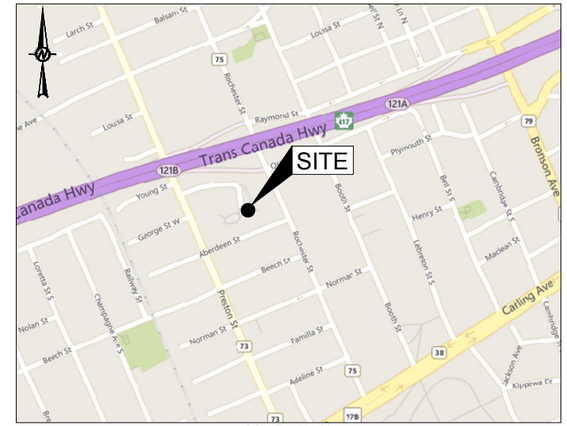
During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



KEY MAP



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LEGEND

- APPROXIMATE BOREHOLE LOCATION, CURRENT INVESTIGATION BY GOLDER ASSOCIATES LTD.
- APPROXIMATE BOREHOLE LOCATION, PREVIOUS INVESTIGATION BY OTHERS
- APPROXIMATE MONITORING WELL LOCATION, PREVIOUS INVESTIGATION BY OTHERS
- APPROXIMATE TEST PIT LOCATION, PREVIOUS INVESTIGATION BY OTHERS

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658054-2000
2. BOREHOLE AND TEST PIT RECORDS NOT PROVIDED IN THIS REPORT HAVE BEEN "GREYED-OUT" FOR CLARITY

REFERENCE(S)

1. BASE IMAGE SUPPLIED BY IBI GROUP ON FEBRUARY 22, 2019, FILE NO. 2019-02-22-ArchSet_Tower.pdf
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 12.5 25
1:750 METRES

CLIENT
SATKO CORPORATION

PROJECT
GEOTECHNICAL INVESTIGATION
PROPOSED ADELAIDE TOWER EXTENSION
333 PRESTON STREET, OTTAWA, ONTARIO

TITLE
SITE PLAN

CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-28
DESIGNED	----
PREPARED	JM/ZS
REVIEWED	AG
APPROVED	WC

PROJECT NO.	PHASE	REV.	FIGURE
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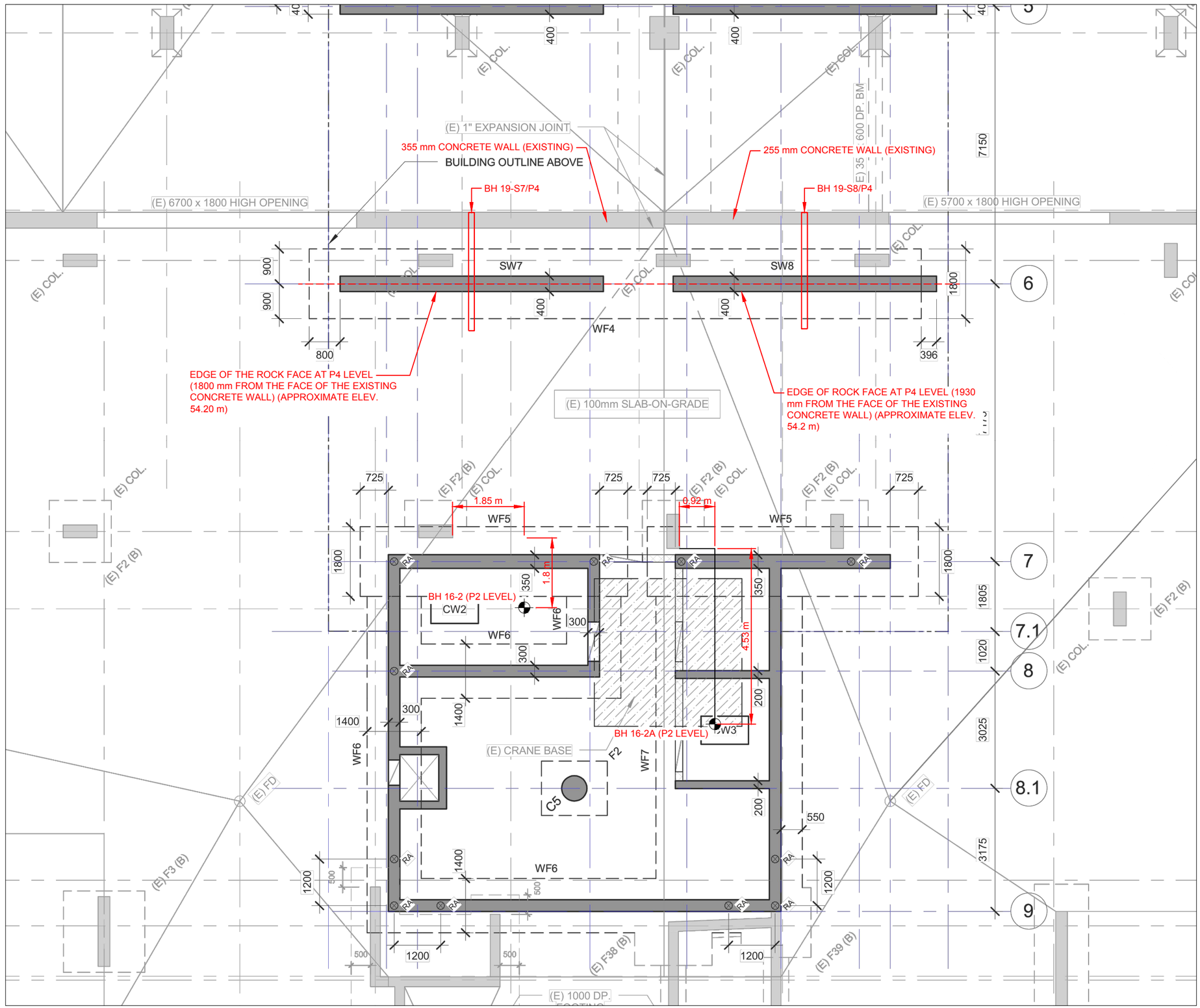
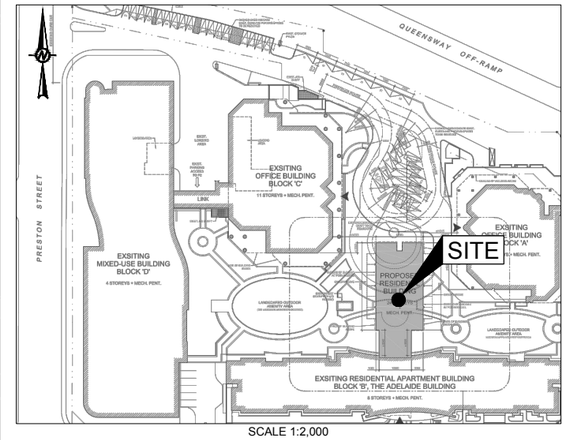
0 25 mm

Path: \\golder.gds\gal\ottawa\Active\Spatial_IM\Satko_Corp\Adelaide_Extension\99_PROJ\1658054_Satko_Phase1_ES\A40_PROD\Phase3001_Geotechnicalnvestigation\ | File Name: 1658054-3001-BG-0001.dwg | Last Edited By: zsauve Date: 2019-05-28 Time:10:34:25 AM | Printed By: ZSauve Date: 2019-05-28 Time:10:34:54 AM



KEY MAP



SCALE 1:2,000

LEGEND

APPROXIMATE BOREHOLE LOCATION, CURRENT INVESTIGATION BY GOLDER ASSOCIATES LTD.

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658054-3000

REFERENCE(S)

1. BASE IMAGE SUPPLIED BY SAKTO CORPORATION

0 2.5 5
1:100 METRES

CLIENT
SATKO CORPORATION

PROJECT
GEOTECHNICAL INVESTIGATION
PROPOSED ADELAIDE TOWER EXTENSION
333 PRESTON STREET, OTTAWA, ONTARIO

TITLE
SITE PLAN

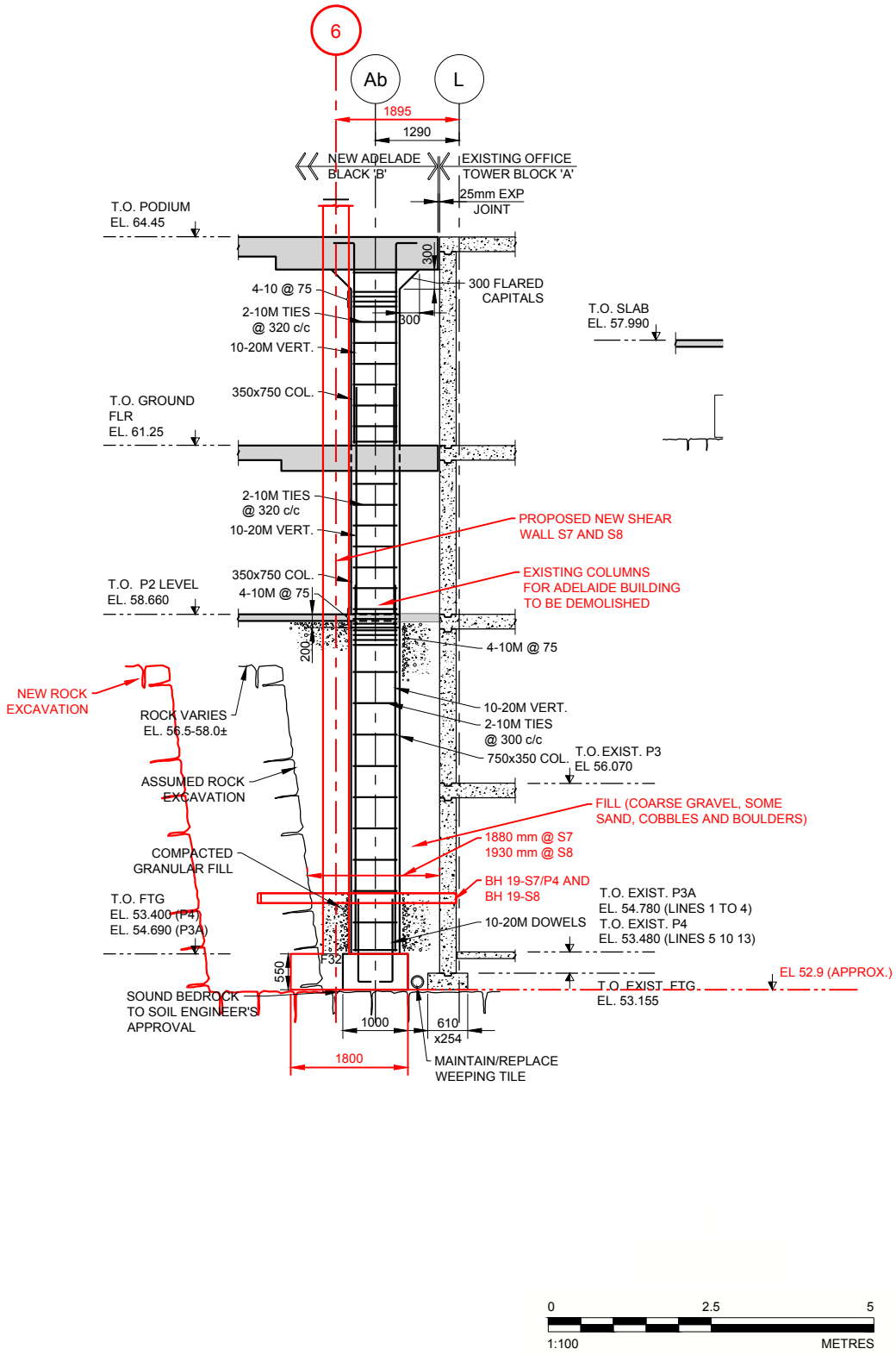
CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-15
DESIGNED	----
PREPARED	ZS
REVIEWED	AG
APPROVED	WC

PROJECT NO.	PHASE	REV.	FIGURE
1658054	3000	A	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm



0 2.5 5

1:100 METRES

CLIENT
SATKO CORPORATION

CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-15
DESIGNED	----
PREPARED	ZS
REVIEWED	AG
APPROVED	WC

PROJECT
GEOTECHNICAL INVESTIGATION
PROPOSED ADELAIDE TOWER EXTENSION
333 PRESTON STREET, OTTAWA, ONTARIO

TITLE
SECTION - AT NORTH WALL

PROJECT NO.	PHASE	REV.	FIGURE
1658054	3000	A	3

APPENDIX A

Initial Investigation 2016

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of rock material weathering.

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)
The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)
The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)
The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completely broken core to 100% for core in solid segments.

DISCONTINUITY DATA

Fracture Index
A count of the number of naturally occuring discontinuities (physical separations) in the rock core. Mechanically induced breaks caused by drilling are not included.

Dip with Respect to Core Axis
The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90^{o} angle is horizontal.

Description and Notes
An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

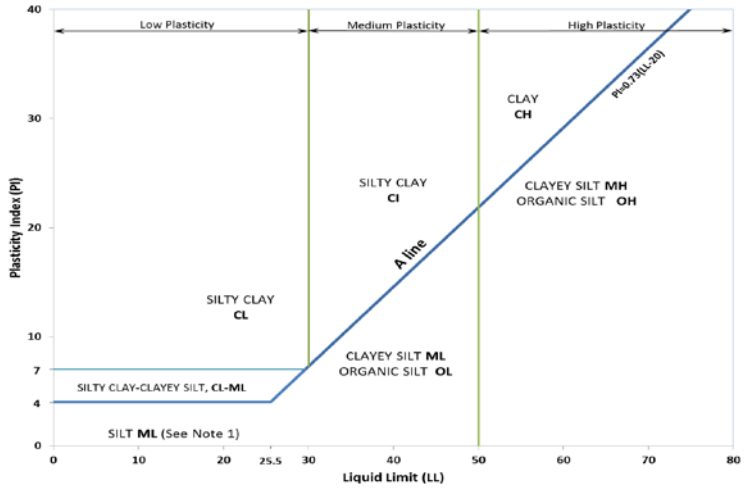
JN	Joint	PL	Planar
FLT	Fault	CU	Curved
SH	Shear	UN	Undulating
VN	Vein	IR	Irregular
FR	Fracture	K	Slickensided
SY	Stylolite	PO	Polished
BD	Bedding	SM	Smooth
FO	Foliation	SR	Slightly Rough
CO	Contact	RO	Rough
AXJ	Axial Joint	VR	Very Rough
KV	Karstic Void		
MB	Mechanical Break		

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 1658054

RECORD OF BOREHOLE: 16-1

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: September 22, 2016

DATUM: N/A

SAMPLER HAMMER, 20kg; DROP, 760mm

PENETRATION TEST HAMMER, 20kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		FINISHED FLOOR OF P4		53.48							
	Portable Drill / Open Hole	PORTLAND CEMENT CONCRETE; contains wire mesh		0.00							
		FILL - (GW) GRAVEL, some sand; grey, crushed; non-cohesive		0.17 / 53.13	1	GRAB	-				
		FILL - (SP) gravelly SAND; dark brown, crushed; non-cohesive		0.35 / 52.90	2	SS	>50				
		Borehole continued on RECORD OF DRILLHOLE 16-1		0.58							
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: KM

CHECKED: SD

MIS-BHS 001 1658054.GPJ GAL-MIS.GDT 19-5-16 ZS

PROJECT: 1658054

RECORD OF DRILLHOLE: 16-1

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: September 22, 2016

DATUM: N/A

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Portable Drill

DRILLING CONTRACTOR: CCC

JN - Joint, FLT - Fault, SHR- Shear, VN - Vein, CJ - Conjugate | BD- Bedding, FO- Foliation, CO- Contact, OR- Orthogonal, CL - Cleavage | PL - Planar, CU- Curved, UN- Undulating, ST - Stepped, IR - Irregular | PO- Polished, K - Slickensided, SM- Smooth, Ro - Rough, MB- Mechanical Break | BR - Broken Rock

NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	
		BEDROCK SURFACE		52.90															
1	Rotary Drill, NQ Core	Slightly weathered to fresh, thinly to medium bedded, grey, fine grained LIMESTONE, with shale interbeds - Silty clay seam from 3.47 m to 3.53 m depth		0.58	1	5													
					2	5													
2					3	10													
					4	5													UCS = 95.6 MPa
3					5	5													
				49.95															
		End of Drillhole		3.53															
4																			
5																			
6																			
7																			
8																			
9																			
10																			

DEPTH SCALE

1 : 50

GOLDER

LOGGED: KM

CHECKED: SD

MIS-RCK 004 1658054.GPJ GAL-MISS.GDT 19-5-16 ZS

PROJECT: 1658054

RECORD OF BOREHOLE: 16-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: September 22, 2016

DATUM: N/A

SAMPLER HAMMER, 20kg; DROP, 760mm

PENETRATION TEST HAMMER, 20kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		FINISHED FLOOR OF P2		58.66							
	Portable Drill / Open Hole	PORTLAND CEMENT CONCRETE		0.00							
		FILL - (GW) sandy GRAVEL; grey, crushed; non-cohesive		0.10	1	GRAB	-				
				0.20	2	SS	>50				
	RD / NQ	FILL - (SW) gravelly SAND; dark brown, crushed; non-cohesive		58.18							
				0.48	3	RC	DD				
		PORTLAND CEMENT CONCRETE		57.97							
				0.69							
1		End of Borehole									
2		Note(s):									
3		1. Grinding on possible steel at 0.7 m depth.									
4		2. Borehole terminated due to the presence of unexpected portland cement concrete at depth. Refer to Record of Borehole 16-2A.									
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: KM

CHECKED: SD

MIS-BHS 001 1658054.GPJ GAL-MIS.GDT 19-5-16 ZS

PROJECT: 1658054

RECORD OF BOREHOLE: 16-2A

SHEET 1 OF 2

LOCATION: See Site Plan

BORING DATE: September 26, 2016

DATUM: N/A

SAMPLER HAMMER, 20kg; DROP, 760mm

PENETRATION TEST HAMMER, 20kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		FINISHED FLOOR OF P2		58.66									
0	Portable Drill / Open Hole	PORTLAND CEMENT CONCRETE *(0.00 m - 0.41 m)*		0.00									
				58.25	1	GRAB	-						
	Rotary Drill / NQ Core	FILL - (GW) sandy GRAVEL; grey, crushed; non-cohesive		0.48									
1		PORTLAND CEMENT CONCRETE - Some grinding may represent the presence of steel reinforcement			2	RC	DD						
2				56.32	3	RC	DD						
		Borehole continued on RECORD OF DRILLHOLE 16-2A		2.34									
3													
4													
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

GOLDER

LOGGED: KM

CHECKED: SD

MIS-BHS 001 1658054.GPJ GAL-MIS.GDT 19-5-16 ZS

PROJECT: 1658054

RECORD OF DRILLHOLE: 16-2A

SHEET 2 OF 2

LOCATION: See Site Plan

DRILLING DATE: September 26, 2016

DATUM: N/A

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Portable Drill

DRILLING CONTRACTOR: CCC

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD - Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	
		BEDROCK SURFACE		56.32															
3	Rotary Drill / NQ Core	Slightly weathered to fresh, thinly to medium bedded, grey, fine grained LIMESTONE, with shale interbeds		2.34	1	5													UCS = 213.9 MPa
4					2	5													
5					3	5													
6					4	5													
				51.91															
7		End of Drillhole		6.75															
8																			
9																			
10																			
11																			
12																			

DEPTH SCALE
1 : 50

GOLDER

LOGGED: KM
CHECKED: SD

MIS-RCK 004 1658054.GPJ GAL-MISS.GDT 19-5-16 ZS

APPENDIX B

Additional Investigation 2019

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of rock material weathering.

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)
The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)
The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)
The percentage of solid drill core, greater than 100 mm length, as measured along the centerline axis of the core, relative to the length of the total core run. RQD varies from 0% for completely broken core to 100% for core in solid segments.

DISCONTINUITY DATA

Fracture Index
A count of the number of naturally occuring discontinuities (physical separations) in the rock core. Mechanically induced breaks caused by drilling are not included.

Dip with Respect to Core Axis
The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90^{o} angle is horizontal.

Description and Notes
An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

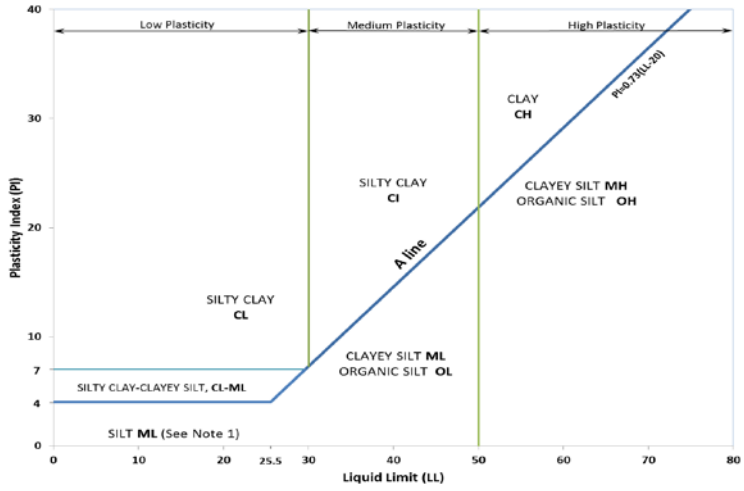
JN	Joint	PL	Planar
FLT	Fault	CU	Curved
SH	Shear	UN	Undulating
VN	Vein	IR	Irregular
FR	Fracture	K	Slickensided
SY	Stylolite	PO	Polished
BD	Bedding	SM	Smooth
FO	Foliation	SR	Slightly Rough
CO	Contact	RO	Rough
AXJ	Axial Joint	VR	Very Rough
KV	Karstic Void		
MB	Mechanical Break		

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
GS	Grab Sample
MC	Modified California Samples
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
2. Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grainsize. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	non-plastic
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 1658054-3000

RECORD OF BOREHOLE: 19-S7/P4

SHEET 1 OF 2

LOCATION: P4 Parking Garage

BORING DATE: April 10, 2019

DATUM: N/A

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Portable Drill / Open Hole	PORTLAND CEMENT CONCRETE		0.00	1	CC	-				
		FILL - (GP) GRAVEL, coarse, some sand; grey, contains cobbles and boulders; non-cohesive, moist		0.36	2	GS	-				
1					3	GS	-				
2		Borehole continued on RECORD OF DRILLHOLE 19-S7/P4		1.88							
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AG

CHECKED: WC

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PROJECT: 1658054-3000

RECORD OF DRILLHOLE: 19-S7/P4

SHEET 2 OF 2

LOCATION: P4 Parking Garage

DRILLING DATE: April 10, 2019

DATUM: N/A

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Portable Drill

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint, FLT - Fault, SHR- Shear, VN - Vein, CJ - Conjugate
BD - Bedding, FO- Foliation, CO- Contact, OR- Orthogonal, CL - Cleavage
PL - Planar, CU- Curved, UN- Undulating, ST - Stepped, IR - Irregular
PO- Polished, K - Slickensided, SM- Smooth, Ro - Rough, MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

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		BEDROCK SURFACE																
2	Rotary Drill / NQ Core	Highly weathered to fresh, thinly to medium bedded, grey to dark grey, fine grained LIMESTONE, with shale interbeds		1.88	1													
					2													
3					3													
		End of Drillhole		3.05														
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		

DEPTH SCALE
1 : 50

GOLDER

LOGGED: AG
CHECKED: WC

MIS-RCK 004 1658054.GPJ GAL-MISS.GDT 19-5-16 ZS

PROJECT: 1658054-3000

RECORD OF BOREHOLE: 19-S8/P4

SHEET 1 OF 2

LOCATION: P4 Parking Garage

BORING DATE: April 8, 2019

DATUM: N/A

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Portable Drill / Open Hole	PORTLAND CEMENT CONCRETE		0.00	0	CC	-				
		FILL - (SP/GP) SAND and GRAVEL; grey, contains cobbles and boulders; non-cohesive, moist		0.25	2	GS	-				
1					3	GS	-				
					4	GS	-				
2		Borehole continued on RECORD OF DRILLHOLE 19-S7/P4		1.93							
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AG

CHECKED: WC

MIS-BHS 001 1658054.GPJ GAL-MIS.GDT 19-5-16 ZS

PROJECT: 1658054-3000

RECORD OF DRILLHOLE: 19-S8/P4

SHEET 2 OF 2

LOCATION: P4 Parking Garage

DRILLING DATE: April 8, 2019

DATUM: N/A

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Portable Drill

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint, FLT - Fault, SHR- Shear, VN - Vein, CJ - Conjugate
BD - Bedding, FO- Foliation, CO- Contact, OR- Orthogonal, CL - Cleavage
PL - Planar, CU- Curved, UN- Undulating, ST - Stepped, IR - Irregular
PO- Polished, K - Slickensided, SM- Smooth, Ro - Rough, MB- Mechanical Break
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NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.
		BEDROCK SURFACE																
2	Rotary Drill / NQ Core	Highly weathered to fresh, thinly to medium bedded, grey to dark grey, fine grained LIMESTONE, with shale interbeds		1.93	1													
					2													
3		End of Drillhole		3.00														
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		

DEPTH SCALE
1 : 50

GOLDER

LOGGED: AG
CHECKED: WC

MIS-RCK 004 1658054.GPJ GAL-MISS.GDT 19-5-16 ZS

APPENDIX C

Previous Investigation by Others

REFERENCE No.: F2741 ENCLOSURE No.:

FONDEX

BOREHOLE No.: BH01-79
ELEVATION: 60.65 m

BOREHOLE LOG

Page: 1 of 1

CLIENT: SAKTO Development Corporation
PROJECT: Proposed Commercial Development
LOCATION: 333 Preston Street, Ottawa, Ontario
DESCRIBED BY: H.Krzywicki/NGC CHECKED BY:
DATE (START): April 5, 1979 DATE (FINISH):

LEGEND

- SS Split Spoon
- ST Shelby Tube
- RC Rock Core
- Water Level
- Water content (%)
- Atterberg limits (%)
- N Penetration Index based on Split Spoon sample
- N Penetration Index based on Dynamic Cone sample
- Cu Shear Strength based on Field Vane
- Cu Shear Strength based on Lab Vane
- S Sensitivity Value of Soil
- Shear Strength based on Pocket Penetrometer

SCALE		STRATIGRAPHY		SAMPLE DATA					
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Organic Vapour ppm or %LEL	Penetration Index / RQD	SCALE FOR TEST RESULTS 50kPa 100kPa 150kPa 200kPa 10 20 30 40 50 60 70 80 90
metres	60.65		GROUND SURFACE			%	ppm	N	
	60.58		ASPHALTIC CONCRETE		AS1				
0.5			FILL, crushed stone at upper levels, becoming mixed with peat by 0.3m depth		SS2			22	
1.0			- becoming predominantly peat between 0.6m and 1.2m depth		SS3			11	
1.5			- sand and gravel below		SS4			31	
2.0	58.52		SILTY SAND TILL, very dense, grey, frequent gravel sizes, very moist		SS4a			49	
2.5					SS5			100	
3.0									
3.5	57.00		SHALEY LIMESTONE BEDROCK, moderately fractured limestone to 4.57m		RC6	44			
4.0					RC7	90			
4.5			- becoming sound bedrock at 4.27m depth						
5.0			- becoming very shaley at 4.57m depth		RC8	90			
5.5									
6.0	54.85		End of borehole						
6.5									

NOTES:
1. Water level at 2.19m depth after 24 hours.

BOREHOLE LOG F2741-00(05-APR-1979-BM)BH-OT006.GPJ INSPEC_SOL.GDT 1/11/05

REFERENCE No.: F2741 ENCLOSURE No.:

CONESTOGA-ROVERS & ASSOCIATES

TEST PIT No.: TP03-02
ELEVATION: 61.50 m

TEST PIT LOG

Page: 1 of 1

CLIENT: SAKTO Development Corporation
PROJECT: Proposed Commercial Development
LOCATION: 333 Preston Street, Ottawa, Ontario
DESCRIBED BY: B.Sinclair/E.Farquhar CHECKED BY:
DATE (START): May 4, 2002 DATE (FINISH):

LEGEND

- GSE Grab Sample (environmental)
- GS Grab Sample (Geotechnical)
- CHEM Chemical Analysis
- Water Level
- Water content (%)
- Atterberg limits (%)
- Cu Shear Strength based on Lab Vane
- S Sensitivity Value of Soil
- Shear Strength based on Pocket Penetrometer

SCALE		STRATIGRAPHY		SAMPLE DATA			
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Test Type	Organic Vapour ppm or %LEL	SCALE FOR TEST RESULTS 50kPa 100kPa 150kPa 200kPa 10 20 30 40 50 60 70 80 90
metres	61.50		GROUND SURFACE			ppm	
	61.43		ASPHALT				
	61.20		GRANULAR 'A'				
0.5	61.00		SAND FILL, medium grained, compact to loose, poorly graded to uniform, light brown, damp, no odour.				
1.0			SAND AND GRAVEL FILL, some construction debris, trace silt, medium sand, medium gravel, brown, slightly damp, no odour				
1.5							
2.0			- faint hydrocarbon odour, grey to brown, damp				
2.5							
3.0							
3.5	58.00		Excavation refusal on limestone bedrock				
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES:

BOREHOLE LOG F2741-00(05-APR-2002-BM)BH-OT007.GPJ INSPEC_SOL.GDT 1/11/05

REFERENCE No.: F2741 ENCLOSURE No.:

CONESTOGA-ROVERS & ASSOCIATES

TEST PIT No.: TP06-02
ELEVATION: 61.00 m

TEST PIT LOG

Page: 1 of 1

CLIENT: SAKTO Development Corporation
PROJECT: Proposed Commercial Development
LOCATION: 333 Preston Street, Ottawa, Ontario
DESCRIBED BY: B.Sinclair/E.Farquhar CHECKED BY:
DATE (START): May 4, 2002 DATE (FINISH):

LEGEND

- GSE Grab Sample (environmental)
- GS Grab Sample (Geotechnical)
- CHEM Chemical Analysis
- Water Level
- Water content (%)
- Atterberg limits (%)
- Cu Shear Strength based on Lab Vane
- S Sensitivity Value of Soil
- Shear Strength based on Pocket Penetrometer

SCALE		STRATIGRAPHY		SAMPLE DATA			
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	Type and Number	Test Type	Organic Vapour ppm or %LEL	SCALE FOR TEST RESULTS 50kPa 100kPa 150kPa 200kPa 10 20 30 40 50 60 70 80 90
metres	61.00		GROUND SURFACE			ppm	
			GRANULAR 'A'				
	60.80		SAND FILL, little fine to medium grained gravel, medium grained sand, brown, damp, no odour, some construction debris				
0.5							
1.0							
1.5							
			- some cobbles, and shale, becoming grey to brown, and damp to moist				
2.0	59.00		SP -SAND TILL, little fine gravel, dense, medium to coarse sand, grey, moist, no odour				
2.5							
3.0							
3.5							
4.0							
4.5	56.50		Excavation refusal on limestone bedrock				
5.0							
5.5							
6.0							
6.5							

NOTES:

BOREHOLE LOG F2741-00(05-APR-2002-BM)BH-OT007.GPJ INSPEC_SOL.GDT 1/11/05

REFERENCE No.: F2741 ENCLOSURE No.:

CONESTOGA-ROVERS & ASSOCIATES

BOREHOLE No.: MW05-00

ELEVATION: 60.65 m

BOREHOLE LOG

Page: 1 of 1

CLIENT: SAKTO Development Corporation

PROJECT: Proposed Commercial Development

LOCATION: 333 Preston Street, Ottawa, Ontario

DESCRIBED BY: M. Roy CHECKED BY:

DATE (START): May 25, 2000 DATE (FINISH):

LEGEND

- SS Split Spoon
- ST Shelby Tube
- RC Rock Core
- Water Level
- w Water content (%)
- Atterberg limits (%)
- N Penetration Index based on Split Spoon sample
- N Penetration Index based on Dynamic Cone sample
- Cu Shear Strength based on Field Vane
- Cu Shear Strength based on Lab Vane
- S Sensitivity Value of Soil
- Shear Strength based on Pocket Penetrometer

SCALE		STRATIGRAPHY		SAMPLE DATA					
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Organic Vapour ppm or %LEL	Penetration Index / RQD	SCALE FOR TEST RESULTS 50kPa 100kPa 150kPa 200kPa 10 20 30 40 50 60 70 80 90
metres	60.65		GROUND SURFACE			%	ppm	N	
0.5			SAND AND GRAVEL FILL, fine sand, fine gravel, little silt, medium dense,dark brown, moist		SS1			14	●
1.0			- rebar and wood, split spoon refusal						
1.5			- chemical odour, pieces of suspended ceiling tiles						
2.0					SS2				
2.5	58.27		- split spoon refusal, piece of concrete, black staining on concrete and ceiling tile piece, no odour		SS3			6	●
3.0			GREY LIMESTONE, wet, in pieces		RC1	7		0	
3.5					RC2	41		0	
4.0			- chemical odour		RC3	100		64	
4.5	56.32		End of borehole						
5.0									
5.5									
6.0									
6.5									

NOTES:
1. Monitoring well installed in borehole.
2. Water table measured at 3.00m on January 24, 2002.

BOREHOLE LOG F2741-00\24-MAY-2000-BMIBH-OT003.GPJ INSPEC.SOL.GDT 1/11/05

REFERENCE No.: F2741 ENCLOSURE No.:

CONESTOGA-ROVERS & ASSOCIATES

BOREHOLE No.: MW12-00
ELEVATION: 60.57 m

BOREHOLE LOG

Page: 1 of 1

CLIENT: SAKTO Development Corporation
PROJECT: Proposed Commercial Development
LOCATION: 333 Preston Street, Ottawa, Ontario
DESCRIBED BY: M. Roy CHECKED BY:
DATE (START): September 27, 2000 DATE (FINISH):

LEGEND

- SS Split Spoon
- ST Shelby Tube
- RC Rock Core
- Water Level
- Water content (%)
- Atterberg limits (%)
- N Penetration Index based on Split Spoon sample
- N Penetration Index based on Dynamic Cone sample
- Cu Shear Strength based on Field Vane
- Cu Shear Strength based on Lab Vane
- S Sensitivity Value of Soil
- Shear Strength based on Pocket Penetrometer

SCALE		STRATIGRAPHY			SAMPLE DATA				
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Organic Vapour ppm or %LEL	Penetration Index / RQD	SCALE FOR TEST RESULTS 50kPa 100kPa 150kPa 200kPa 10 20 30 40 50 60 70 80 90
metres	60.57		GROUND SURFACE			%	ppm	N	
	60.42		CONCRETE SLAB						
0.5			GRAVEL FILL, fine gravel, light grey, dry		SS1	42		15	
	59.86		SAND FILL, medium sand, poorly graded, medium dense, orange, moist						
1.0	59.50		SILT TILL, little fine sand, medium dense, light brown, moist		SS2	67		16	
	59.35		LIMESTONE, fractured, some fine sand, grey, moist						
	59.22		SAND TILL, medium to coarse, dense, grey, moist						
1.5					SS3	75		33	
2.0	58.51		- little silt and clay						
			LIMESTONE, presence of fossils, light grey						
2.5					RC4	100		96	
3.0									
3.5									
4.0					RC5	98		93	
4.5									
5.0			- fracture						
			- fracture		RC6	100		100	
5.5	55.03		End of Borehole						
6.0									
6.5									

NOTES:
1. Monitoring well installed in borehole.
2. Water table measured at 3.20m on January 24, 2002.

BOREHOLE LOG F2741-0024-MAY-2000-BM\BH-OT003.GPJ INSPEC_SOL.GDT 1/11/05

TP 11

PROJECT PROPOSED RESIDENTIAL DEVELOPMENT — DRILLING DATE 12-10-02

LOCATION 333 PRESTON STREET, OTTAWA, ONTARIO — REPORT DATE 17-01-03

DATUM GEODETIC — BOREHOLE TYPE CME-55 CFA — COMPILED BY LRB

Scale (m)	Elev. / Depth (m)	GEOLOGIC PROFILE: DESCRIPTION	SAMPLE: Stratigraphy	Number	Type	Blows (N) / RQD	% Recovery	Dynamic Cone Penetrometer Resistance Plot (0 20 40 60 80 100) / Shear Strength (kPa) (0 50 100 150 200): in-situ intact ●, in-situ disturbed ⊗, laboratory ⊕	Moisture Content (%) (0 20 40 60 80 100): natural (W), liquid limit (w_l), plastic limit (w_p)
	60.01	50mm ASPHALT over SAND AND GRAVEL FILL - COMPACT, BROWN, MOIST - SOME CONSTRUCTION DEBRIS AT LOWER LEVELS							
	59.41 / 0.60	CONSTRUCTION DEBRIS FILL - CONCRETE, BRICK, WOOD IN SAND AND SILT MATRIX, MOIST							
1	58.41 / 1.60	ORGANIC FILL - LOOSE, DARK BROWN, DECOMPOSED WOOD DEBRIS AND PEAT, MOIST							
2									
3	56.41 / 3.60	REFUSAL TO BACKHOE ON BEDROCK END OF TEST PIT							

TP 12

PROJECT PROPOSED RESIDENTIAL DEVELOPMENT — DRILLING DATE 12-10-02

LOCATION 333 PRESTON STREET, OTTAWA, ONTARIO — REPORT DATE 17-01-03

DATUM GEODETIC — BOREHOLE TYPE CME-55 CFA — COMPILED BY LRB

Scale (m)	Elev. / Depth (m)	DESCRIPTION	Stratigraphy	Number	Type	Blows (N)/RQD	% Recovery	Dynamic Cone Penetrometer Resistance Plot ▲ 0 20 40 60 80 100 / Shear Strength (kPa) in-situ intact ● in-situ disturbed ✕ laboratory ⊕ 0 50 100 150 200	Moisture Content (%) natural (W) liquid limit (w_l) plastic limit (w_p) 0 20 40 60 80 100
	60.30								
		SAND AND GRAVEL FILL - COMPACT, BROWN, MOIST - SOME CONSTRUCTION DEBRIS AT LOWER LEVELS							
1	59.20								
	1.10	CONSTRUCTION DEBRIS FILL - CONCRETE, BRICK, WOOD IN SAND AND SILT MATRIX, MOIST							
2	58.20								
	2.10	ORGANIC FILL - LOOSE, DARK BROWN/BLACK, DECOMPOSED WOOD DEBRIS AND PEAT, MOIST							
3	57.10								
	3.20	REFUSAL TO BACKHOE ON BEDROCK END OF TEST PIT							

APPENDIX D

Core Photos

BH 19-S7/P8 (Dry)
Cored Length of 1.88 to 3.05 metres
Core Box 1 to 1 of 1

1.88 m

3.05 m

GOLDER

Geotechnical Investigation

Proposed Adelaide Tower Extension

Ottawa, Ontario

Project No.	1658054-3000
Drawn:	AG
Date:	05/15/2018
Checked:	AG
Review:	MSS

19-S7/P8

BH 19-S7/P8 (Wet)
Cored Length of 1.88 to 3.05 metres
Core Box 1 to 1 of 1

1.88 m

3.05 m

GOLDER

Geotechnical Investigation

Proposed Adelaide Tower Extension

Ottawa, Ontario

Project No.	1658054-3000
Drawn:	AG
Date:	05/15/2018
Checked:	AG
Review:	MSS

19-S7/P8
2 of 4

BH 19-S8/P8 (Dry)
Cored Length of 1.93 to 3.0 metres
Core Box 1 to 1 of 1

1.93 m

3.0 m

GOLDER

Geotechnical Investigation

Proposed Adelaide Tower Extension

Ottawa, Ontario

Project No.	1658054-3000
Drawn:	AG
Date:	05/15/2018
Checked:	AG
Review:	MSS

19-S8/P8
3 of 4

BH 19-S8/P8 (Wet)
Cored Length of 1.93 to 3.0 metres
Core Box 1 to 1 of 1

1.93 m

3.0 m

GOLDER

Geotechnical Investigation

Proposed Adelaide Tower Extension

Ottawa, Ontario

Project No.	1658054-3000
Drawn:	AG
Date:	05/15/2018
Checked:	AG
Review:	MSS

19-S8/P8
4 of 4

BH 16-1 (Wet)

Cored Length of 0.58 to 3.53 metres

Core Box 1 and 2 of 2

0.58 m Top of Bedrock

GOLDER

Geotechnical Investigation

Proposed Adelaide Tower Extension

Ottawa, Ontario

Project No.	1658054-2000
Drawn:	WAM
Date:	2016-11-01
Checked:	SD
Review:	TMS

16-1 (1 of 2)

BH 16-2A (Wet)

Cored Length of 0.48 to 6.75 metres

Core Box 1 to 3 of 3

GOLDER	**Geotechnical Investigation** **Proposed Adelaide Tower Extension** **Ottawa, Ontario**	Project No. 1658054-2000 Drawn: WAM Date: 2016-11-01 Checked: SD Review: TMS	**16-2A (2 of 2)**

APPENDIX E

Unconfined Compressive Strength (UCS) Test Results

Golder Associates Ltd.
1931 Robertson Road
Ottawa, Ontario
K2H 5B7

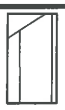
UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORE

Project: Sakto - Adelaide Extension

Project No.: 1658054

Date: October 23, 2016

Location(s): See Table Below

Bore Hole No.	Depth (m)	Date Tested	Core Size	Diameter (mm)	Density (kg/m³)	Compressive Strength (MPa)	Failure Mode
16-1	2.19-2.31	Oct 20/16	NQ	47.6	2704	95.6	
16-2A	3.09-3.21	Oct 20/16	NQ	50.4	2692	213.9	

REMARKS : - Cores tested in vertical direction.
- Cores tested in air-dry condition.
- Specimen ends prepared with high-strength plaster, but un-restrained.
- L/D ratio's between 2.2:1 and 2.5:1

TESTING WAS CARRIED OUT IN GENERAL ACCORDANCE WITH ASTM D7012 - Method C

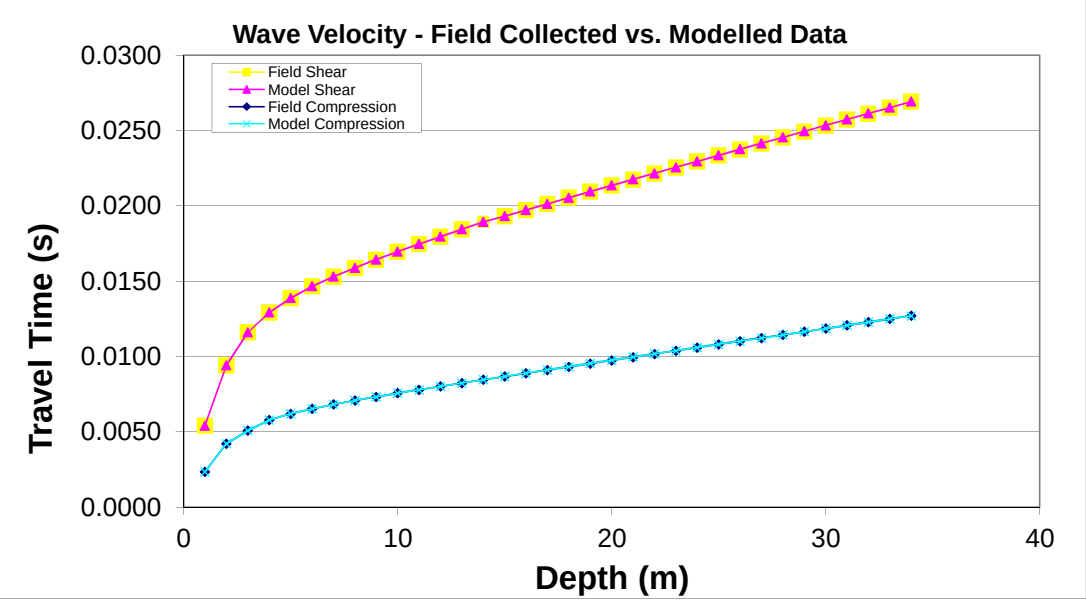
SIGNED: _____
C.N.Mangione P.Eng.

APPENDIX F

Vertical Seismic Profile (VSP) Test Result

TABLE 1
SHEAR WAVE VELOCITY PROFILE AT BH-13-1

Layer Depth (m)				Estimated Bulk Density (kg/m^3)	Dynamic Engineering Properties			
Top	Bottom	Compressional Wave (m/s)	Shear Wave (m/s)		Poissons Ratio	Shear Modulus (MPa)	Deformation Modulus (MPa)	Bulk Modulus (MPa)
0.0	1	427	185	1750	0.38	60	166	239
1.0	2	535	250	1750	0.36	109	298	355
2.0	3	1150	455	2300	0.41	476	1340	2407
3.0	4	1430	765	2300	0.30	1346	3498	2909
4.0	5	2420	1045	2300	0.39	2512	6959	10121
5.0	6	3000	1270	2300	0.39	3710	10319	15754
6.0	7	3500	1555	2300	0.38	5561	15317	20760
7.0	8	3800	1740	2300	0.37	6963	19043	23927
8.0	9	4100	1800	2300	0.38	7452	20577	28727
9.0	10	4180	1900	2300	0.37	8303	22747	29116
10.0	11	4400	1950	2300	0.38	8746	24100	32867
11.0	12	4400	2050	2300	0.36	9666	26317	31640
12.0	13	4550	2050	2300	0.37	9666	26535	34728
13.0	14	4550	2050	2300	0.37	9666	26535	34728
14.0	15	4550	2600	2300	0.26	15548	39106	26885
15.0	16	4650	2500	2300	0.30	14375	37281	30565
16.0	17	4650	2450	2300	0.31	13806	36112	31324
17.0	18	4650	2450	2300	0.31	13806	36112	31324
18.0	19	4650	2450	2300	0.31	13806	36112	31324
19.0	20	4650	2450	2300	0.31	13806	36112	31324
20.0	21	4750	2500	2300	0.31	14375	37617	32727
21.0	22	4750	2500	2300	0.31	14375	37617	32727
22.0	23	4750	2500	2300	0.31	14375	37617	32727
23.0	24	4750	2500	2300	0.31	14375	37617	32727
24.0	25	4750	2500	2300	0.31	14375	37617	32727
25.0	26	4750	2500	2300	0.31	14375	37617	32727
26.0	27	4750	2550	2300	0.30	14956	38812	31953
27.0	28	4750	2500	2300	0.31	14375	37617	32727
28.0	29	4750	2550	2300	0.30	14956	38812	31953
29.0	30	4750	2500	2300	0.31	14375	37617	32727
30.0	31	4750	2500	2300	0.31	14375	37617	32727
31.0	32	4750	2550	2300	0.30	14956	38812	31953
32.0	33	4750	2550	2300	0.30	14956	38812	31953
33.0	34	4750	2550	2300	0.30	14956	38812	31953

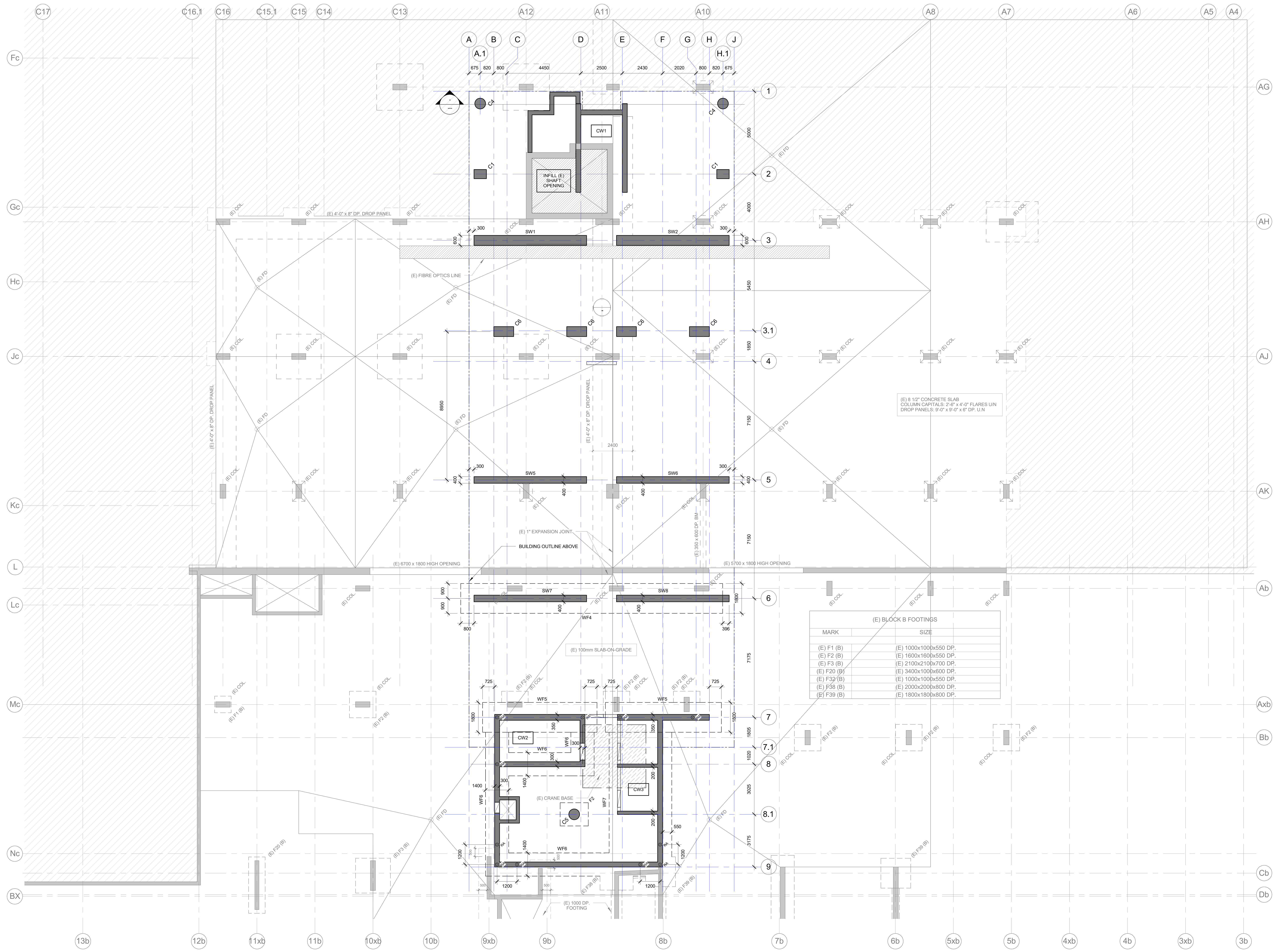


Notes

1. Depth Presented relative to ground surface.
2. This Table to be analyzed in conjunction with the accompanying report.

APPENDIX G

Structural Drawing No. S102 by IBI Group, dated Nov. 21, 2017



(E) BLOCK B FOOTINGS	
MARK	SIZE
(E) F1 (B)	(E) 1000x1000x550 DP.
(E) F2 (B)	(E) 1600x1600x550 DP.
(E) F3 (B)	(E) 2100x2100x700 DP.
(E) F20 (B)	(E) 3400x1000x600 DP.
(E) F32 (B)	(E) 1000x1000x550 DP.
(E) F38 (B)	(E) 2000x2000x800 DP.
(E) F39 (B)	(E) 1800x1800x800 DP.

2018-02-22 9:29:29 AM

CLIENT

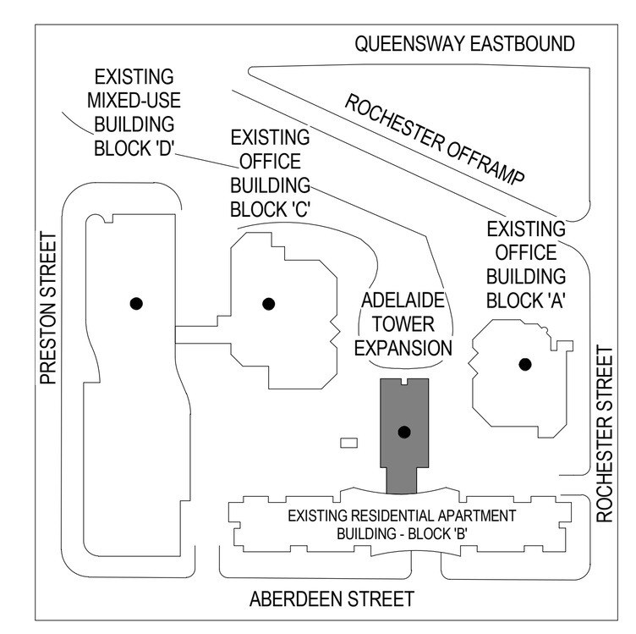
Owner

Street Address
City, Country, Postal Code

ISSUES

No.	DESCRIPTION	DATE
A	ISSUED FOR DESIGN DEVELOPMENT REVIEW	2018-02-02
B	ISSUED FOR 50% PRICING	2018-06-14

KEYPLAN



CONSULTANTS

NORTH ARROW:

SEAL

PRIME CONSULTANT
IBI GROUP
Suite 500, 611 Meredith Road NE.,
Calgary, AB T2E 2W5, Canada
tel 403 270 5600 fax 403 270 5610
ibigroup.com

PROJECT
ADELAIDE TOWER EXPANSION
333 Preston Street
Ottawa, Ontario, Canada
K1S 5N4

PROJECT NO: 14-0133	
DRAWN BY: J. LABBÉ	CHECKED BY: B. AOUN
PROJECT MGR: B. AOUN	APPROVED BY: R. MUNDEN
SCALE: 1 : 100	DATE: 11/21/17

SHEET TITLE
PARKING P2 FLOOR PLAN

SHEET NUMBER
S102

ISSUE
B

\\cje-1\folder redirections\JessikaL\desktop\ATE-08-Structural-16.rvt

SCALE CHECK 1 in 10mm

golder.com