Geotechnical Investigation
Proposed Building Additions, Jami Omar Mosque
3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

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1. Introduction and Site Description

A geotechnical investigation was undertaken at the site of the proposed two (2) buildings addition at the Jami Omar Mosque complex situated at 3990 and 4016 Old Richmond Road and 572 Moodie Drive, City of Ottawa, Ontario (Figure 1). The proposed building facing Old Richmond Road will be four-storey with one full basement level with one level of underground parking garage for a total footprint of 1373 m 2 (14,781 square feet) whereas the building facing Moodie Drive will be as three-storey with one raised basement level approximately 1.8 m below grade for a total footprint of 1347 m2 (4,240 square feet). The existing one storey structure facing Moodie Drive will be demolished to allow the new construction.

Terms and conditions of the assignment were outlined in EXP's Proposal dated July 10, 2020.

Preliminary concept drawings were provided to EXP (Appendix A). However, these drawings do not include site grades as well ground floor/basement elevations.

The geotechnical investigation was undertaken to:

a) Establish the subsurface soil, bedrock and groundwater conditions at the location of the boreholes drilled at the site;

b) Comment on grade-raise restrictions for the site;

c) Make recommendations on the most suitable type of foundations, founding depth and Serviceability Limit State (SLS) bearing pressures and Ultimate Limit State (ULS) factored geotechnical resistances for the proposed buildings construction as well as anticipated total and differential settlements;

d) Discuss slab-on-grade construction;

e) Provide lateral earth pressure parameters for subsurface basement wall design;

f) Comment on backfilling requirements and suitability of the on-site soils for backfilling purposes;

g) Discuss subsurface concrete requirement;

h) Discuss excavation conditions and dewatering requirements during construction; and

i) Provide classification of the site for seismic design in accordance with requirements of the 2012 Ontario Building Code (OBC) and assess the liquefication potential of the on-site soils in a seismic event.

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 it may require additional field or laboratory work to check

whether the changes are acceptable from a geotechnical viewpoint. construction of the proposed three-storey building. It must be noted that this report does not include recommendations for the demolishing of this building.

2. Site Description

The subject site is bounded by Old Richmond Road on the west, by Moodie Drive on the east side, and surrounded by residential houses on all other sides. The site includes the main mosque building accessible from Old Richmond Road and surrounded by parking lots and an axillary building accessible from Moodie Drive. The parking lot is mostly paved with a gravel surface portion and green field on the southwest side of the property. The proposed four-storey building will be situated along the gravel surfaced parking lot and green field. The proposed three-storey building will be situated at the existing building accessible from Moodie Drive which will be demolished to allow the new building construction. The site is generally flat lying with approximate ground elevations ranging between 98.9 and 100.2 m at the location of the boreholes.

3. Procedure

The fieldwork for the geotechnical investigation was completed on August 19, 2020 and comprised the drilling of seven (7) boreholes, i.e., Borehole Nos. 1 to 7, to depths ranging between 0.9 m and 3.7 m below the existing ground surface. The boreholes were drilled using truck-mounted drill-rig equipment operated by a drilling specialist subcontracted to EXP and was supervised on a full-time basis by a representative of EXP.

The locations and geodetic elevations of the boreholes were established in the field by EXP and are shown on Figure 2.

Prior to the fieldwork, the locations of the boreholes were cleared of any public and private underground services. Standard penetration tests were performed in all the boreholes at continuous depth intervals and soil samples retrieved by split-barrel sampler in accordance with ASTM 1586. Wash-boring and core-drilling techniques were used to advance Borehole No. 5 beyond the refusal depth.

Long-term groundwater monitoring installations consisting of 19 mm diameter polyvinyl chloride (PVC) pipes were installed in Borehole No. 5 in accordance with EXP standard practice. The installation configuration is documented on the respective borehole log.

All the soil samples were visually examined in the field for textural classification, logged, preserved in plastic bags and identified. Similarly, all the rock cores were visually examined, placed in core boxes, identified and logged. On completion of the fieldwork, all the soil and rock samples were transported to the EXP laboratory in the City of Ottawa, Ontario, where they were visually examined by a geotechnical engineer, and borehole logs prepared. The engineer also assigned the laboratory testing which consisted of performing the following tests on soil and rock samples;

Natural Moisture Content.....17 tests
Grain Size Analysis.....2 Tests
Chemical Analysis (pH, sulphate, chloride and resistivity).....1 Test
Unit Weight and Unconfined Compressive Strength Tests on Rock Cores.....2 tests

4. Subsurface Soil and Groundwater Conditions

A detailed description of the geotechnical conditions encountered in the boreholes is given on the borehole logs, Figures 3 to 9 inclusive. The borehole logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time may also result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

It should be noted that the soil and rock boundaries indicated on the borehole logs are intended to 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 Descriptions" preceding borehole logs form an integral part of this report and should be read in conjunction with this report.

A review of the borehole logs indicates the following subsurface soil and groundwater conditions with depth.

4.1 Asphalt Pavement

40 mm asphalt pavement was contacted at the surface in Borehole No. 6.

4.2 Fill

Fill was contacted beneath the asphalt pavement in Borehole No. 6 and at ground surface in all other boreholes. The fill material comprised mainly on silty sand to silty sand with gravel (SM)with some roots and organics. A 100 mm to 150 mm thick crushed stone type fill was contacted overlying the silty sand to silty sand with gravel fill in Borehole Nos. 3, 4, 5, and 6. The fill material extended to refusal depths ranging from 0.7 m and 2.1 m below ground surface at inferred bouldery fill to weathered bedrock or bedrock (Elevation. 99.3 m to 96.8 m). Occasional cobbles and boulders were inferred within this fill material based on auger grinding. The fill is loose to very dense as indicated by the SPT N-values which ranged from 7 to 52 blows for 300 mm or less of the spoon split sampler and has a natural moisture content ranging from 3 percent to 22 percent.

Grain size analysis was conducted on two (2) samples of the fill material and the results presented in Figures 10 and 11 and summarized in Table I below.

Table I: Summary of Results from Grain-size Analysis – Fill Samples						
Borehole No. – Sample No.	Depth (m)	Grain-size Analysis (%)				Soil Classification (USCS)
		Gravel	Sand	Silt	Clay	
BH2 – AS1	0 - 0.8	25	38	23	14	Silty SAND with Gravel (SM)
BH7 – SS3	1.5 – 1.9	13	41	35	11	Silty SAND (SM)

Based on the results of the grain size analysis, the soil may be classified as silty sand to silty sand with gravel (SM) in accordance with the Unified Soil Classification System (USCS).

4.3 Bouldery Fill to Possible Weathered Bedrock

The upper fill is underlain by bouldery fill to possible weathered bedrock in Boreholes Nos. 1 to 4 and 6 to 7. This layer was inferred based on SPT refusal and auger grinding. The inferred thickness of this layer based on auger refusal ranges from 0.1 m to 0.7 m.

4.4 Bedrock

Refusal to auger was met in all the boreholes at depths ranging between 0.9 m and 2.2 m, i.e Elevations 98.8 m to 96.7 m. Wash-boring and core drilling techniques to advance below the refusal depth in Borehole No.5 revealed that refusal was met on bedrock at 1.6 m below ground surface, i.e. Elevation 98.0.

A summary of the inferred bedrock depths and elevations based on auger grinding is shown in Table II.

Table II: Summary of Inferred Bedrock Depths and Elevations in Boreholes			
Borehole No.	**Ground Surface Elevation (m)**	**Depth (Elevation) of Inferred Bedrock (m)**	**Bedrock Proven by Coring**
BH1	100.2	1.5 (99.3)	No
BH2	99.9	0.9 (99.0)	No
BH3	99.7	1.4 (98.3)	No
BH4	99.5	0.7 (98.8)	No
BH5	99.6	1.5 (98.1)	Yes
BH6	98.9	2.1 (96.8)	No
BH7	99.2	1.9 (97.3)	No

A review of the recovered bedrock cores and published geology maps indicate that the bedrock underlying the site comprises of limestone with dolostone interbeddings of the Beekmantown Group of the Lower Ordovician Period.

A Total Core Recovery (TCR) and Rock Quality Designation (RQD) of 100 percent and 87 to 92 percent respectively were obtained from the recovered bedrock cores. On this basis, the bedrock quality within the depth investigated may be classified as good to excellent quality.

A total of two (2) rock core samples were selected for unconfined compressive strength testing and the test results are presented in Table III. A review of the test results indicates a bedrock with compressive strength ranging between 198.8 MPa and 225.4 MPa. Based on these values, the rock can be classified with respect to intact strength as “very strong”, (Canadian Foundation engineering manual, 4th edition, 2006). The unit weight of the bedrock ranged between 2636 kg/m^3 and 2705 kg/m^3. Photographs of the bedrock core recovered are presented in Figure 12.

Table III: Results of Unconfined Compressive Tests on Rock Core Samples			
Borehole No. – Run No.	**Depth (m)**	**Compressive Strength (MPa)**	**Unit Weight (Kg/m^3)**
BH5 – Run1	1.6 – 1.8	198.8	2636
BH5 – Run2	2.7 – 2.9	225.4	2705

4.5 Groundwater

Groundwater level measurements were made in all the open boreholes upon the completion of the drilling. All open boreholes were dry. One (1) groundwater level measurement was taken at the monitoring well installed in Borehole No. 5 on the 6th day after installation. The measurement revealed that the groundwater table to be at a depth of 1.4 m below the existing ground surface or elevation 98.2 m.

Groundwater levels were determined in the boreholes at the times and under the conditions stated in the scope of services. Note that fluctuations in the level of groundwater may occur due to a seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods

5. Grade Raise

The investigation has revealed the site to be underlain by up to 2.1 m of fill materials over limestone with dolostone interbeddings bedrock.

Based on the geotechnical findings a grade raise of up to 2 m is considered acceptable from a geotechnical point of view. However, significant grade raise is not expected at the site as the results of the proposed new buildings construction.

6. Foundation Consideration

Preliminary concept drawings provided did not include site grades as well ground floor/basement elevations of the proposed two buildings (Appendix A). It is understood that the existing building facing Moodie Drive will be demolished prior to the construction of the proposed building.

Based on the results of the investigation, the proposed buildings may be founded on limestone with dolostone interbeddings bedrock below any weathered or fractured zones and designed for a bearing pressure at Ultimate Limit State (ULS) of 960 kPa. Since the footings will be founded on sound bedrock, factored geotechnical resistance at ULS will govern the design. Settlement for footings founded on sound bedrock is expected to be minimal.

All footing beds should be examined by a geotechnical engineer to ensure that the founding surfaces can support the design bearing pressure and that the footing beds have been properly prepared as described above. A minimum of 1.2m of earth cover should be provided to the footings of a heated structure founded on bedrock to protect them from damage due to frost penetration. The frost cover should be increased to 1.5 m for unheated structures.

In the area of the existing building which will be demolished, all building material, footings, foundation walls, construction material must be removed and disposed of site. If the exposed bedrock is found to be below the proposed new footings level, two options are available for the proposed new footings:

- Option 1 – Found the new footings at the exposed bedrock face or on 20 MPa lean mix concrete placed from the surface of the exposed bedrock to the proposed underside of footing and using the ULS bearing pressure a Ultimate State (ULS) of 960 KPa

- Option 2- Backfill from the surface of the exposed bedrock to the proposed underside of footing using OPSS 1010 Granular B Type II placed in 300 mm lifts and each lift compacted to 100 percent of the Standard Proctor Maximum Dry Density (SPMDD). Footings designed on engineered fill pad prepared as recommended may be design for a bearing capacity at Serviceability limit State (SLS) and at ultimate limit state of 250 KPa and 400 KPa respectively. Settlement for footings founded on engineered fill pad is expected to be withing tolerable limits of 25 mm total and 19 mm differential.

- Footings must not bear partly on bedrock and partly on engineered fill. If this is the case, transition zone or construction joints must be provided to reduce the potential of differential settlement between the two founding mediums.

The recommended bearing pressures 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, more specific information is available with respect to conditions between the boreholes when foundation construction is underway. The interpretation between the boreholes and the recommendations of this report must therefore be checked

through field monitoring provided by an experienced geotechnical engineer to validate the information for use during the construction stage.

7. Floor Slab and Drainage Requirements

The lowest basement floor slab of the proposed buildings may be constructed provided they are set on beds of well-compacted 19 mm clear stone at least 300 mm thick placed on bedrock or on well-compacted engineered fill comprising of OPSS 1010 Granular B or A placed in 300 mm lift and each lift compacted to 95 % of the SPMDD. The clear stone would prevent the capillary rise of moisture to the floor slab. Adequate saw cuts should be provided in the floor slab to control cracking. All fill materials must be removed from the envelope of the buildings and replaced with well compacted engineered fill as described in Section 12 of the report.

It is anticipated that perimeter and underfloor drainage system would be required for the proposed building with basement. The perimeter and underfloor drainage system may consist of 100 mm diameter perforated pipe wrapped with filter cloth (sock) and set on the footings and under the floor slab and surrounded with 150 mm of 19 mm clear stone and properly connected to an outflow. The subsurface walls should be adequately damp proofed.

The finished exterior grade should be sloped away from the buildings to prevent surface ponding of water close to the exterior walls.

8. Pipe Bedding Requirement

It is recommended that the bedding for the underground services including material specification, thickness of cover material and compaction requirements conform to the local requirements of the municipality and/or Ontario provincial Standard Specification and Drawings (OPSS and OPSD).

For guidance, the pipe bedding may consist of 150 mm of OPSS 1010 Granular A for services founded on bedrock. The bedding material should be also placed along the sides and on top of the pipes to provide a minimum cover of 300 mm. The bedding, spring line and cover should be compacted to at least 98 percent the Standard Proctor Maximum Dry Density (SPMDD).

9. Lateral Earth Pressure Against Basement Walls

The subsurface wall should be backfilled with free draining material, such as OPSS 1010 for Granular B, Type II and equipped with a perimeter drainage system to prevent the buildup of hydrostatic pressure behind the walls. The walls will be subjected to lateral static and dynamic (seismic) earth forces.

For design purposes, the lateral static earth thrust against the subsurface walls may be computed from the following equation:

$$P = K_0 H (q + \tfrac{1}{2} \gamma H)$$

where P = lateral earth thrust acting on the subsurface wall; kN/m

K_0 = lateral earth pressure coefficient for 'at rest' condition for Granular B Type II backfill material = 0.5

γ = unit weight of free draining granular backfill; Granular B = 22 kN/m^3

H = Height of backfill adjacent to foundation wall, m

q = surcharge load, kPa

The lateral seismic thrust may be computed from the equation given below:

$$\Delta P_E = 0.32 \gamma H^2$$

where ΔP_E = resultant thrust due to seismic activity; kN/m

γ = unit weight of free draining granular backfill; Granular B Type II = 22 kN/m^3

H = height of backfill behind wall, (m)

The ΔPE value does not take into account the surcharge load. The resultant load should be assumed to act at 0.6 H from the bottom of the wall

10.Subsurface Excavation and De-Watering Requirements

Excavations for the construction of the proposed buildings and underground services will likely be undertaken through the shallow fill and into bedrock to a maximum depth of 3.0 m to 3.5 m below ground surface or elevation 95.9 m. These excavations are expected to be up to 2.3 m below the groundwater table.

Excavations at the site must comply with the latest version of Ontario Occupational Health and Safety Act, Ontario Regulations 213/91 (January 11, 2014).

Excavations at the site in the overburden may be undertaken as open-cut provided they are cut back at a slope of 3H to 1V. Excavation of the bedrock would require the use of hoe-ramming and/or line drilling and may be undertaken with near vertical sides. Contractor bidding on this project must review the available data and decide on their own the most suitable method to excavate the bedrock, i.e. line drilling, blasting, etc. It should be noted that lab testing has revealed the bedrock underlaying the site to be strong to very strong.

Vibrations should be monitored during construction to prevent damage to adjacent structures and services. A pre-condition survey of all the structures and services situated within the proximity of the site will be required prior to the commencement of construction and during the excavation of the bedrock. Care must be undertaken to ensure that the footings of the neighbouring properties are not undermined or damaged during construction.

Water inflow into the excavation should be expected. However, it should be possible to adequately handle this inflow by collecting the water in perimeter ditches and pumping from properly filtered sumps. It is possible that additional localized sumps may be required in areas where the seepage is more extensive.

11.Seismic Site Classification

11.1 Liquefaction Potential

The investigation has revealed that the proposed buildings will be founded on bedrock.

Based on the results of the investigation, there is no liquefaction potential of the subsurface soil during a seismic event.

11.2 Seismic Classification

Based on the subsurface conditions, the site is classified as **Class C for seismic site response** in accordance with Section 4.1.8.4 of the 2012 Ontario Building Code (ONBC 2012) given that the buildings foundations or foundation pads will be placed directly on intact bedrock.

A higher site class will likely be obtained if a shear-wave velocity testing is completed at the site.

12. Backfilling Requirements and Suitability of On-Site Soils for Backfilling Purposes

The material to be excavated from the site will be comprised of heterogenous fill underlain by bedrock and is expected to be of limited quantity

It is anticipated that the majority of the material required for backfilling purposes will need to be imported and should preferably conform to OPSS 1010 Granular B Type II. It should be placed in 300 mm lift and each lift compacted to 100 percent of the SPMDD under footings and structural elements, 98 percent under slabs-on-grade and to 95 percent against exterior foundation walls.

The on-site fill may be used for grading purposes in the landscaped area provided it is free of organics and foreign debris. Excavated bedrock is not suitable for backfilling and should be discarded

13.Subsurface Concrete Requirements

Chemical tests limited to pH, chloride, sulphate and electrical resistivity were performed on one (1) selected rockcore sample. The certificate of the laboratory test results is attached in Appendix B and the results are summarized in Table IV below.

Table IV: Results of pH, Chloride, Sulphate and Electrical Resistivity Tests on Soil Samples

Borehole No. (Sample No.)	Strata	Depth (m)	pH	Sulphate (%)	Chloride (%)	Electrical Resistivity Ohm.cm
Threshold Values			<5	>0.1	>0.04	<1500 ohm.cm High corrosion potential
BH1	Limestone with dolostone interbeddings bedrock	1.6-1.8	9.1	0.0140	0.0109	1780

The results indicate a rock with a sulphate and chloride content of less than 0.1 percent and 0.04 percent respectively. These concentrations of sulphate and chloride in the bedrock would have a negligible potential of sulphate and chloride attack on subsurface concrete. The concrete should be designed in accordance with Table Nos. 3 and 6 of CSA A.23.1-14. However, the concrete should be dense, well compacted and cured.

The results of the electrical resistivity tests indicate that the bedrock is moderately corrosive to corrosive to buried steel. A corrosion expert should be contacted to provide recommendations.

14.General Comments

The comments given in this report are intended only for the guidance of the design engineers. The number of boreholes required to determine the localized underground conditions, especially bedrock elevations 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 interpretation of the factual borehole and test pit results to draw their own conclusions as to how the subsurface conditions may affect them.

The information contained in this report is not intended to reflect on environmental aspects of the soils and groundwater. Should specific information be required, including for example, the presence of pollutants, contaminants or other hazards in the soil, additional testing may be required.

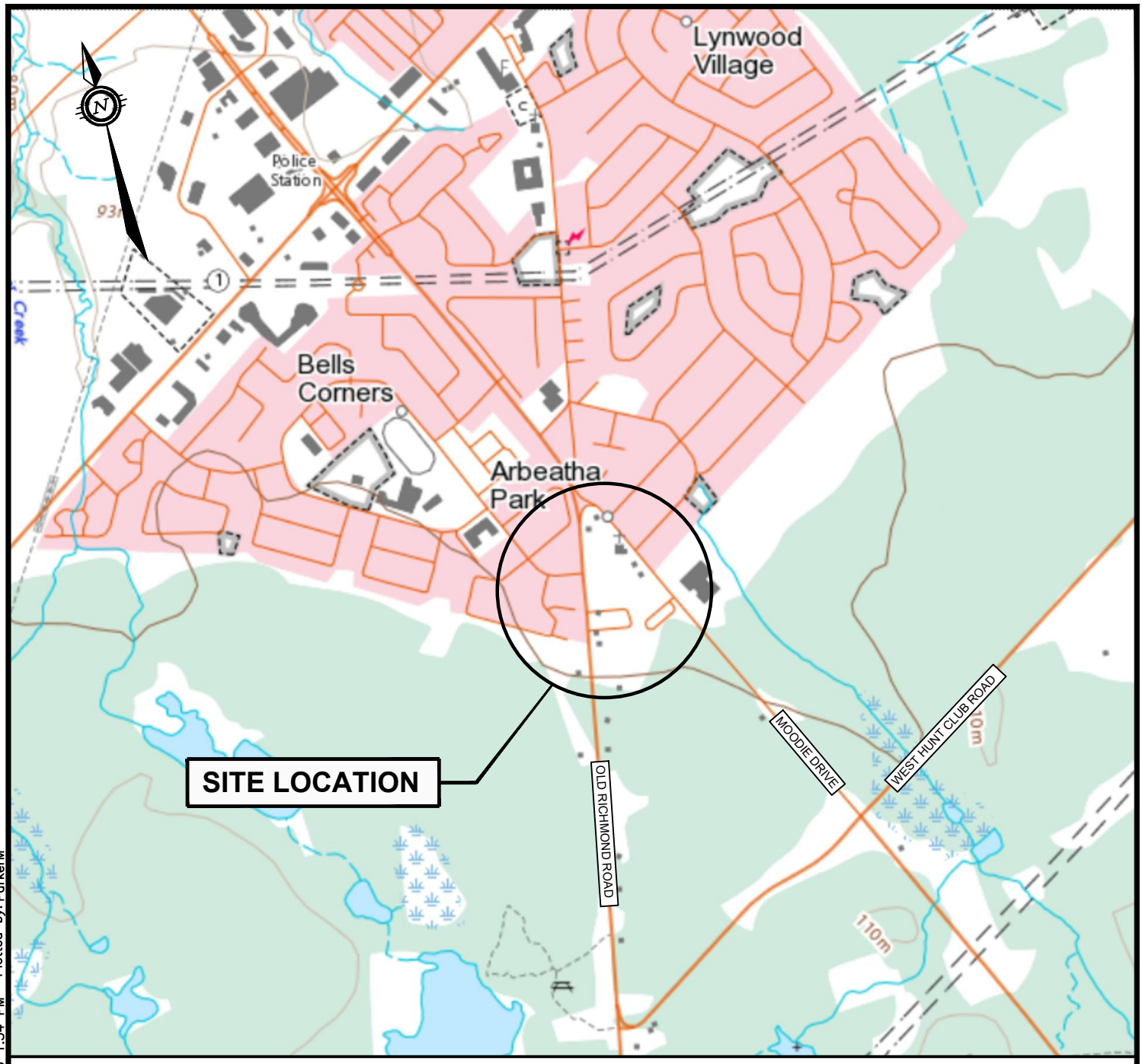
15.Signatures

We trust that this information is satisfactory for your purposes. Should you have any questions, please contact this office.

Athir Nader, M.A.Sc., P Eng.
Senior Geotechnical Engineer and Project Manager, Geotechnical Services
Earth and Environment

Ismail Taki, P Eng., M.Sc.
Manager, Geotechnical Services
Earth and Environment

Figures



0 150m 300m 600m

HORIZONTAL 1:15,000

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DATE: AUGUST 2020	CLIENT: JAMI OMAR MOSQUE	project no.: OTT-00260904-A0
DESIGN: L.W. / CHECKED: P.S.		scale: 1:15,000
DRAWN BY: M.P.	TITLE: SITE LOCATION PLAN 3990 OLD RICHMOND ROAD, OTTAWA, ON	FIG 1

Filename: E:\OTT\OTT-00260904-A0\60 Execution\65 Drawings\3990 Old Richmond Road – Fig 1-3.dwg
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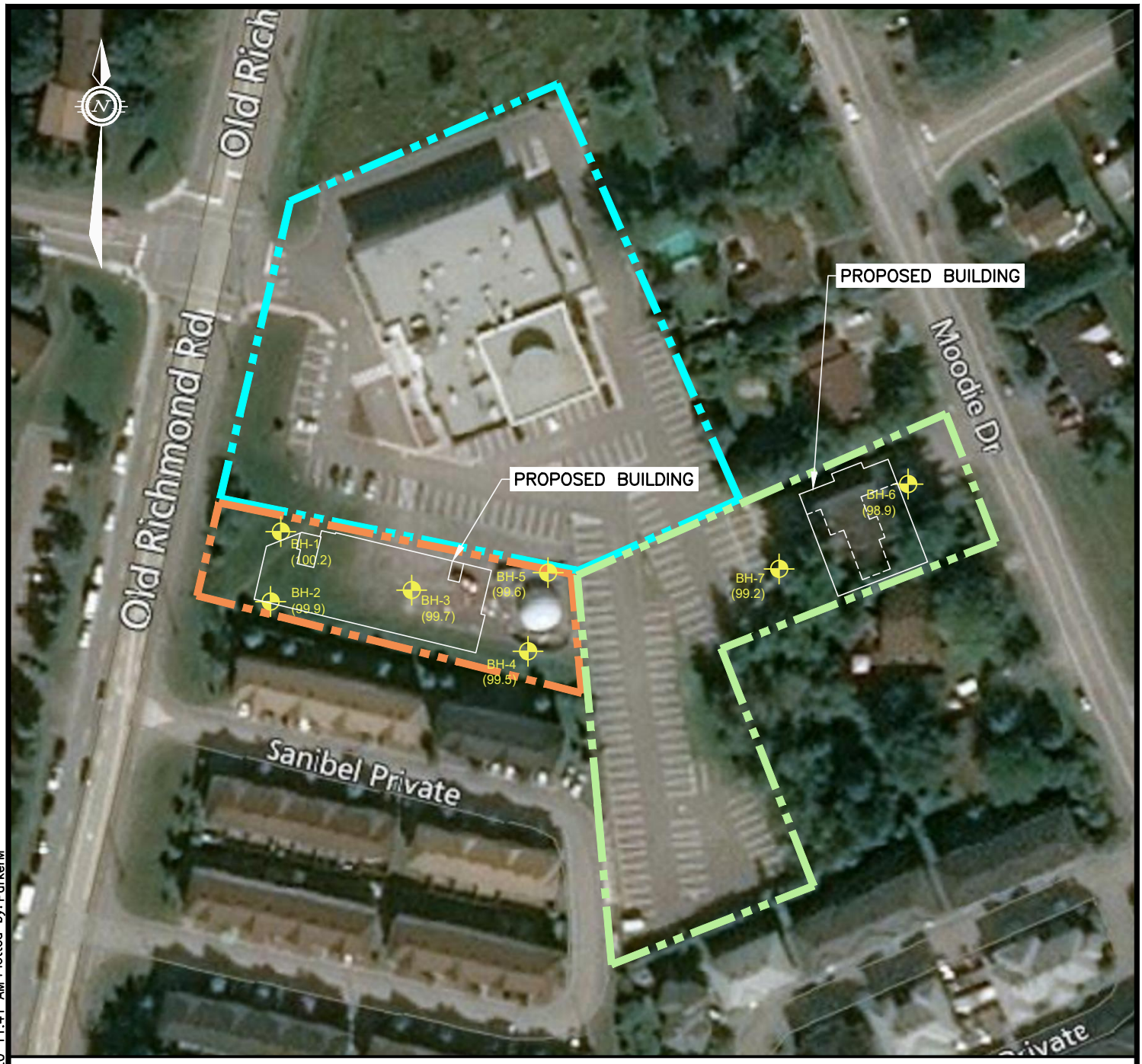

LEGEND

- 3990 OLD RICHMOND PROPERTY BOUNDARY
- 4016 OLD RICHMOND PROPERTY BOUNDARY
- 572 MOODIE DRIVE PROPERTY BOUNDARY

BH-4 (99.5) — BOREHOLE LOCATION AND NUMBER (GROUND ELEVATION)

0 10m 20m 50m

HORIZONTAL 1:1250

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DATE: AUGUST 2020	CLIENT: JAMI OMAR MOSQUE	project no.: OTT-00260904-A0
DESIGN: L.W. / CHECKED: P.S.		scale: 1:1,250
DRAWN BY: M.P.	TITLE: CONCEPTUAL SITE MODEL - BOREHOLE LOCATION PLAN 3990 OLD RICHMOND ROAD, OTTAWA, ON	FIG 2

Filename: E:\OTT\OTT-00260904-A0\60 Execution\65 Drawings\3990 Old Richmond Road – Fig 1-3.dwg
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Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Societv for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by **exp** Services Inc. also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. 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.

ISSMFE SOIL CLASSIFICATION

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

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

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

UNIFIED SOIL CLASSIFICATION

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 (60 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.

Log of Borehole BH1

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Silty sand to silty sand wih gravel (SM), some roots and organics, occasional inferred cobbles and boulders, brown to grey, moist, (compact)	100.2	0	23		SS1	
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	99.3	1	50 for 100 mm		SS2	
		Borehole Terminated at 1.6 m Depth at Auger Refusal	98.6					

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

Log of Borehole BH2

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Silty sand to silty sand wih gravel (SM), inferred occasional cobbles and boulders, some roots and organics, brown to grey, moist	99.9	0			AS1	
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	99.0	1	50 for 75 mm		SS2	
		Borehole Terminated at 1.1 m Depth at Auger Refusal	98.8					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

Log of Borehole BH3

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		CRUSHED STONE TYPE FILL 150 mm, silty sand with gravel, grey, moist	99.7	0				
		FILL Silty sand to silty sand with gravel (SM), inferred occasional cobbles and boulders, brown to grey, moist, (compact)	99.6				AS1	
				1	14		SS2	
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	98.3					
		Borehole Terminated at 1.5 m Depth at Auger Refusal	98.2					

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

Log of Borehole BH4

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		CRUSHED STONE TYPE FILL 100 mm, silty sand with gravel, grey, moist	99.5	0				
		FILL Silty sand to silty sand wih gravel (SM), inferred occasional cobbles and boulders, brown to grey, moist, (dense)	99.4		40		SS1	
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	98.8		50 for 75 mm		SS2	
		Borehole Terminated at 0.9 m Depth at Auger Refusal	98.6					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

Log of Borehole BH5

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		CRUSHED STONE TYPE FILL 150 mm, silty sand with gravel, grey, moist	99.6	0				
		FILL Silty sand to silty sand wih gravel (SM), inferred occasional cobbles and boulders, brown to grey, moist, (compact)	99.5		23		SS1	
				1	12		SS2	
			98.2					
		BEDROCK Limestone with dolostone interbeddings, fine to medium grained, Highly weathered for the top 0.1 m thickness, moderately to slightly weathered, light grey to white, strong, (good to excellent quality)	98.1		50 for 75 mm		SS3	
				2			RUN1	
				3			RUN2	
		Borehole Terminated at 3.7 m Depth	95.9					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Monitoring Well Installed
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
completion	N/A	-
6 day	1.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.6 - 2.7	100	87
2	2.7 - 3.7	100	92

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD REV5.GPJ TROW OTTAWA.GDT 9/4/20

Log of Borehole BH6

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		ASPHALT PAVEMENT 40 mm	98.9	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
		CRUSHED STONE TYPE FILL 150 mm, silty sand with gravel, grey, moist	98.7		11		SS1	
		FILL Silty sand to silty sand wih gravel (SM), inferred occasional cobbles and boulders, brown to grey, moist, (loose to very dense)		1	8		SS2	
					52		SS3	
			96.8	2				
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	96.7					
		Borehole Terminated at 2.2 m Depth at Auger Refusal						

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH7

Project No: OTT-00260904-A0

Project: Geotechnical Investigation For Residential Development, Jami Omar

Location: 3990&4016 Old Richmond Road, 572 Moodie Drive, City of Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: August 19th, 2020

Drill Type: CME 75 (truck mount)

Datum: Geodetic

Logged by: ML Checked by: AN/IT

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Silty sand to silty sand wih gravel (SM), inferred occasional cobbles and boulders, brown to grey, moist, (loose)	99.2	0	8		SS1	
				1	7		SS2	
					50 for 75 mm		SS3	
		BOULDERY FILL to POSSIBLE WEATHERED BEDROCK	97.3	2				
		Borehole Terminated at 2.1 m Depth at Auger Refusal	97.1					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole Backfilled Upon Completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00260904-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
completion	Dry	No

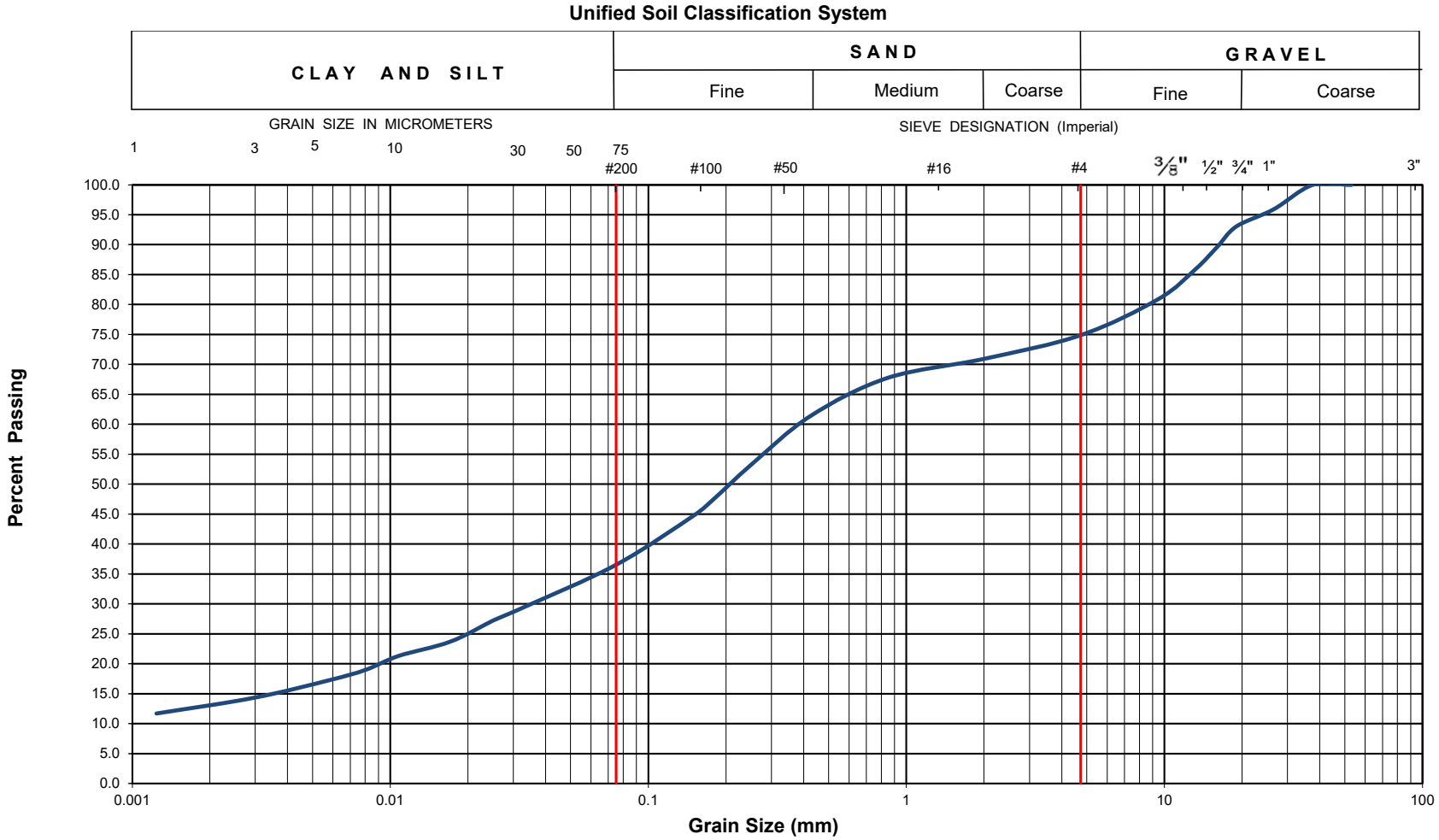
CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES - 3990 OLD RICHMOND ROAD_REV5.GPJ TROW OTTAWA.GDT 9/4/20

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

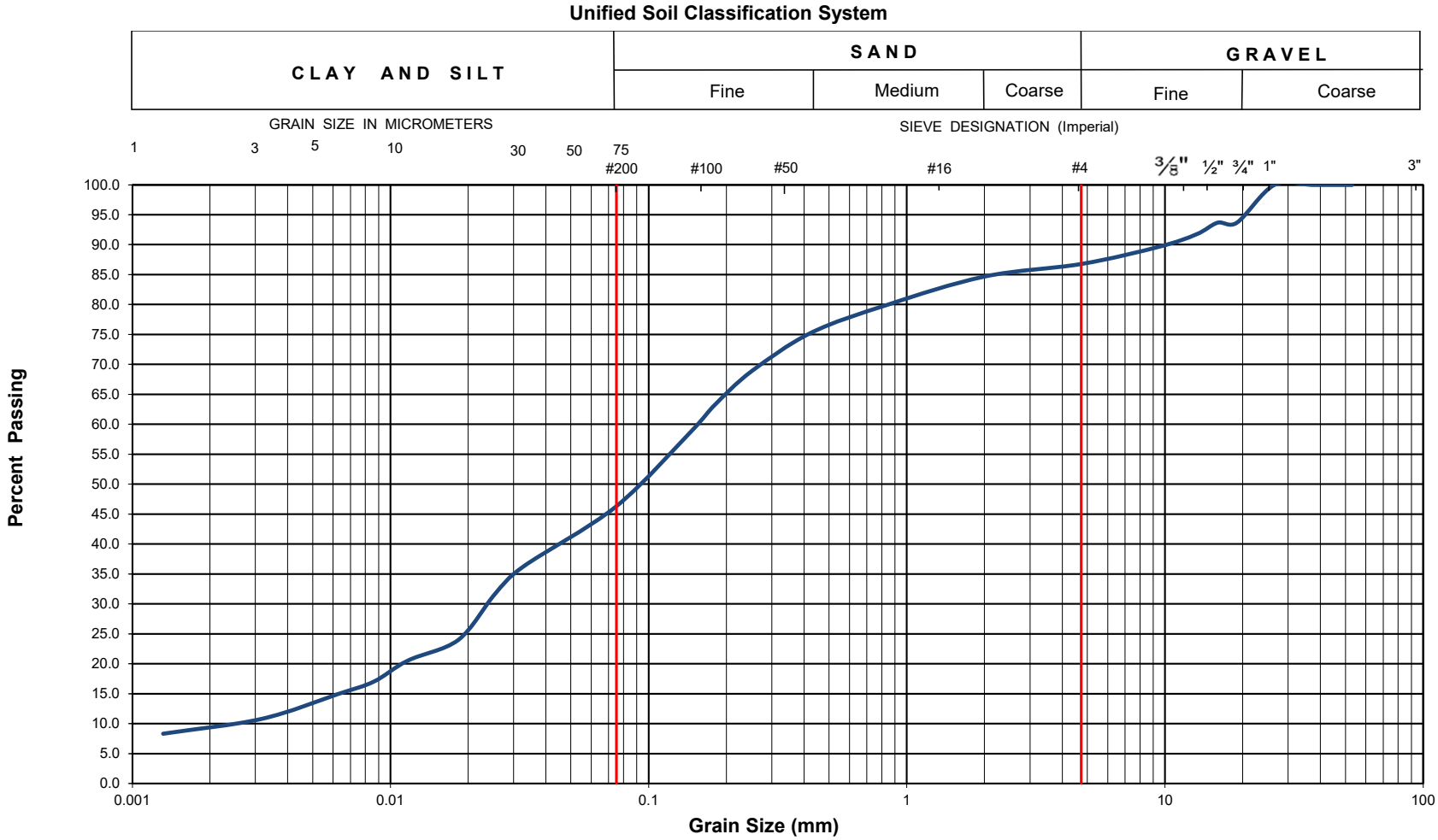
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



EXP Project No.:	**OTT-00260904-A0**	**Project Name :**	**Geotechnical Investigation**						
Client :	**Jami Omar Mosque**	**Project Location :**	**3990 Old Richmond Rd, Ottawa**						
Date Sampled :	**August 19, 2020**	**Borehole No:**	**BH2**		**Sample No.:**	**AS1**		**Depth (m) :**	**0-0.8**
Sample Description :		**% Silt and Clay**	**37**	**% Sand**	**38**	**% Gravel**	**25**	**Figure :**	**10**
Sample Description :		**Silty Sand with Gravel (SM)**							

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



EXP Project No.:	**OTT-00260904-A0**	**Project Name :**	**Geotechnical Investigation**						
Client :	**Jami Omar Mosque**	**Project Location :**	**3990 Old Richmond Rd, Ottawa**						
Date Sampled :	**August 19, 2020**	**Borehole No:**	**BH7**		**Sample No.:**	**SS3**		**Depth (m) :**	**1.5-1.9**
Sample Description :		**% Silt and Clay**	**46**	**% Sand**	**41**	**% Gravel**	**13**	**Figure :**	**11**
Sample Description :		**Silty SAND (SM)**							

DRY BEDROCK CORES

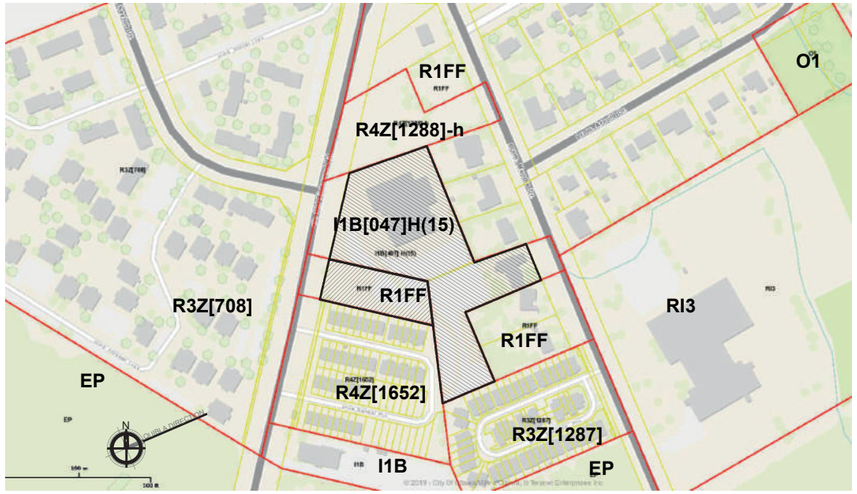
WET BEDROCK CORES

exp Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

borehole no.	core runs	PROJECT	project no.
BH5	Run 1: 1.6m-2.7m Run 2: 2.7m-3.7m	Geotechnical Investigation 3990 Old Richmond Road, Ottawa, Ontario	OTT-00260904-A0
date cored			
Aug 19, 2020		ROCK CORE PHOTOGRAPHS	FIG. 12

Appendix A:
Preliminary Concept Drawings (provided by the client)



1 / A0 LOCATION/ZONING MAP
Scale: NTS

PROPOSED 4 STOREY
ASSISTED LIVING RESIDENTIAL BUILDING
"BUILDING A" (60 UNITS)

HEIGHT: 12.2 m/ 40 ft
FOOTPRINT 14,781 SF
(1,373 M²)

DRAWING INDEX:

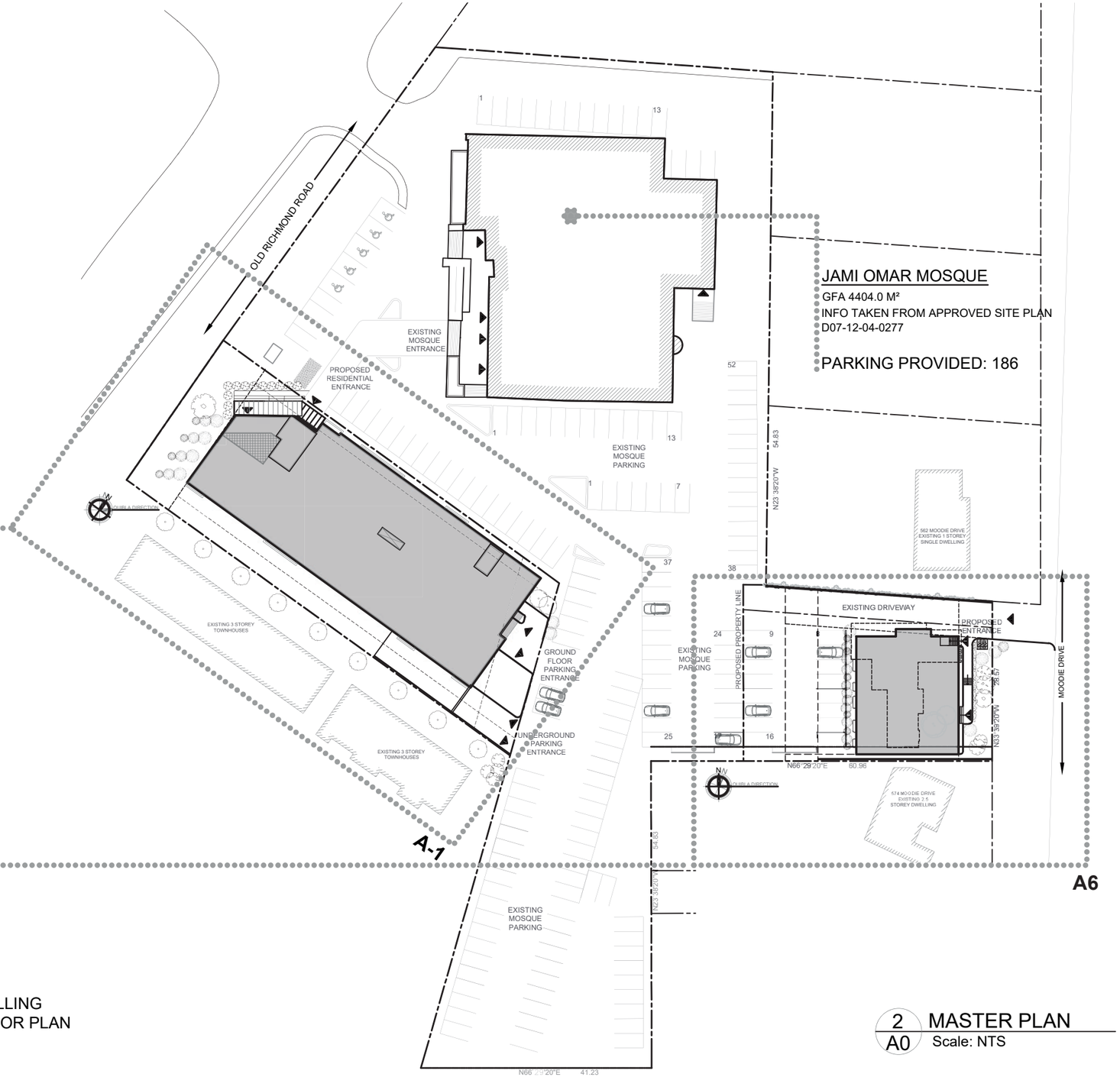
A1	SITE PLAN BUILDING "A"
A2	ZONING
A3	ZONING
A4	FLOOR PLANS
A5	BASEMENT - UNDERGROUND PARKING

PROPOSED 3 STOREY
STACKED DWELLING (6 UNITS)

HEIGHT: 11 M
FOOTPRINT 4,240 SF
(393.8 M²)

DRAWING INDEX:

A6	SITE PLAN -STACKED DWELLING
A7	BASEMENT & GROUND FLOOR PLAN
A8	2ND & 3RD FLOOR PLAN



2 / A0 MASTER PLAN
Scale: NTS

3990 OLD RICHMOND ROAD
OTTAWA, ONTARIO

PRELIMINARY CONCEPT

SUSAN D. SMITH ARCHITECT
941 MERIVALE RD, OTTAWA,
ON. K1Z 6A1
613-722-5327
s.smith@sdsarch.ca

REVISION No.	DATE
2	24/09/2019
3	30/01/2020

MASTER PLAN

SCALE	NTS
PROJECT	1917
DATE	JUNE 20 /2019

A0

ISSUED FOR PRE-APPLICATION CONSULTATION, FEBRUARY 4, 2020

SURVEY INFORMATION TAKEN FROM:
APPROVED SITE PLAN D07-12-04-0277
PREPARED BY KHALIL U. SYED
ARCHITECT

562 MOODIE DRIVE
EXISTING 1 STOREY
SINGLE DWELLING
(R1FF)

38

EXISTING PROPERTY LINE

133' [40.54]

EXISTING UNKEMPT HEDGE

PROPOSED FRONT
YARD SETBACK 6 M

PROPOSED RETAINING WALL

EXISTING EASEMENT
4.7 M

21'-11¾" [6.70]

15'-5" [4.70]

EXISTING DRIVEWAY

PROPOSED INTERIOR
SIDE YARD SETBACK
6.7 M

PROPOSED
LANDSCAPE BUFFER

18'-2½" [5.54]

PROPOSED
BICYCLE
PARKING

24 9 8

30% OF LOT DEPTH
18.29 M REAR YARD SETBACK

VISITOR
PARKING

UP

5'-1¼" [1.56]

EXISTING MOSQUE PARKING

EXIST. CATCH
BASIN

PROPOSED TREES

PROPOSED 3 STOREY
STACKED DWELLING
(6 UNITS)

HEIGHT: 11 M
FOOTPRINT 4,240 SF
(393.8 M²)

UP

7.5 M REAR YARD SETBACK

PROPOSED PROPERTY LINE

69'-2" [21.08]

EXISTING TREES

28.57

93'-8¾" [28.57]

95'-1¼" [28.99]

N33°39'20"W

MOODIE DRIVE

UP

19'-8½" [6.00]

17 16 1

4'-11¾" [1.52]

PROPOSED TREES

3'-11½" [1.20]

N66°29'20"E 60.96

PROPOSED INTERIOR SIDE YARD SETBACK 1.2 M

PROPOSED RETAINING WALL

EXISTING PROPERTY
LINE

EXISTING BLDG, IMAM'S
RESIDENCE
TO BE DEMOLISHED

N

QUIBLA DIRECTION

66'-2" [20.17]

60'-0¼" [18.29]

145'-10¼" [44.46]

574 MOODIE DRIVE
EXISTING 2.5 STOREY
SINGLE DWELLING
(R1FF)

1/A6 SITE PLAN
Scale: 1/16"=1'-0"

572 MOODIE DRIVE
OTTAWA, ONTARIO

PRELIMINARY CONCEPT

SUSAN D. SMITH ARCHITECT
941 MERIVALE RD, OTTAWA,
ON. K1Z 6A1
613-722-5327
s.smith@sdsarch.ca

REVISION No.	DATE
2	24/09/2019
3	30/01/2020

SITE PLAN - STACKED DWEL.

SCALE	NTS
PROJECT	1917
DATE	JUNE 20 /2019

A6

ISSUED FOR PRE-APPLICATION CONSULTATION, FEBRUARY 4, 2020

Appendix B:
Laboratory Certificates of Analysis

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: EXP SERVICES INC
2650 QUEENSVIEW DRIVE, UNIT 100
OTTAWA, ON K2B8H6
(613) 688-1899
ATTENTION TO: Athir Nader
PROJECT: OTT-260904-AO
AGAT WORK ORDER: 20Z642602
SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
DATE REPORTED: Sep 02, 2020
PAGES (INCLUDING COVER): 6
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20Z642602

PROJECT: OTT-260904-AO

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Athir Nader

SAMPLING SITE:3990 Old Richmond Rd

SAMPLED BY:EXP

Inorganic Chemistry (Soil) %

DATE RECEIVED: 2020-08-25 **DATE REPORTED: 2020-09-02**

				BH5 Run1
		SAMPLE DESCRIPTION:		5'3"-5'10"
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-08-19
Parameter	Unit	G / S	RDL	1389349
Chloride (2:1)	%		0.0002	0.0109
Sulphate (2:1)	%		0.0002	0.014

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1389349 Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil). Resistivity is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20Z642602

PROJECT: OTT-260904-AO

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Athir Nader

SAMPLING SITE:3990 Old Richmond Rd

SAMPLED BY:EXP

Inorganic Chemistry (soil)

DATE RECEIVED: 2020-08-25 **DATE REPORTED: 2020-09-02**

				BH5 Run1
		SAMPLE DESCRIPTION:		5'3"-5'10"
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2020-08-19
Parameter	Unit	G / S	RDL	1389349
Chloride (2:1)	µg/g		2	109
Sulphate (2:1)	µg/g		2	140
pH (2:1)	pH Units		NA	9.1
Resistivity (2:1) (Calculated)	ohm.cm		1	1780

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

1389349 pH, Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil). Resistivity is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
NIVINE BASILY
CHEMIST

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 20Z642602

PROJECT: OTT-260904-AO

ATTENTION TO: Athir Nader

SAMPLING SITE:3990 Old Richmond Rd

SAMPLED BY:EXP

Soil Analysis

RPT Date: Sep 02, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (soil)															
Chloride (2:1)	1389349	1389349	109	109	0.2%	< 2	94%	70%	130%	96%	80%	120%	101%	70%	130%
Sulphate (2:1)	1389349	1389349	140	140	0.3%	< 2	99%	70%	130%	103%	80%	120%	105%	70%	130%
pH (2:1)	1389349	1389349	9.1	8.96	1.6%	NA	97%	90%	110%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Inorganic Chemistry (Soil) %															
Chloride (2:1)	1389349	1389349	0.0109	0.0109	0.0%	< 0.0002	94%	70%	130%	96%	80%	120%	101%	70%	130%
Sulphate (2:1)	1389349	1389349	0.014	0.014	0.0%	< 0.0002	99%	70%	130%	103%	80%	120%	105%	70%	130%

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 20Z642602

PROJECT: OTT-260904-AO

ATTENTION TO: Athir Nader

SAMPLING SITE:3990 Old Richmond Rd

SAMPLED BY:EXP

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Chloride (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Resistivity (2:1) (Calculated)	INOR-93-6036	McKeague 4.12, SM 2510 B,SSA #5 Part 3	CALCULATION

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: EXP Services
Contact: Athir Nader
Address: 2650 Queensview Drive Suite 100
Ottawa, ON K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: Athir.Nader@exp.com
2. Email:

Project Information:

Project: OTT-260804-A0
Site Location: 3990 Old Richmond Rd
Sampled By: EXP
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐
Company:
Contact:
Address:
Email:

Regulatory Requirements:

☐ No Regulatory Requirement
(Please check all applicable boxes)

☐ Regulation 153/04
Table _____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region _____ *Indicate One*
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Laboratory Use Only

Work Order #: 2076412602
Cooler Quantity: One - no ice
Arrival Temperatures: 23.3 | 23.6 | 23.5
UT- 8.4 (on ice)
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day
OR Date Required (Rush Surcharges May Apply):
_____
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*
For 'Same Day' analysis, please contact your AGAT CPM

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides))	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	pH	SO4	Chloride	Electro Resistivity	Potentially Hazardous or High Concentration (Y/N)
BH 5 Run 1 5'3"-5'10"	Aug 19/20																				✓	✓	✓	✓	

Samples Relinquished By (Print Name and Sign): Ryan DiGiacomo	Date: Aug 25/20	Time: 5:00pm	Samples Received By (Print Name and Sign):	Date: 2020/08/25	Time: 17h02
Samples Relinquished By (Print Name and Sign): COD to FedEx 2020/08/26	Date:	Time: 16h05	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign): Shaunn d	Date: Aug 27/2020	Time: 9:55am

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No: T 093837

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

Appendix C:
Legal Notification

Legal Notification

This report was prepared by EXP Services Inc. (EXP) for the account of Mr. Fernando Matos.

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