688 Brant Street, Burlington, ON

Elite Developments

Type of Document:
Supplemental Geotechnical Investigation Report

Project Name:
Proposed Mid-Rise Residential Development
688 Brant Street
Burlington, Ontario

Project Number:
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1. Introduction and Background

This report presents the results of the supplemental geotechnical investigation carried out at the site of the proposed residential development at 688, 694, and 698 Brant Street (hereafter referred to as the "Site") in Burlington, Ontario. Based on the site plan provided to EXP, it is understood that the proposed development will consist of a 12-storey residential structure including a commercial/retail area and 3 levels of underground parking covering most of the site. The investigation was authorized by Ms. Ibti Safi on behalf of Elite Developments.

EXP completed preliminary geotechnical investigation at the site in 2021 and a supplemental investigation was completed to confirm the subsoil and groundwater conditions at the site. Five (5) additional boreholes were advanced and based on an assessment of the factual subsurface data, an engineering report containing general geotechnical recommendations pertinent to the proposed construction is provided herein. Additional fieldwork and testing were carried out at the site by EXP as part of hydrogeological and environmental studies, the results of which are presented under separate cover. This report does not address the environmental considerations at the site.

The comments and recommendations given in this report assume that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations or the requirement of additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description & Geological Setting

The Site is situated at 688, 694, and 698 Brant Street and is currently occupied by a commercial building on the south portion (688 Brant Street) and low rise residential buildings (694 and 698 Brant Street) with an associated paved parking lot and driveways. The site is bounded by Brant Street to the east, residential properties to the north and west, and commercial properties to the south. The topography at the site is relatively flat lying.

Based on the Ministry of Natural Resources Map 2509, Quaternary Geology, Hamilton Area, and previous investigations undertaken in the vicinity of the Site, the overburden at the Site consists of lacustrine and outwash sand which overlies Halton Till (clay and silt). The underlying bedrock consists of red shale of the Queenston Formation as indicated on the Ministry of Northern Development and Mines Map 2336, Bedrock Geology, Hamilton Area.

3. Field Investigation

EXP advanced a total of ten (10) boreholes at the Site, numbered BH-1 to BH-5 (2021) and BH-1 to BH-5 (2023). The approximate borehole locations are shown on Drawing No. 1 in Appendix A. The boreholes were advanced using solid stem auger and rock coring techniques and were terminated in shale bedrock at depths ranging from approximately 4.8 to 13.7 m below existing grade, except Borehole BH-5 (2023) which was advanced primarily for environmental purposes and terminated in the fill at 2.1 m.

The fieldwork for this investigation was carried out on October 12 and 13, 2021 and January 12 to 20, 2023. Drilling and sampling operations were completed by a combination of auger and split-spoon techniques using truck mounted drilling equipment owned and operated by a specialist drilling subcontractor. Prior to the commencement of the drilling, the public and private-owned underground services were located to minimize the risk of contacting any such services during the investigation.

Soil samples were obtained using a 51 mm outside diameter split-spoon sampler driven in conjunction with Standard Penetration Test procedure (ASTM D1586) at the depths noted graphically on the borehole logs. The retained soil and bedrock samples were logged in the field and then carefully packaged and transported to our Hamilton laboratory for detailed visual, textural, and olfactory classification. The Standard Penetration Test (SPT) N values and pocket penetrometer measurements were recorded and used to provide an assessment of the compactness condition or consistency of the in-situ soils.

Bedrock samples were retrieved from BH-1, BH-3, and BH-4 (2023) using HQ sized core barrels. The cores were visually logged in the field, including the total core recovery, and the rock quality designation (RQD). Selected sections of intact cores were tested for the unconfined compressive strength (UCS) with results presented in Appendix B. Photographs of the rock cores are presented in Appendix C.

Groundwater levels within the boreholes were measured prior to backfilling. Four (4) of the boreholes were equipped with 50 mm diameter groundwater monitoring wells to allow for stabilized groundwater level measurements and subsequent hydrogeological testing. The remaining boreholes were backfilled upon completion of drilling in accordance with O.Reg. 903.

The boreholes were located in accessible areas on site by EXP field personnel. Ground surface elevations at the borehole locations were surveyed by EXP and referenced to a temporary benchmark (TBM), described as follows:

TBM:	Top of catch basin in northmost asphalt driveway, approximately 40 m south of Olga Drive and 11 m west of the west curb of Brant Street
Elevation:	91.08 m (as per the topographical survey by A.T. McLaren Ltd, dated January 7, 2022)

4. Subsurface Conditions

Details of the subsurface conditions encountered during the drilling program are summarized on the borehole logs in Appendix A. The logs include textural descriptions of the subsoil and groundwater conditions and indicate the soil boundaries inferred from non-continuous sampling and observations during drilling. These boundaries reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Description" preceding the borehole logs form an integral part of and should be read in conjunction with this report.

4.1 Soil Stratigraphy

Asphalt (overlying granular fill) or surficial topsoil was encountered at all boreholes, which were underlain by fill and/or native sand. The fill extended to depths ranging from approximately 0.8 to the maximum explored depth of 2.1 m below existing grade at Borehole BH-5 (2023). The native soil consisted of sand or silty sand overlying various till deposits. Red shale bedrock of the Queenston Formation was encountered underlying the tills at depths ranging

from approximately 4.6 to 6.1 m below existing grade. Details of the encountered materials are provided in the following subsections.

4.1.1 Pavement Structure

Boreholes BH-1 to BH-4 (2021) and Boreholes BH-1, BH-2, and BH-4 (2023) were advanced through the existing pavement structure, which consisted of approximately 80 to 125 mm of asphalt overlying approximately 80 to 250 mm of granular base. The granular base generally consisted of crushed limestone.

4.1.2 Surficial Topsoil

Boreholes BH-5 (2021) and Boreholes BH-3 and BH-5 (2023) encountered a surficial layer of topsoil ranging in thickness from approximately 150 to 330 mm. It is noted that topsoil thicknesses may further vary across the site.

4.1.3 Fill

Fill was encountered in all boreholes, except Borehole BH-4 (2021), underlying the pavement structure or topsoil and extended to depths of approximately 0.8 to the maximum explored depth of 2.1 m at Borehole BH-5 (2023). The fill generally comprised clayey silt, sandy silt, or silty sand with some clay pockets, traces of gravel, asphalt, and rootlets, and varying proportions of red brick fragments. The fill was reddish brown, brown, or dark brown; and in a moist state, with moisture contents ranging from 8 to 19%.

4.1.4 Sand to Silty Sand

Native lacustrine sand or silty sand was encountered in all the boreholes below the granular road base and/or fill and extended to depths of approximately 2.3 to 4.6 m below existing grade. The sand contained trace to some silt, gravel, and occasional shale fragments. A sample of the sand from BH-2 (2021) was tested and found to contain 86% sand, 11% silt and 3% clay. This grading curve is shown in Figure B1 in Appendix B. The sand was brown or grey; and in a moist to very moist state, with moisture contents ranging from 6 to 17%. SPT N values of the stratum ranged from 0 to 71 blows per 305 mm of penetration, indicating very loose to loose conditions in the upper portion of the stratum, but generally became compact to very dense below 1.5 m.

4.1.5 Glacial Tills

Glacial till deposits were encountered in all boreholes between the sand and the bedrock, with a thickness of 1.9 to 3.8 m generally, but only 0.7 m in BH-3 (2021). The tills extended to the shale bedrock at depths ranging from 4.6 to 6.1 m below grade. The till materials varied from silty clay to silt, sandy silt, or silty sand, with trace to some gravel and shale fragments. A sample of the silt till from BH-4 (2021) was tested for grain size distribution. The tested sample contained 8% gravel, 20% sand, 69% silt, and 3% clay (see Figure B1, Appendix B). The tills also contains some cobbles and boulders. The till was reddish brown, brown, or grey in colour; and in a damp to wet state, with moisture contents ranging from 5 to 20%. The stratum was compact to very dense and/or hard with SPT N values ranging from 16 to greater than 100 blows per 305 mm penetration.

4.1.6 Shale Bedrock

Sampling spoon refusal on assumed bedrock surface was encountered in all boreholes except BH-5 (2023) at depths ranging from 4.6 to 6.1 m below grade. It should be noted that the contact elevations should not be interpreted as exact planes of bedrock since the auger will frequently penetrate some distance into the weathered rock before noticeable resistance is encountered. Furthermore, the distinction between highly weathered shale and the overlying stratum, particularly if the latter contains abundant shale fragments, is not always clear and consequently, some of the soil resting on the surface of the bedrock might be very weak and highly weathered shale. After reaching auger refusal, the bedrock was confirmed by coring in Boreholes BH-1, BH-3, and BH-4 (2023) to approximate depths of 13.2 to 13.7 m below grade.

Based on the review of the retrieved rock samples and Ontario Geological Survey Map 2544, Bedrock Geology of Ontario, Southern Sheet, the bedrock consists of red shale of the Queenston formation. In general, the Queenston Shale bedrock is highly weathered in the upper portion (becoming more sound with depth), where it could exhibit characteristics more commonly encountered with soil than with rock (slake durability index less than 80%, higher moisture content, etc.). Hard, relatively thin limestone and siltstone interbeds are also possible within the shale.

The bedrock surface depth and rock quality are summarized in the following table. Unconfined compressive strength testing was conducted on five (5) samples, with the results also summarized in the table below and complete results included in Appendix B. Photographs of the rock cores are included in Appendix C.

Table 4-1: Depth and Elevation of Bedrock Surface

Borehole No.	Depth of Bedrock Surface (m)	Bedrock Surface Elevation (m)	Rock Quality Designation (RQD)	Unconfined Compressive Strength (MPa)
BH-1 (2021)	5.3	85.9	-	-
BH-2 (2021)	5.2	86.2	-	-
BH-3 (2021)	5.3	86.1	-	-
BH-4 (2021)	5.6	85.7	-	-
BH-5 (2021)	4.6	85.9	-	-
BH-1 (2023)	5.4	86.1	25% - 65%	52 - 54
BH-2 (2023)	5.3	85.9	-	-
BH-3 (2023)	6.1	85.4	44% - 100%	62
BH-4 (2023)	5.0	86.5	36% - 59%	42 - 49

4.2 Groundwater Conditions

Groundwater conditions were monitored in the open boreholes during and upon completion of the investigation. Boreholes BH-1 and BH-2 (2021) encountered groundwater at a depth of approximately 4.0 m below grade upon completion and the remaining boreholes were dry upon completion, but groundwater levels are not anticipated to have stabilized during the short term of the investigation. Groundwater monitoring wells were installed Boreholes BH-1 to BH-4 (2023), with measured groundwater depths ranging from 2.6 to 3.8 m below grade on January 31, 2023.

Reference should be made to the EXP hydrogeological report for additional groundwater details. Seasonal variations in the water table should be anticipated, with higher levels occurring during wet weather conditions (spring thaw and late fall) and lower levels occurring during dry weather conditions.

5. Engineering Discussion and Recommendations

Based on the conceptual site plan provided to EXP, it is understood that the proposed development will consist of a 12-storey residential structure including a commercial/retail area and a 3-storey below-grade parking garage that occupies the majority of the site. We offer the following comments and recommendations for the proposed construction.

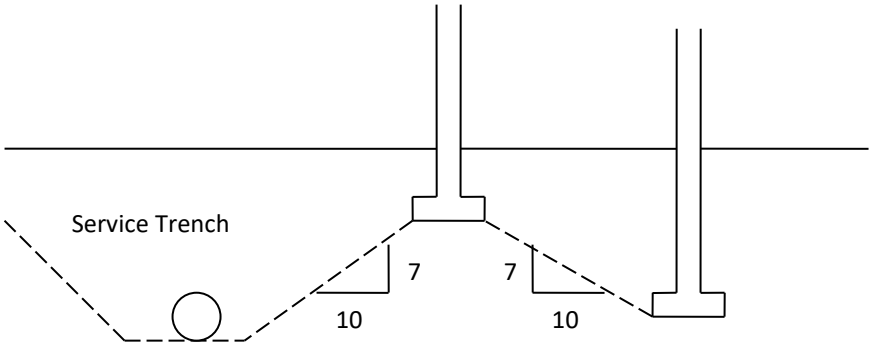
5.1 Foundation Considerations

Three (3) levels of underground parking is envisioned which corresponds to an assumed founding level of about 10 m below grade. Based on the conditions encountered in the boreholes, the proposed building will be founded in the shale bedrock.

Foundations supported on slightly weathered to sound shale bedrock at least 1.5 m below the rock surface can be designed using a geotechnical resistance of 3,000 kPa at Ultimate Limit State (ULS). The expected deformation of the shale bedrock is less than the normally tolerated limits of 25 mm and therefore ULS governs. Prior to placement of foundation concrete, all existing soils and highly weathered/fractured shale bedrock must be removed down to the slightly weathered to sound shale bedrock. The exposed bearing surface is to be reviewed by EXP and must be protected by weathering and disturbance; this can be accomplished by placing a skim coat of concrete shortly after excavation.

5.2 General Foundation Recommendations

If applicable, any conventional foundations in soil at different elevations should be located such that higher footings are set below a line drawn up at 10:7, horizontal to vertical from the near edge of the lower footing. This requirement is not applicable for foundations in sound bedrock. This concept should also be applied to excavations for new foundations in relation to existing foundations or underground services.



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

All foundations exposed to freezing conditions must be provided with a minimum of 1.2 m of earth cover or equivalent insulation for frost protection, depending on the final grade requirements.

The recommended geotechnical resistances have been calculated by EXP from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of underground conditions becomes available. For example, it should be appreciated that modifications to bearing levels may be required if unforeseen subsoil conditions are revealed after the excavation is exposed to full view or if final design decisions differ from those assumed in this report. For this reason, this office should be retained to review final foundation drawings and to provide field inspections during the construction stage.

5.3 Excavations

Excavations for the proposed 3-storey parking garage are expected to extend to depths of about 10 m below existing grade. Excavations will be carried out through the fill, native sand, and tills. Excavation of the overburden soil at this site is generally not expected to pose any major difficulty and can be carried out with heavy hydraulic excavators as required. However, it should be noted that the tills are non-sorted sediments and cobbles, boulders, and shale fragments may be encountered within these deposits. Shale bedrock was encountered as shallow as 4.6 m below grade in the boreholes, therefore up to 5 m of rock excavation should be anticipated. Excavations proceeding into the weathered shale may be carried out using heavy hydraulic excavators equipped with rock teeth. The deeper excavations into the sound shale or where limestone lenses are encountered will require the use of rock breaking equipment such as pneumatic hammers and will proceed slowly.

All excavations must be completed in accordance with the most recent regulations of the Ontario Occupation Health and Safety Act (OHSA). The encountered fill and native sand may generally be classified as Type 3 Soil above the groundwater level. The dense to very dense till and highly weathered shale may be classified as Type 2 Soil. Excavations in the more sound shale bedrock can generally be carried out with side slopes of approximately 1:6, horizontal to vertical, provided all loose rock is removed from the face of the excavation and it is monitored for seepage/sloughing. Netting and/or shotcrete covering may be required to prevent loose rock fragments from falling into the excavation and injuring the work crew.

In accordance with the OHSA regulations if the excavation contains more than one type of soil, the soil shall be classified as the type with the highest number. The OHSA requires that excavation slopes be cut at predetermined inclinations, based on the soil types encountered. The need to excavate flatter side slopes if excessively wet or

soft/loose materials, or concentrated seepage zones are encountered, should not be overlooked. Water (i.e. surface water runoff) should not be permitted to enter and/or pond within the construction area.

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

5.4 Temporary Shoring

If required, the shoring method chosen by the structural engineer and/or contractor will depend on the settlement tolerance of the surrounding structures and infrastructure. Where settlement sensitive structures or services are located within a distance from the excavation equal or less than the overburden excavation depth, the use of a rigid retaining structure will be required.

In general, temporary shoring can be laterally restrained with tieback anchors, rakers, struts, or corner braces. The shoring system should be designed in accordance with the guidelines provided in the Canadian Foundation Engineering Manual (CFEM).

Lateral support for the shoring system can be obtained by using rakers founded on bedrock. Tieback anchors should be installed in the soil or rock behind the excavation to a sufficient distance to allow mobilizing the desired lateral load resistance. The recommended configuration of the no-load zone is shown in Figure 26.16 of the Canadian Foundation Engineering Manual (CFEM), 4th Edition. The minimum horizontal spacing between anchors should be 1.2 m to ensure that group effects between adjacent ground anchors are minimized and that anchor intersection (due to drilling deviations) is avoided. Group effects will reduce the load-carrying capacity of individual ground anchors. A bond stress of 100 kPa in the native sand or glacial tills and 150 kPa in shale (minimum 3 m penetration) may be used. Higher bond values may be considered if the soil anchors are constructed using re-groutable techniques. The actual value should be based on the results of pullout tests conducted in the early phases of construction.

The recommended design parameters should be confirmed by load testing a number of anchors to 200% design load in accordance with the current edition of the CFEM. As a minimum for this site, at least two 200% anchor load tests for each soil stratum should be carried out to verify the capacity of the anchors. The design for the production anchors should then be modified based on the test results, where necessary. All remaining anchors must be installed using similar procedures and proof tested to 1.5 times the design load.

EXP should be retained to review the shoring design, to monitor installation and testing of the system, and to monitor the shoring movements during all phases of the excavation. Inclinometers should be installed at locations where buildings or services lie close to the excavation. Careful monitoring is needed in any shored excavation, especially when buildings are located in close proximity. This is necessary to anticipate when and if additional support is needed.

5.5 Lateral Earth Pressure

Under certain conditions, Queenston Shale has been found to have time dependent deformation characteristics which could impose higher lateral pressures on the basement walls. However, EXP has completed testing on this rock type in numerous previous projects and found that most of the rock swelling should occur within approximate 90

days of excavation. Therefore if the basement walls are backfilled after 90 days, they should not suffer swelling pressures. Notwithstanding, it is suggested that the use of oversized excavations or compressible backfill material be used or additional site-specific testing be carried out.

The lateral earth pressure acting on the foundation walls due to soil backfill may be calculated using the following equation:

$$p = K(\gamma h + q)$$

where
- p = lateral earth pressure intensity at depth h (kPa)
- K = earth pressure coefficient (assume 0.40)
- γ = unit weight of retained soil, assume 22.0 kN/m^3 for granular backfill
- h = depth to point of interest (m)
- h_w = height of water (m)
- q = surcharge load acting adjacent to the wall at the ground surface (kPa)

The above expression assumes that the perimeter drainage system prevents the build-up of hydrostatic pressure behind the wall and free-draining granular material will be used for backfilling adjacent to the wall. Otherwise, if the building is constructed as a waterproof tank without drainage, lateral hydrostatic and uplift pressures below the slab will need to be accounted for using the expression below:

$$p = K[(\gamma h_w) + (\gamma' (h - h_w) + q)] + (\gamma_w (h - h_w))$$

where
- p = lateral earth pressure and hydrostatic pressure acting at depth h (kPa)
- K = active earth pressure coefficient, assume 0.40
- γ_w = unit weight of water, 9.8 kN/m^3
- γ = unit weight of soil backfill surrounding the structure, assume 22.0 kN/m^3
- γ' = effective unit weight of retained soil, assume 12.2 kN/m^3
- h = depth to point of interest (m)
- h_w = height of water (m)
- q = equivalent value of surcharge on the ground surface (kPa)

5.6 Groundwater Control

Excavations for three levels of underground parking would encounter some perched water within the fill or from the base of the sand layer as well as seepage from the till and shale bedrock. The seepage rate should be slow, and it should be possible to remove the water using conventional construction dewatering techniques, i.e. pumping from filtered sumps combined with ditching or oversized excavations as needed. Reference should be made to the hydrogeological report for the anticipated dewatering volumes and additional groundwater comments.

Dewatering requirements will be governed by the time of year the construction is performed. It is the responsibility of the contractor to propose a suitable dewatering system based on the groundwater levels at the time of construction. The method used should not undermine adjacent structures. Seasonal variations in the water table

should be anticipated, with higher levels occurring during wet weather conditions (spring thaw and late fall) and lower levels occurring during dry weather conditions.

5.7 Building Floor Slab-on-Grade and Permanent Drainage

The floor slab-on-grade for the proposed building can be supported on the bedrock. It is recommended that the exposed subgrade be examined by a geotechnical engineer prior to constructing the floor slab-on-grade. Any loose or disturbed material encountered during the review should be sub-excavated and replaced with approved fill placed in lifts not exceeding 200 mm and compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) within 2% of the optimum moisture content.

Perimeter drainage is considered necessary for buildings with a basement unless the building is constructed as a "tank" and waterproofed. Perimeter walls should be designed to allow for drainage (equipped with a proprietary drainage board and/or backfilled with free draining granular material). A weeping tile system consisting of 100 mm diameter perforated pipes surrounded with 300 mm clear stones and wrapped with a filter fabric, should be constructed at footing level to prevent the build-up of hydrostatic pressure behind the wall. In addition, underfloor drains should be installed at invert level of at least 300 mm below the granular base of the basement slabs unless the building is constructed as "tank" given the groundwater levels measured at the site. The perimeter and underfloor drainage systems should not be connected to the same collector pipe.

The floor slab should be cast on a layer of moisture barrier consisting of 19 mm clear stone with a thickness of at least 200 mm. The clear stone layer will minimize the capillary rise of moisture from the subsoil to the floor slab (moisture barrier). Adequate saw cuts should be provided in the floor slab as directed by the structural engineer to help control cracking. The exterior grade should be sloped to ensure positive drainage of surface water away from the structure and reduce groundwater infiltration adjacent to the foundations.

5.8 Backfill

Backfill used to satisfy under slab requirements and service trenches, etc. should be compactible fill, i.e. inorganic soil with its moisture content close to its optimum moisture content as determined in the Standard Proctor Test. Fill placed below concrete slab areas should be compacted to 100% SPMDD in lifts not exceeding 200 mm.

To minimize potential problems, any trench backfilling operations should follow closely after excavation so that only minimal length of trench slope is exposed. This will minimize wetting of the subgrade material. Should construction extend to the winter season, particular attention should be given to ensure that frozen material is not used as backfill.

The majority of excavated material will likely consist of sand and various till soils. In general, the excavated material may be reused for backfill subject to the removal of any obviously unsuitable material. However, silty materials require strict moisture content control and significant compactive effort and as such, it may be preferable to use imported fill as needed. The excavated shale bedrock should not be reused as backfill.

In general, the overburden soils are not free draining and therefore should not be used where this characteristic is required, or in confined areas. Imported granular material conforming to OPSS Granular B Type I or II would be suitable for these purposes.

All backfilling and compaction operations must be closely examined by a qualified geotechnical consultant to ensure uniform compaction to specification requirements, especially in the vicinity of manholes and catch basins, and in all areas that are not readily accessible to compaction equipment.

5.9 Earthquake Considerations

The recommendations for the geotechnical aspects to determine the earthquake loading are presented in the subsections below.

5.9.1 Subsoil Conditions

The subsoil and groundwater information at this site have been examined in relation to Section 4.1.8.4 of the OBC 2012. Foundations are anticipated to be founded on shale bedrock. There have been no shear wave velocity measurements carried out at this site and therefore, N values and EXP's knowledge of the soil and bedrock conditions in the area have been used to determine the site classification.

5.9.2 Site Classification

Based on the known soil conditions and anticipated founding conditions, the recommended Site Class for this site is "C" as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012. The acceleration and velocity-based site coefficients, F_a and F_v, should be determined from Tables 4.1.8.4.B. and 4.1.8.4.C. respectively of the OBC for the above recommended Site Class. It may be possible to achieve an improved site class through the evaluation of the subsurface conditions using shear wave velocities. EXP can be contacted to provide this service, if required.

6. General Comments

The information presented in this report is based on a limited investigation designed to provide information to support an overall assessment of the current geotechnical conditions of the subject property. The conclusions presented in this report reflect site conditions existing at the time of the investigation.

EXP Services Inc. should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, EXP Services Inc. will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

More specific information, with respect to the conditions between samples, or the lateral and vertical extent of materials, may become apparent during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, EXP Services Inc. should be contacted to assess the situation and additional testing and reporting may be required. EXP Services Inc. has qualified personnel to provide assistance in regard to future geotechnical and environmental issues related to this property.

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

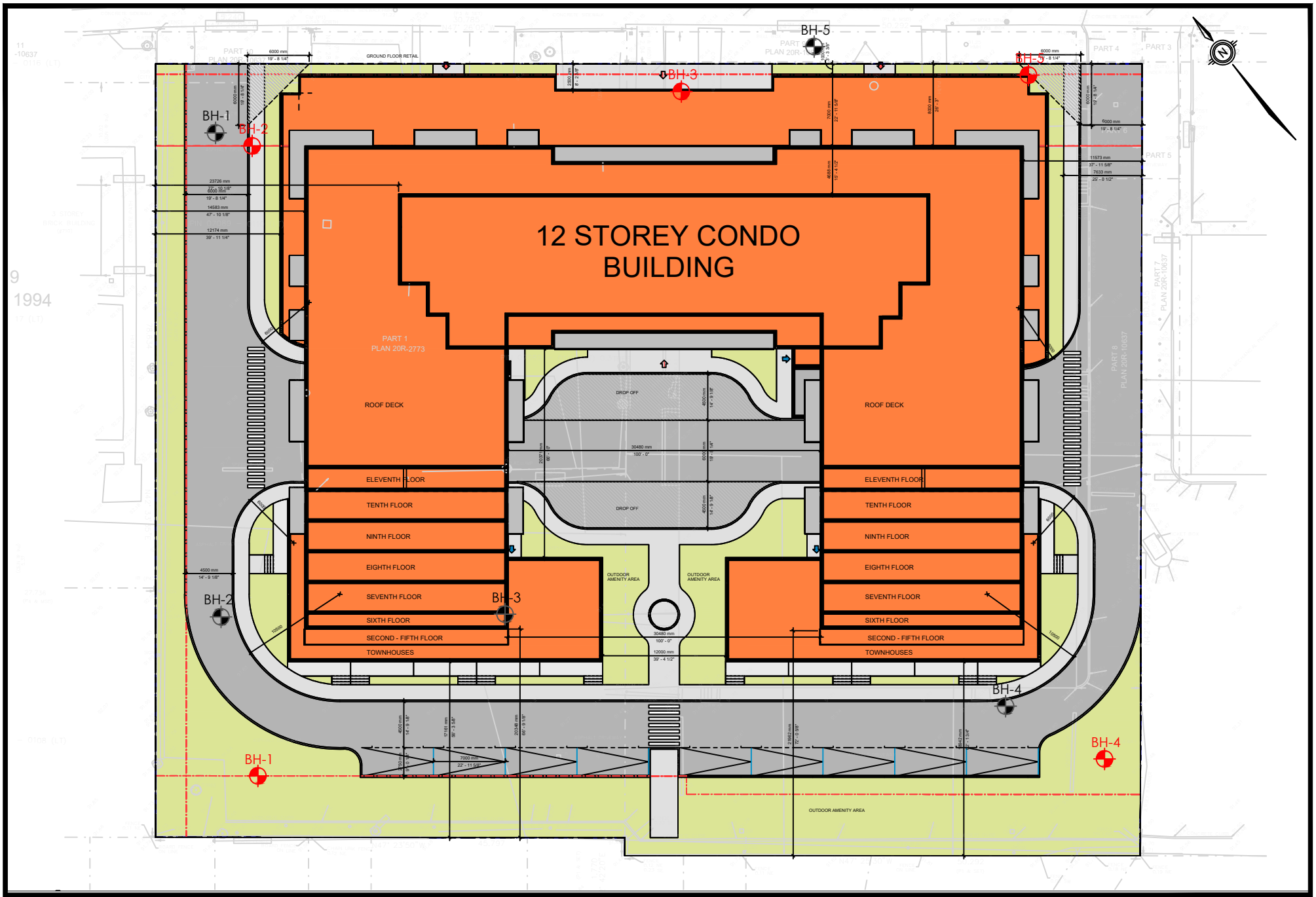


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Appendix A

Drawings & Borehole Logs



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LEGEND:

APPROXIMATE BOREHOLE LOCATION (EXP 2021)

APPROXIMATE BOREHOLE LOCATION (EXP 2023)

TITLE AND LOCATION:

BOREHOLE LOCATION PLAN
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
688-698 BRANT STREET, BURLINGTON, ON

JOB NO.: GTR-21018895-B1	DRAWN BY: SG
SCALE: NTS	CHECKED BY: JG
DATE: FEBRUARY 2023	DWG NO.: 1

Notes on Sample Descriptions

1. All sample descriptions included in this report follow the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), as outlined in the Canadian Foundation Engineering Manual. Note, however, that behavioral properties (i.e. plasticity, permeability) take precedence over particle gradation when classifying soil. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

UNIFIED SOIL CLASSIFICATION

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Notes On Soil Descriptions

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay and Silt	<0.060 mm	"trace" (e.g. Trace sand)	1% to 10%
Sand	0.060 to 2.0 mm	"some" (e.g. Some sand)	10% to 20%
Gravel	2.0 to 75 mm	adjective (e.g. sandy, silty)	20% to 35%
Cobbles	75 to 200 mm	"and" (e.g. and sand)	35% to 50%
Boulders	>200 mm		

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

Cohesionless Soil		Cohesive Soil		
Compactness	**Standard Penetration Resistance "N" Blows / 0.3 m**	**Consistency**	**Undrained Shear Strength (kPa)**	**Standard Penetration Resistance "N" Blows / 0.3 m**
Very Loose	0 to 4	Very soft	<12	<2
Loose	4 to 10	Soft	12 to 25	2 to 4
Compact	10 to 30	Firm	25 to 50	4 to 8
Dense	30 to 50	Stiff	50 to 100	8 to 15
Very Dense	Over 50	Very Stiff	100 to 200	15 to 30
		Hard	>200	>30

5. **ROCK CORING**

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

RQD Classification	RQD (%)
Very Poor Quality	<25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

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

Log of Borehole BH-1 (2021)

Project No. HAM-21018895-A0 Drawing No. 3

Project: Geotechnical Investigation Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, Ontario

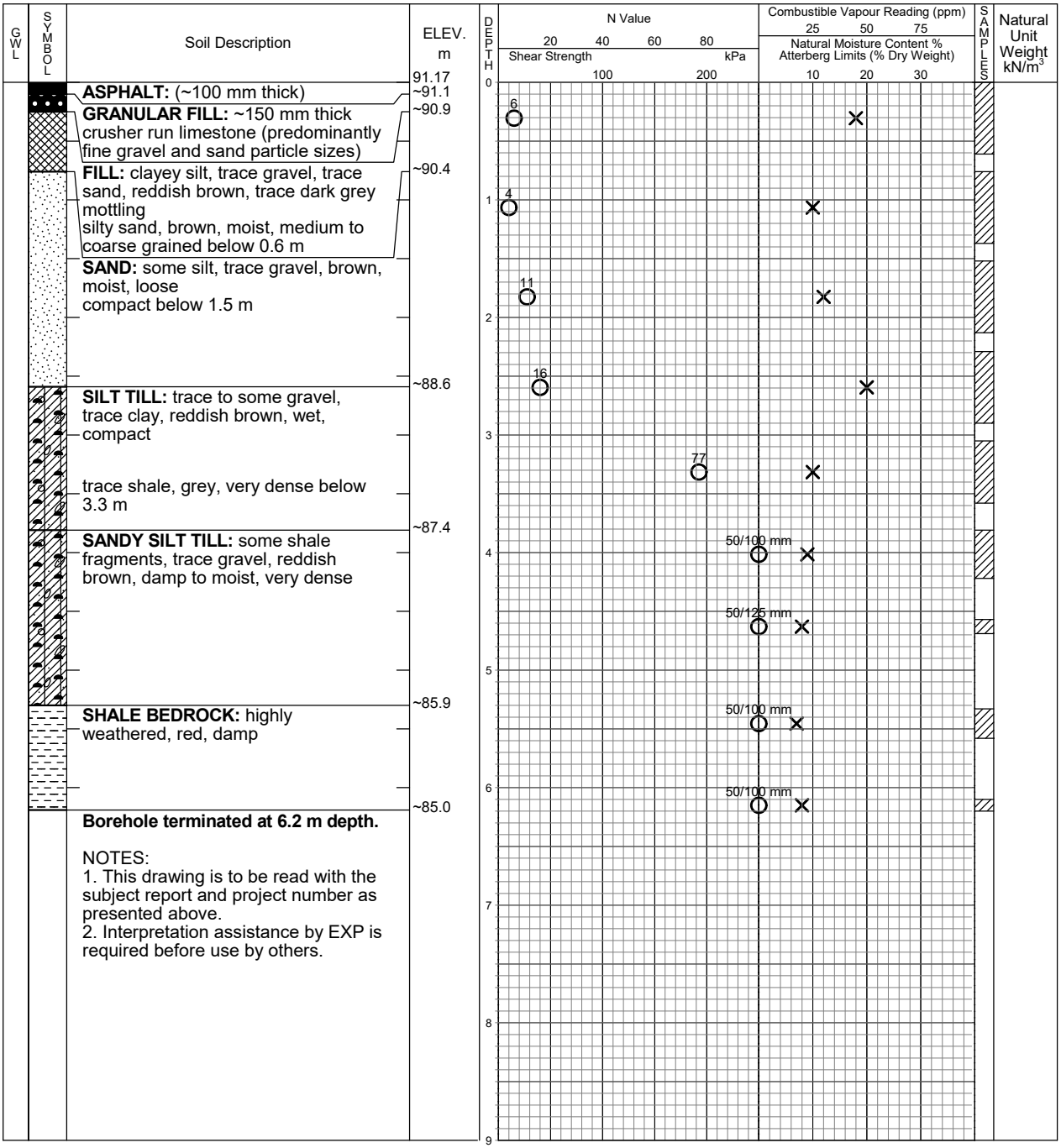
Date Drilled: October 12, 2021

Drill Type: D-50 Truck Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	3.96	open

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Log of Borehole BH-2 (2021)

Project No. HAM-21018895-A0 Drawing No. 4

Project: Geotechnical Investigation Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, Ontario

Date Drilled: October 12, 2021

Drill Type: D-50 Truck Mount, Solid Stem

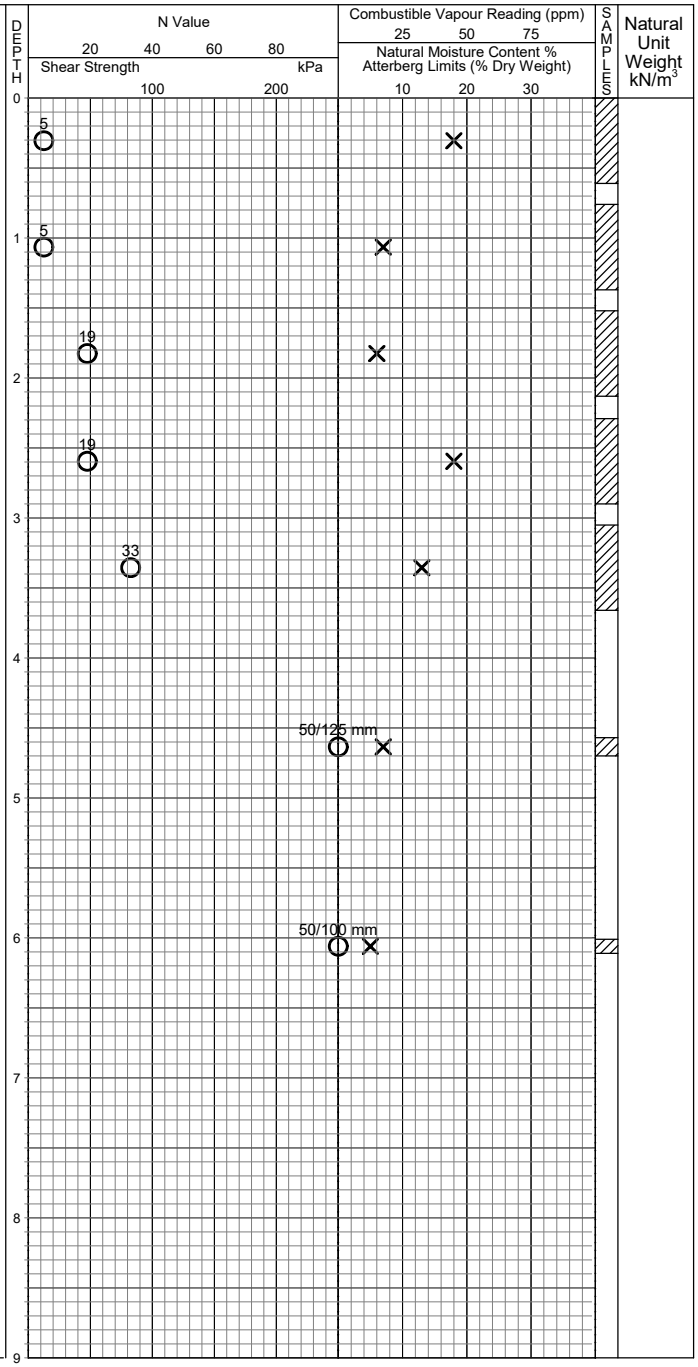
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		ASPHALT: (~125 mm thick)	91.38 ~91.3
		GRANULAR FILL: ~125 mm thick crusher run limestone (predominantly fine gravel and sand particle sizes)	~91.1
		FILL: clayey silt, trace gravel, reddish brown, moist	~90.6
		SAND: trace silt, trace clay, brown, moist, loose, fine to coarse grained brownish grey, compact below 1.5 m very moist below 2.5 m	~88.6
		SILT TILL: some clay, trace gravel, trace sand, brown, moist, dense reddish brown below 3.3 m	~86.8
		SANDY SILT TILL: trace red shale fragments, reddish brown, damp to moist, very dense	~86.2
		SHALE BEDROCK: highly weathered, red, damp	~85.2
		Borehole terminated at 6.2 m depth.	

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.



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EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	3.96	5.03

Log of Borehole BH-3 (2021)

Project No. HAM-21018895-A0 Drawing No. 5

Project: Geotechnical Investigation Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, Ontario

Date Drilled: October 12, 2021

Drill Type: D-50 Truck Mount, Solid Stem

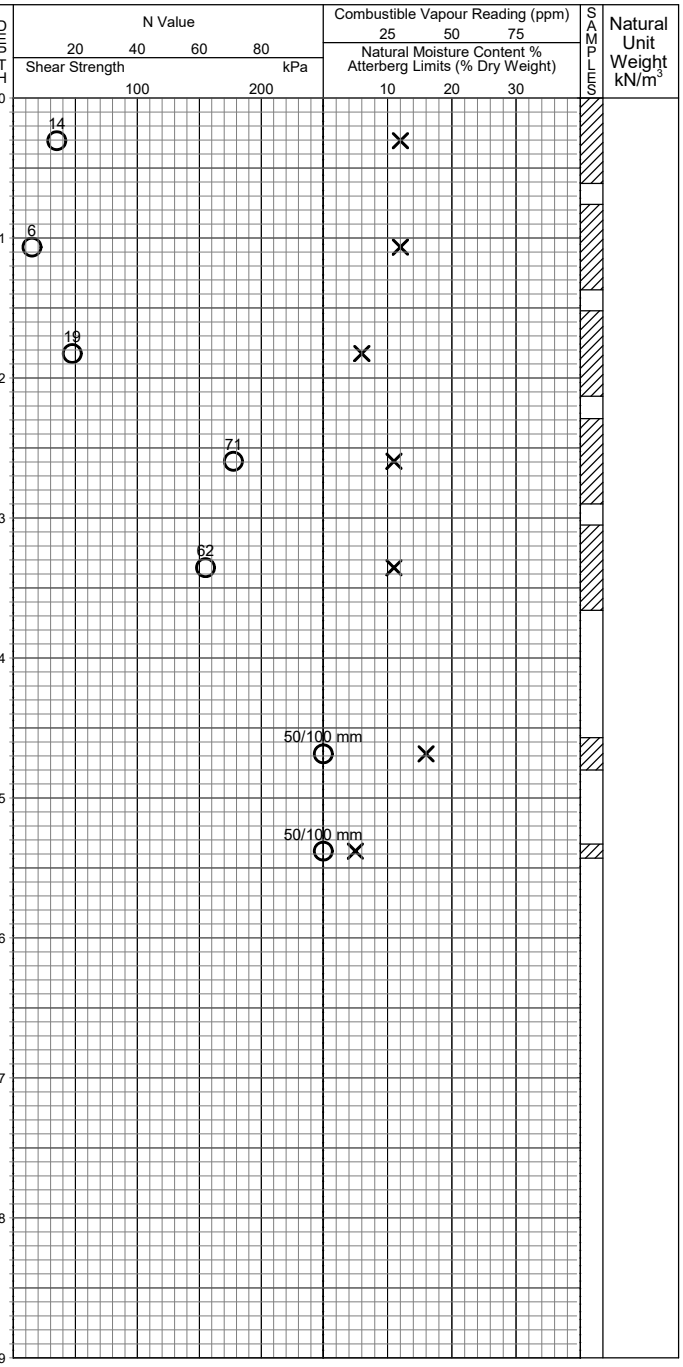
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m
	91.40
ASPHALT: (~100 mm thick)	~91.3
GRANULAR FILL: ~125 mm thick crusher run limestone (predominantly fine gravel and sand particle sizes)	~91.2
FILL: silty sand, trace gravel, dark brown, moist	~90.6
SAND: some silt, trace gravel, brown, moist, loose	
compact below 1.5 m	
very dense below 2.3 m	
trace shale fragments below 3.0 m	
	~86.8
SILT TILL: some shale fragments, trace gravel, trace clay, reddish brown, moist, very dense	
	~86.1
SHALE BEDROCK: highly weathered, red, damp	~86.0
Borehole terminated at 5.4 m depth.	

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.



SAMPLES

Natural Unit Weight kN/m³

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Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	4.88

Log of Borehole BH-4 (2021)

Project No. HAM-21018895-A0 Drawing No. 6

Project: Geotechnical Investigation Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, Ontario

Date Drilled: October 13, 2021

Drill Type: D-50 Truck Mount, Solid Stem

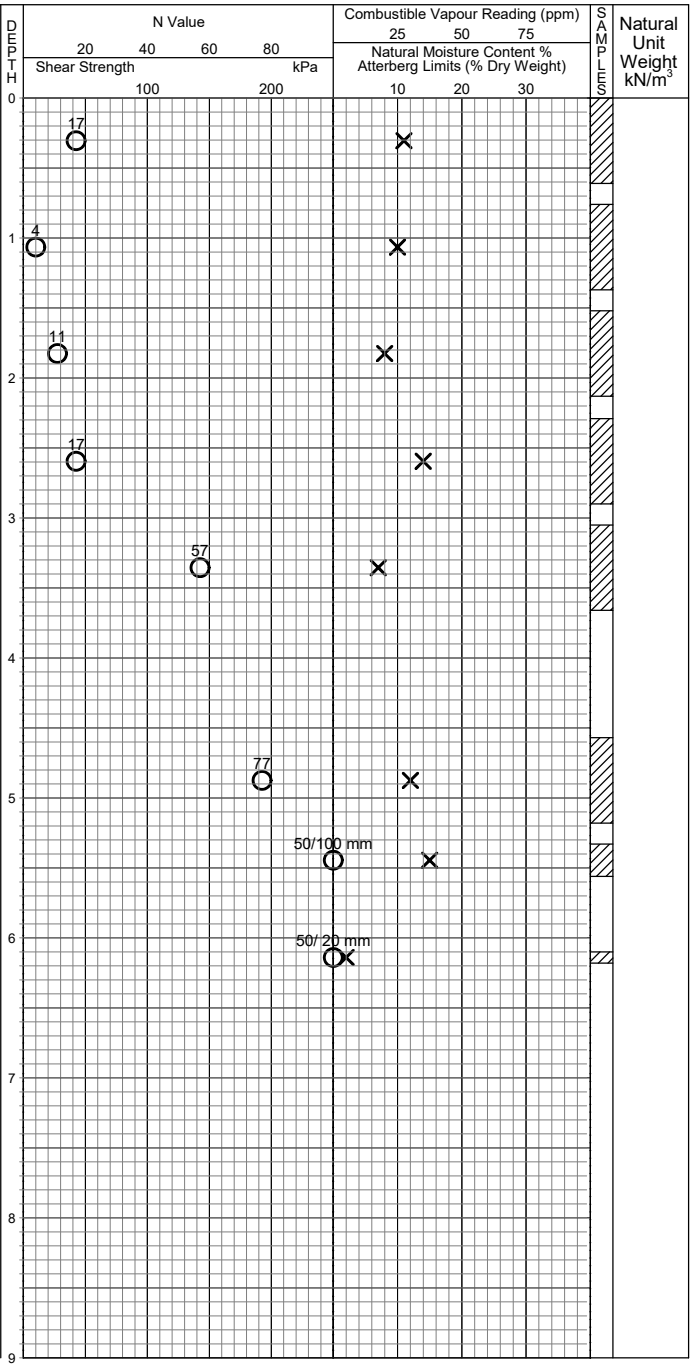
Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
			91.38
		ASPHALT: (~100 mm thick)	~91.3
		GRANULAR FILL: ~250 mm thick crusher run limestone (predominantly fine gravel and sand particle sizes)	~91.0
		SAND: some silt, brown, moist, loose	
		compact below 1.5 m	
		SILT TILL: trace gravel, trace sand, trace clay, moist, brownish grey, very dense	~88.3
		reddish brown, some shale fragments below 4.6 m	
		SHALE BEDROCK: highly weathered, red, damp	~85.7
		Borehole terminated at 6.1 m depth.	~85.3

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.



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EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	5.89

Log of Borehole BH-5 (2021)

Project No. HAM-21018895-A0 Drawing No. 7

Project: Geotechnical Investigation Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, Ontario

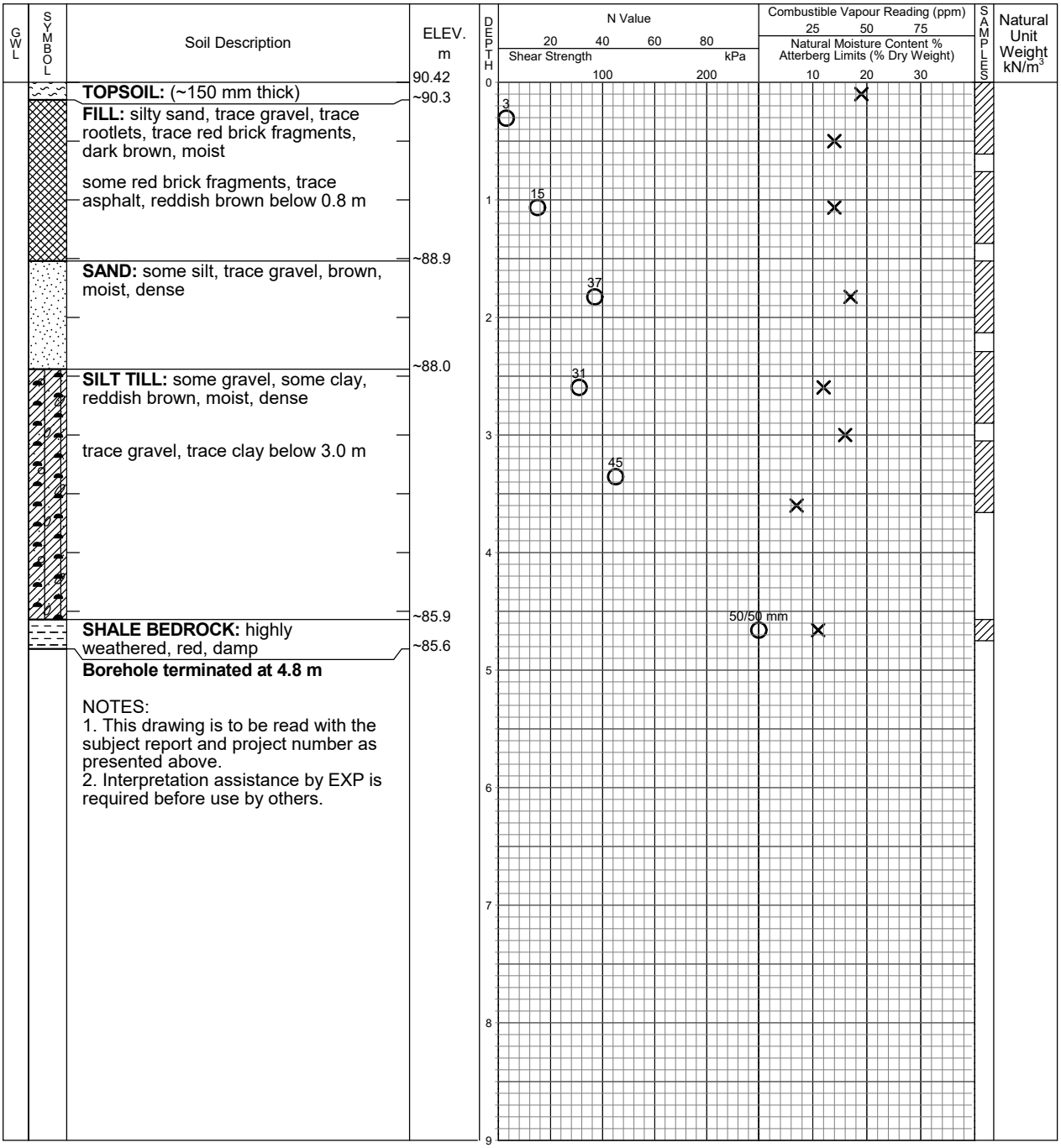
Date Drilled: October 13, 2021

Drill Type: D-50 Truck Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

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EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	open

Log of Borehole BH-1 (2023)

Project No. GTR-21018895-B1 Drawing No. 8

Project: Proposed Mid-Rise Residential Development Sheet No. 1 of 2

Location: 688 Brant Street, Burlington, ON

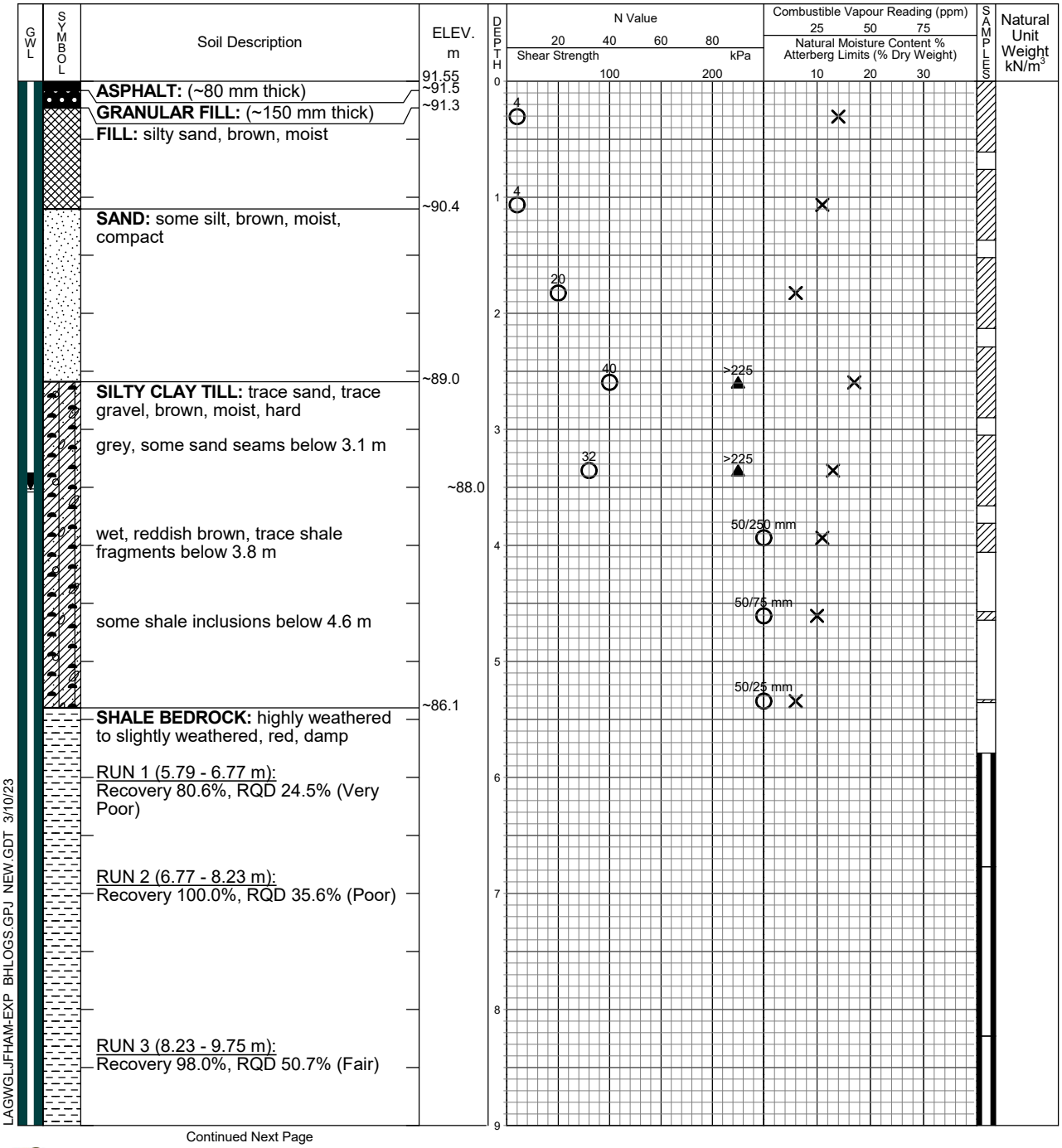
Date Drilled: January 12, 2023

Drill Type: D-120 Truck Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



Continued Next Page

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.54	-

Log of Borehole BH-1 (2023)

Project No. GTR-21018895-B1 Drawing No. 8

Project: Proposed Mid-Rise Residential Development Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
			82.55	9	20 40 60 80 / 100 200	25 50 75 / 10 20 30		
		RUN 4 (9.75 - 11.28 m): Recovery 96.7%, RQD 62.7% (Fair)		10				
		RUN 5 (11.28 - 12.64 m): Recovery 100.0%, RQD 64.7% (Fair)		11				
		RUN 6 (12.64 - 13.71 m): Recovery 100%, RQD 40.2% (Poor)		12				
			~77.8	13				
		Borehole terminated at 13.7 m below grade in shale bedrock.		14				
		NOTES: 1. This drawing is to be read with the subject report and project number as presented above. 2. Interpretation assistance by EXP is required before use by others.		15				
				16				
				17				
				18				
				19				

LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.54	-

Log of Borehole BH-2 (2023)

Project No. GTR-21018895-B1 Drawing No. 9

Project: Proposed Mid-Rise Residential Development Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, ON

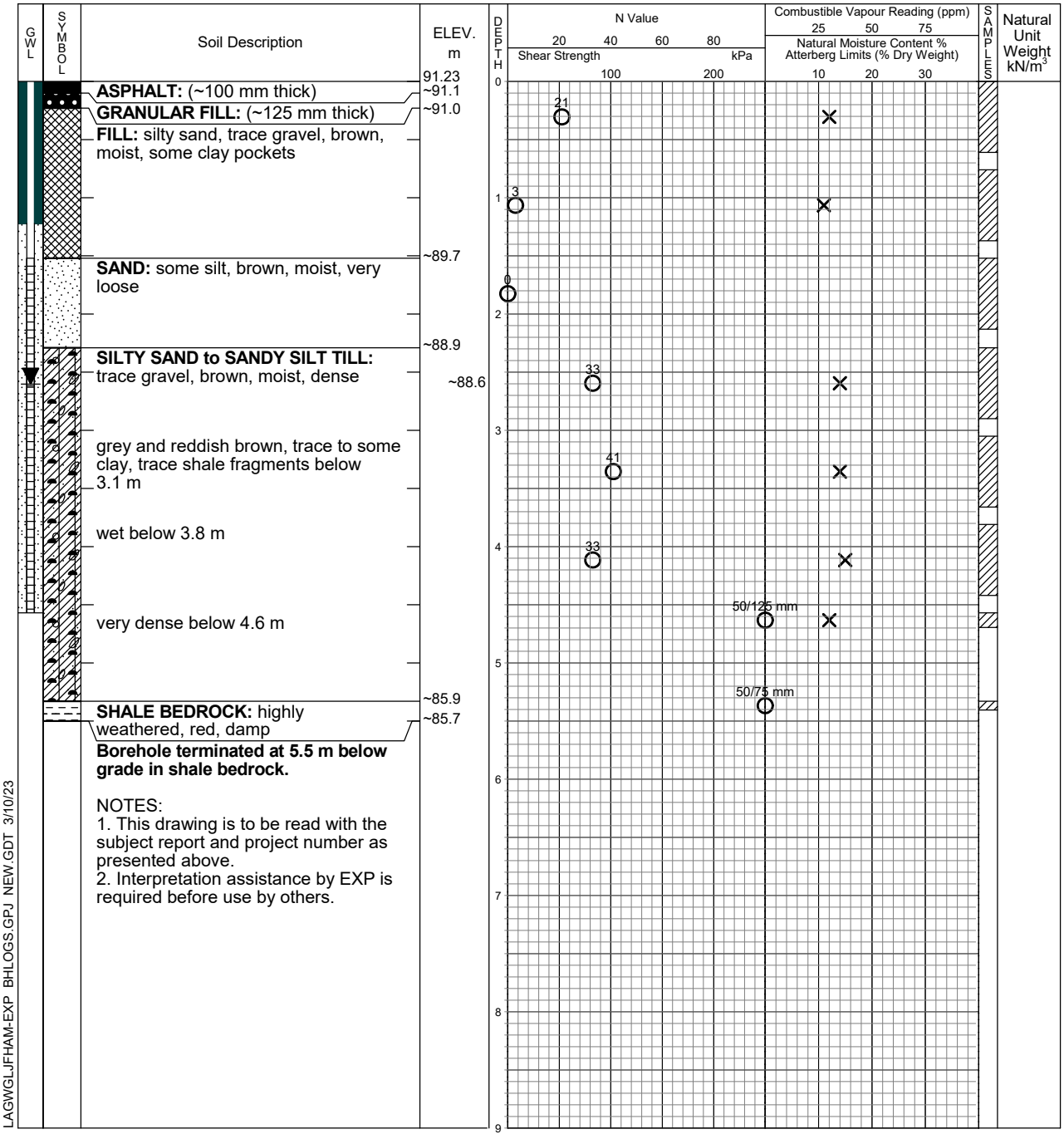
Date Drilled: January 12, 2023

Drill Type: D-120 Truck Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	2.63	-

Log of Borehole BH-3 (2023)

Project No. GTR-21018895-B1 | Drawing No. 10

Project: Proposed Mid-Rise Residential Development | Sheet No. 1 of 2

Location: 688 Brant Street, Burlington, ON

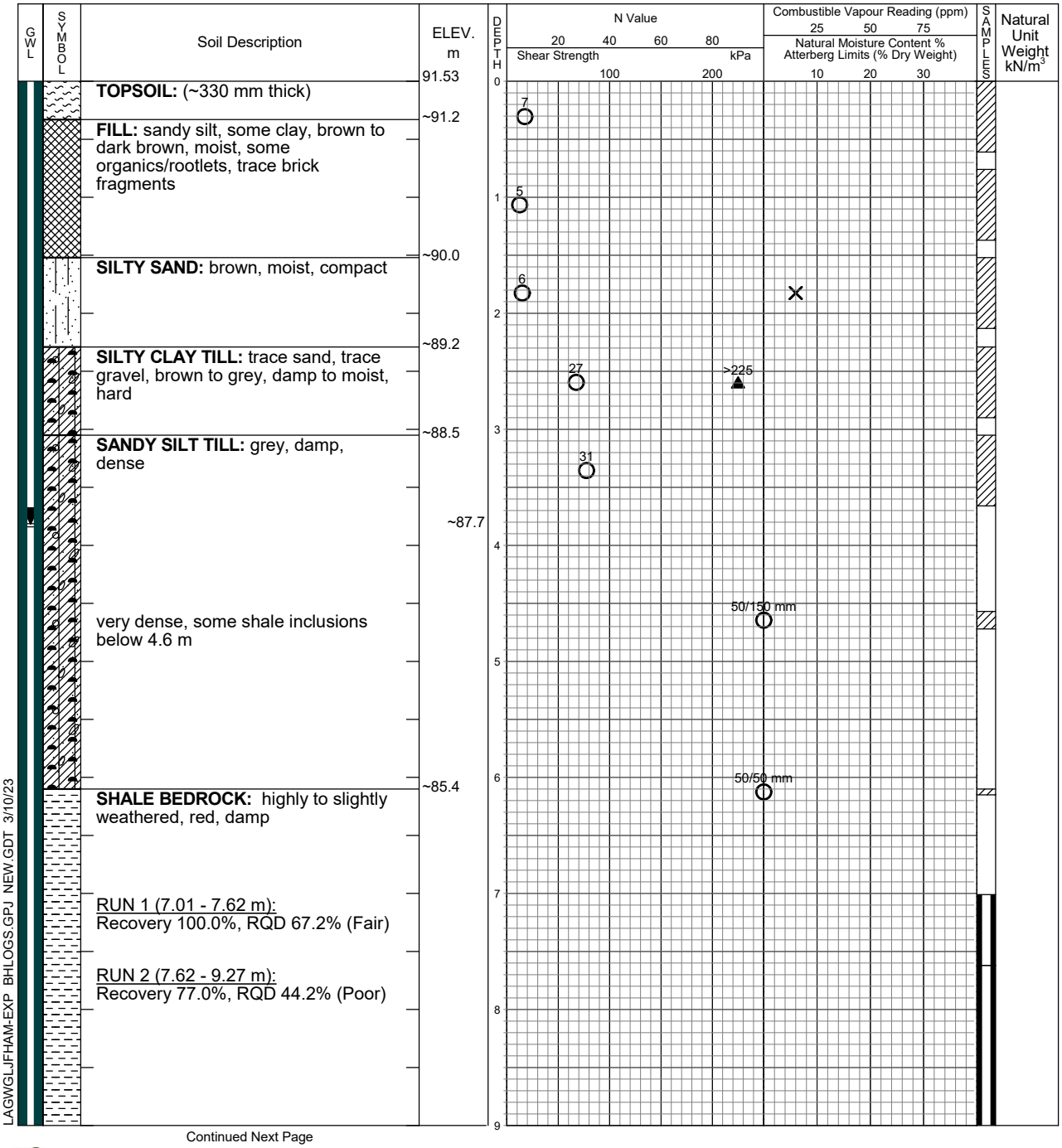
Date Drilled: January 19-20, 2023

Drill Type: D-120 Track Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

Continued Next Page

EXP Services Inc.
Hamilton, Ontario
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Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.84	-

Log of Borehole BH-3 (2023)

Project No. GTR-21018895-B1 Drawing No. 10

Project: Proposed Mid-Rise Residential Development Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
			82.53	9	20 40 60 80 / 100 200	25 50 75 / 10 20 30		
		RUN 3 (9.27 - 10.74 m): Recovery 100.0%, RQD 77.6% (Good)		10				
		RUN 4 (10.74 - 12.27 m): Recovery 100.0%, RQD 73.2% (Good)		11				
		RUN 5 (12.27 - 13.49 m): Recovery 100.0%, RQD 100.0% (Excellent)		12				
				13				
			~78.0	14				
		Borehole terminated at 13.5 m below grade in shale bedrock.		15				
		NOTES: 1. This drawing is to be read with the subject report and project number as presented above. 2. Interpretation assistance by EXP is required before use by others.		16				
				17				
				18				
				19				

LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.84	-

Log of Borehole BH-4 (2023)

Project No. GTR-21018895-B1 Drawing No. 11

Project: Proposed Mid-Rise Residential Development Sheet No. 1 of 2

Location: 688 Brant Street, Burlington, ON

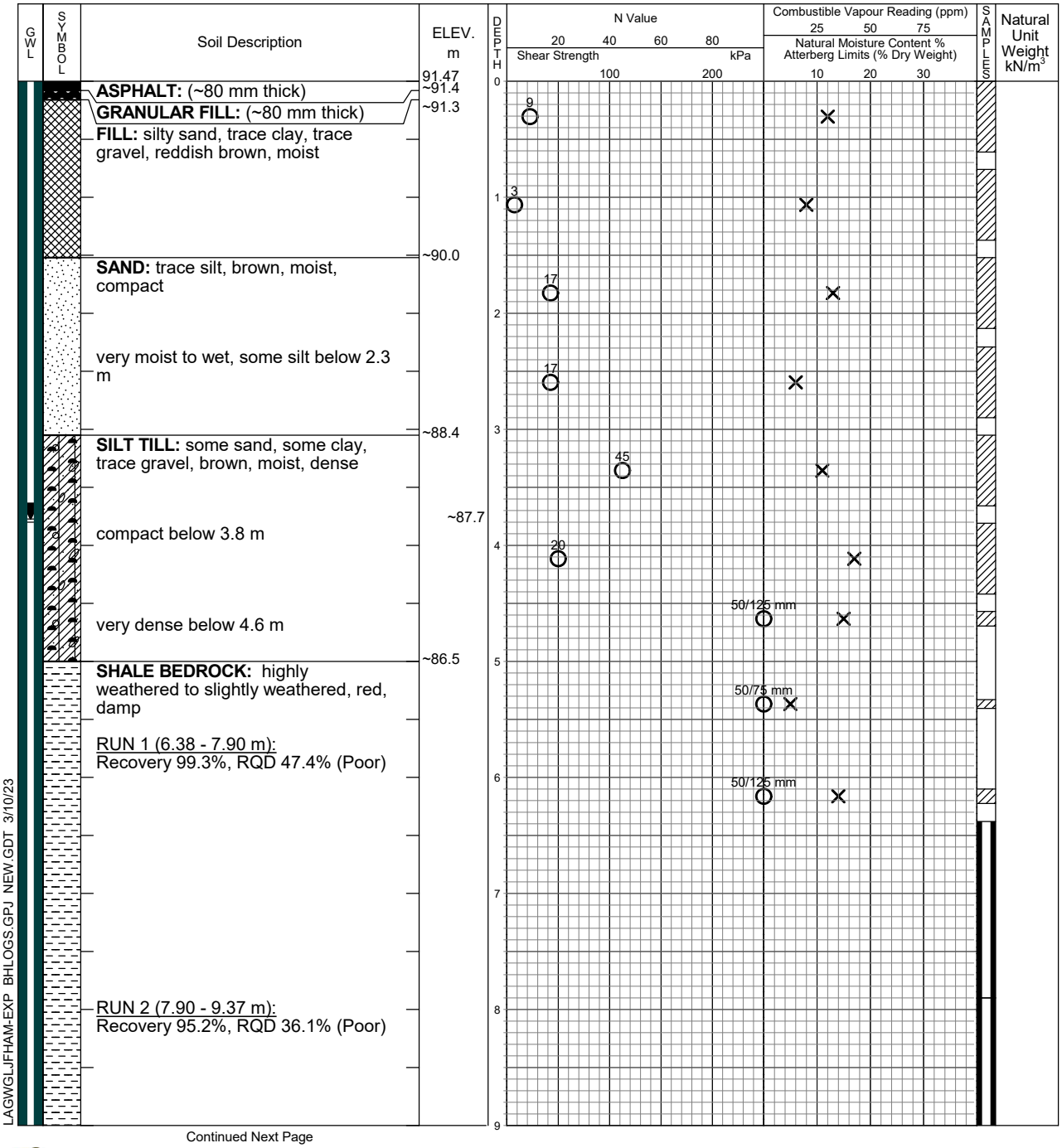
Date Drilled: January 16, 2023

Drill Type: D-120 Truck Mount, Solid Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

Continued Next Page

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.80	-

Log of Borehole BH-4 (2023)

Project No. GTR-21018895-B1 Drawing No. 11

Project: Proposed Mid-Rise Residential Development Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
			82.47	9	20 40 60 80 / 100 200	25 50 75 / 10 20 30		
		RUN 3 (9.37 - 10.92 m): Recovery 99.4%, RQD 47.1% (Poor)		10				
		RUN 4 (10.92 - 12.50 m): Recovery 97.5%, RQD 50.0% (Fair)		11				
		RUN 5 (12.50 - 13.36 m): Recovery 100.0%, RQD 59.3% (Fair)		12				
			~78.1	13				
		Borehole terminated at 13.4 m depth below grade in shale bedrock.		14				
		NOTES: 1. This drawing is to be read with the subject report and project number as presented above. 2. Interpretation assistance by EXP is required before use by others.		15				
				16				
				17				
				18				
				19				

LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave
January 31, 2023	3.80	-

Log of Borehole BH-5 (2023)

Project No. GTR-21018895-B1 Drawing No. 12

Project: Proposed Mid-Rise Residential Development Sheet No. 1 of 1

Location: 688 Brant Street, Burlington, ON

Date Drilled: January 17, 2023

Drill Type: Pionjar

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		TOPSOIL: (~150 mm thick)	91.38	0
		FILL: sand, some silt, trace gravel, brown, moist, trace brick fragments and rootlets	~91.2	
		Borehole terminated at 2.1 m depth below grade.	~89.2	2

NOTES:
1. This drawing is to be read with the subject report and project number as presented above.
2. Interpretation assistance by EXP is required before use by others.

N Value: 20 40 60 80
Shear Strength kPa: 100 200
Combustible Vapour Reading (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

LAGWGLJFHAM-EXP BHLOGS.GPJ NEW.GDT 3/10/23

EXP Services Inc.
Hamilton, Ontario
Telephone: 905.573.4000
Facsimile: 905.573.9693

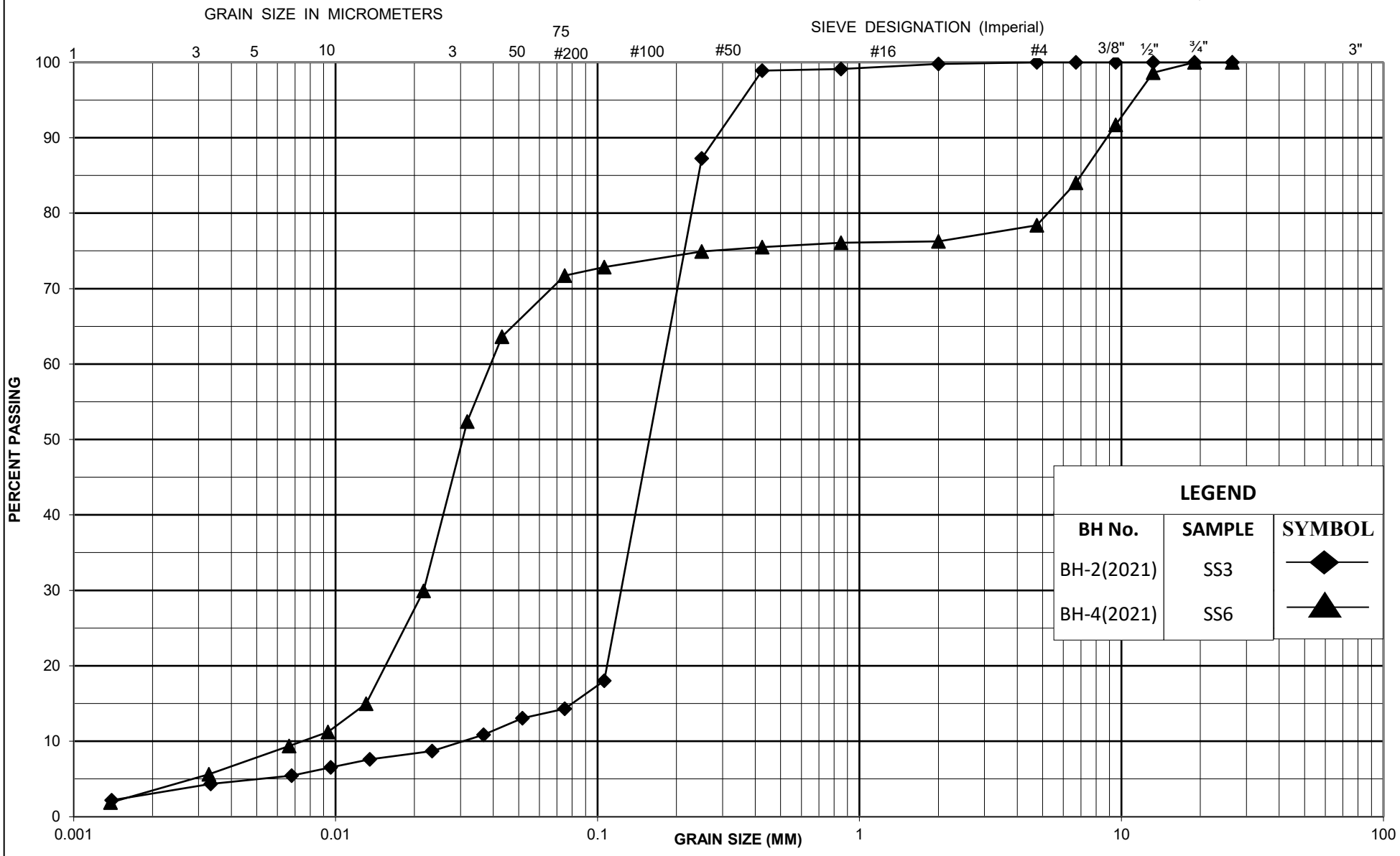
Time	Water Level (m)	Depth to Cave (m)
on completion	no free water	no cave

Appendix B

Laboratory Test Results

ISSMFE SOIL CLASSIFICATION SYSTEM

CLAY	SILT			SAND			GRAVEL			Cobbles
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



GRAIN SIZE DISTRIBUTION

DRAWING NO.: B1

PROJECT NO.: HAM-21014406-A0

DATE: OCTOBER 2021

Unconfined Compressive Strength Results

Sample No.	Sample Depth Below Grade (meters)	Diameter, D (mm)	Length of Core (mm)	Area (mm^2)	Mass of Core (g)	Unit Weight kg/m^3	Correction Factor	Break Load (kN)	Compressive Strength (MPa)
UCS #1	BH1 Run2 at 7.16m	60	88	2826	674.5	2712	0.96	159.21	54.1
UCS #2	BH 1 Run 6 at 12.49m	60	65	2826	492.6	2682	0.87	170.02	52.3
UCS #3	BH 3 Run 5 at 13.38m	60	104	2826	770.8	2623	0.98	178.65	62.0
UCS #4	BH 4 Run 2 at 8.38m	60	110	2826	821.4	2642	0.99	138.67	48.6
UCS #5	BH 4 Run 2 at 11.6m	60	93	2826	674.5	2566	0.97	122.68	42.1

*Test procedure in general accordance with A23.2-14C: Method for Compressive Strength Testing of Drilled Cores

Appendix C

Rock Core Photographs



Borehole BH-1: Run 1 (5.79 to 6.77 m) and Run 2 (6.77 m to 8.23 m)



Borehole BH-1: Run 3 (8.23 to 9.75 m) and Run 2 (9.75 m to 11.28 m)



Borehole BH-1: Run 5 (11.28 to 12.64 m) and Run 6 (12.64 m to 13.71 m)



Borehole BH-3: Run 1 (7.01 to 7.62 m) and Run 2 (7.62 m to 9.27 m)



Borehole BH-3: Run 3 (9.27 to 10.74 m) and Run 2 (10.74 m to 12.27 m)



Borehole BH-3: Run 5 (12.27 to 13.49 m)



Borehole BH-4: Run 1 (6.38 to 7.9 m) and Run 2 (7.9 m to 9.37 m)



Borehole BH-4: Run 3 (9.37 to 10.92 m) and Run 2 (10.92 m to 12.5 m)



Borehole BH-4: Run 5 (12.5 to 13.36 m)