Royal Canadian Mounted Police | Gendarmerie royale du Canada

RETURN BIDS TO :

RETOURNER LES SOUMISSIONS :

RCMP-GRC
Bid Receiving/Réception des sousmissions
Attention: Jordan McKenna
Mail StopéArrêt postal 15
73 chemin Leikin Drive,
Ottawa, ON K1A 0R2

AMENDMENT TO THE INVITATION TO TENDER

Royal Canadian Mounted Police

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services and construction listed herein and on any attached sheets at the price(s) set out therefore.

MODIFICATION À L'APPEL D'OFFRES

Gendarmerie royale du Canada

Nous offrons par la présente de vendre à Sa Majesté l Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments – Commentaries

Vendor/Firm Name and Address

Raison sociale et adresse du fournisseur/de l'entrepreneur

Telehone No. – No de téléphone:

Facsimile No. – No de télécopieur:

Title-Sujet Construction - Bâtiment A		
Solicitation No. – No. de l'invitation 201801002	**Amend. – Modif.** No. : 1	**Date** 3 juillet, 2018
Client Reference No. - No. de Référence du Client 201801002		
GETS Reference No. – No de Référence du SEAG		
Solicitation Closes – L'invitation prend fin **at – à 14:00 HAE** **on – 31 juillet, 2018.**		
F.O.B. - F.A.B. Destination		
Address Enquiries to: - Adresser toute question à : Jordan McKenna		
Telephone No. - No de telephone 613-843-5518	**Fax:** 613-825-0082	
Destination of Goods - Destinations des biens: See Herein		
Instructions : See Herein / Voir aux présentes		
Delivery Required – Livraison exigée: See Herein		
Name and Title of person authorized to sign on behalf of Vendor/Firm. **Nom et titre de la personne autorisée à signer au nom du fournisseur/de l'entrepreneur**		

Modification nº 1

Construction – Bâtiment A
N° DE LA DEMANDE DE SOUMISSIONS : 201801002 Date: 3 juillet 2018

La modification nº 1 a été publiée pour modifier la demande de propositions, répondre aux questions et apporter les changements ci-après.

LES MODIFICATIONS CI-APRÈS AUX DOCUMENTS D'APPEL D'OFFRES ENTRENT EN VIGUEUR IMMÉDIATEMENT.

1. Dans l'appendice 4 – CRITÈRES D'ÉVALUATION
- *Sous l'exigence obligatoire O2*

SUPPRIMER :

1. Les travaux de construction doivent avoir été terminés au cours des sept (7) dernières années;

INSÉRER :

1. Les travaux de construction doivent avoir été terminés au cours des dix (10) dernières années;

2. Veuillez trouver le rapport d'enquête géotechnique ci-joint aux fins de référence.

Questions et réponses – partie 1

Q1) Quelle est l'adresse du nouveau bâtiment?

R1) L'adresse n'est pas disponible pour le moment.

Q2) Un rapport géotechnique sera-t-il publié?

R2) Oui, vous le trouverez en pièce jointe.

Q1) Une visite des lieux est-elle prévue?

R3) Non.

Q4) Selon la page Achats et ventes, la date de clôture est à 16 h, tandis que le document

d’appel d’offres indique que la date de clôture est à 14 h. Je suppose que l’heure figurant dans le document d’appel d’offres est la bonne; je souhaite simplement vérifier auprès de vous.

R4) 14 h est exact.

Q5) J’ai jeté un coup d’œil aux spécifications du projet susmentionné, et l’article 01 11 00 1.2.1 fait mention d’un contrat de conception-construction. Est-ce une faute de frappe?

R5) C’est une faute de frappe. Il s’agit d’un projet de conception-soumission-exécution.

TOUTES LES AUTRES MODALITÉS DEMEURENT INCHANGÉES.

FIN

Geotechnical Investigation

Project Name
Geotechnical Investigation
Proposed Office Building and Surface Parking Facility

Geotechnical Investigation

Project Name:
Geotechnical Investigation
Proposed Office Building and Surface Parking Facility
City of Ottawa, Ontario

Prepared by:

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6
Canada
T: 613 688-1899
F: 613 225-7337
www.exp.com

LICENSED PROFESSIONAL ENGINEER
Z. GUETIF
100193437
July 21, 2016
PROVINCE OF ONTARIO

Zohra Guetif, Ph.D., P.Eng.
Senior Project Manager, Geotechnical Services
Earth and Environment

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

Date Submitted:
July 21, 2016

Legal Notification

This report was prepared by **exp** Services Inc. for the account of **NPDO.**

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** Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Executive Summary

Exp Services Inc. (**exp**) is pleased to present the results of the geotechnical investigation completed for the proposed one-storey office-type building and surface parking facility. Authorization to proceed with this work was provided by NPDO via Purchase Order Number: 7212674.

Design information for the proposed structure and surface parking facilities were not available at the time of the preparation of this report. Therefore, it has been assumed that the finished floor slab of the proposed building will be set at Elevation 109.5 m. The finished grades for the proposed surface parking facilities have been assumed to match the grades of the nearby gravel road, i.e. Elevation 109.1 m to 109.8 m. This office should be contacted once the finished design grades for the proposed building and parking facility are set in order to update/revise any of the recommendations stated in this report as deemed necessary.

The fieldwork for this investigation comprised of the excavation of fourteen (14) Test Pits (Test Pit Nos. 1 to 14 inclusive) to the surface of the bedrock contacted at depths ranging between 0.1 m and 1.6 m, i.e. Elevation 107.79 m to 109.04 m.

The surficial soils at the locations of all the test pits comprised of topsoil ranging in thickness between 100 mm and 380 mm with the exception of Test Pit Nos. 4 to 6 where 200 to 300 mm thick crusher-run granular was encountered surficially. The topsoil in Test Pit Nos. 3, 7, 8, 11, 13 and 14 is underlain by a sandy silt to silty sand layer which extends to the surface of the bedrock contacted at depths of 0.3 m to 1.6 m, i.e. Elevation 107.79 m to 108.94 m. The silty sand to sandy silt layer has variable proportions of gravel and clay. It contains pieces of wood, organic matters and rootlets. The presence of cobbles, boulders were also observed in this layer. The topsoil in Test Pit Nos. 1, 2, 9, 10 and 12 and the fill in Test Pit Nos. 4 to 6 are overlain by limestone bedrock/weathered bedrock which was contacted at depths of 0.1 m to 0.4 m, i.e. Elevation 108.38 m to 109.04 m.

All the tests pits remained dry during or upon completion of the excavations. The groundwater table is subject to seasonal fluctuations and may be at a higher level during wet weather periods.

Review of the previous geotechnical investigation completed by **exp** at the site on May 2006 revealed that the bedrock underlying the site comprised of limestone of the Ottawa Formation.

Based on the existing site grades and assumed finished grades, up to 1.0 m of grade raise is anticipated at the site. This grade raise is considered acceptable from a geotechnical point of view.

The investigation has revealed that the geotechnical conditions at the site are suitable to found the proposed structure on strip and spread footings set on sound bedrock surface or on an engineered fill pad prepared as per the recommendation of the report.

Footings set on the engineered fill pad, prepared as described in the main body of the report may be designed for a Serviceability Limit State (SLS) and factored Ultimate Limit State (ULS) bearing pressures of 150 kPa and 225 kPa respectively.

Footings set on sound bedrock below any fractured or weathered zone may be designed for factored ULS bearing pressure of 1,000 kPa. The SLS bearing pressure of the bedrock, required to produce 25 mm settlements of the structure, will be much larger than the recommended value for factored bearing capacity at ULS. Therefore, the factored bearing capacity at ULS governs the design. The SLS and ULS coefficient of friction may be taken as 0.67 and 0.55 respectively for sound limestone bedrock.

Settlements of footing set on the engineered fill and designed for the recommended SLS bearing pressure of 150 kPa and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements. Settlements of footing set on the bedrock are expected to be less than 10 mm.

In areas where the footings will be founded partly in the bedrock and partly in the engineered fill, it is recommended that a transition zone be provided at the interface to minimize high stress concentration. The transition zone treatment may consist of sub-excavating 600 mm of the bedrock at a slope of 10H:1V and backfilling the area with Granular A fill compacted to 100 percent SPMDD.

The floor of the proposed basementless building may be constructed as a slab-on-grade set on an engineered fill pad. It should be set on a bed of well compacted 19 mm clear stone at least 200 mm thick.

Excavations at the site for installation of the footings are expected to extend to the surface of the sound bedrock, i.e. depths of 0.1 m and 1.6 m below the existing ground surface. However, excavations for installation of any septic tanks or other installation (service pits, etc.) may extend to deeper levels and will likely extend into the bedrock. Excavation of the overburden soils at the site may be undertaken by conventional mechanical equipment and cut back at a slope of 1H to 1V.

Any excavation of the limestone bedrock would require the use of blasting. The blasting operations would have to be carefully planned and closely monitored. It is recommended that the blasting contractor should retain the services of a blast specialist to provide him with a blasting plan. The contractor should have a licensed blaster on site at all times during the blasting and a vibrations engineer on retainer.

The existing fill is not considered suitable for backfilling purposes. However, it can be used for general grading purposes in the landscaped areas provided any debris is removed from it. The silty sand layer may be used as backfill for service trenches situated outside the buildings provided that any cobbles and boulders are removed from it and its moisture content is maintained within +/- 2 percent of the optimum value. It is anticipated that the material available on-site for backfilling purposes is limited in quantity, and therefore, it is anticipated that the majority of material required for backfilling purposes would have to be imported and should preferably conform the recommendations stated in this report.

Based on the geotechnical conditions encountered at the site and other information available in the area, the site has been classified as Class C in accordance with requirements of Table 4.1.8.4A, Site Classification for Seismic Site Response, National Building Code, 2010.

The subgrade for the proposed parking lots and access roadways should be prepared as per the recommendations stated in this report.

The above and other related considerations are discussed in greater detail in the main body of this report.

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1 Introduction

Exp Services Inc. (**exp**) is pleased to present the results of the geotechnical investigation completed for the proposed one-storey office-type building and surface parking facility. Authorization to proceed with this work was provided by the NPDO via Purchase Order Number: 7212674.

The proposed project consists of a one-storey office-type structure with an approximate area of 808 m^2. A parking facility with an approximate surface area of 1549 m^2 is proposed to be constructed on the west side of the proposed building.

Design information for the proposed structure and surface parking facilities were not available at the time of preparation of this report. Therefore, it has been assumed that the finished floor slab of the proposed building will be set at Elevation 109.5 m. The grades of the proposed surface parking facility were assumed to match the grades of the nearby gravel road, i.e. Elevation 109.1 m to 109.8 m. This office should be contacted once the finished design grades for the proposed building and parking facility are set in order to update/revise any of the recommendations stated in this report as deemed necessary.

The investigation was undertaken to:

(a) Establish the subsurface soil, bedrock and groundwater conditions at the site at the location of the test pits;

(b) Comment on grade-raise restrictions ;

(c) Make recommendations on the most suitable type of foundations and recommend bearing pressure at Serviceability Limit State (SLS) and factored geotechnical resistance at Ultimate Limit State (ULS) of the founding soils/bedrock;

(d) Discuss floor slab construction and drainage requirements;

(e) Comment on excavation conditions and de-watering requirements;

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

(g) Assess site classification for seismic site response in accordance with requirements of 2010 National Building Code (NBC);

(h) Recommend pavement structure for parking areas, and access roads; and

(i) Provide the results of the environmental testing on soils samples retrieved from the test pits.

The comments and recommendations given in this report are based on the assumption 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.

2 Site Description

The ground surface elevations in the footprint of the proposed office type building and parking lot vary from Elevation 107.94 m to 109.75 m. A gravel road crosses the site in the east-west direction. The site is currently covered with vegetation comprising of shrubs and trees and forest. Exposed bedrock areas were observed on the east side of the proposed building.

3 Background Information

A geotechnical investigation was undertaken in 2006 at the subject site for the EDTS Building and reported under **Trow** (now **exp**) Report Number OTGE00018368-AO and dated May 18, 2006. The investigation comprised of the excavation of 14 test pits to depths of 0 m to 2.1 m and the drilling of eleven (11) boreholes drilled to depths of 0.7 m to 4.4 metres.

The investigation revealed that the surficial soils comprises of a pavement structure or concrete underlain by sandy silt to silty sand stratum to the surface of the limestone bedrock contacted in the testholes at depths ranging between 0.8 m to 2.1 m, i.e. Elevation 104.0 m to 110.1 m.

The limestone bedrock in the boreholes was of “very poor” to “excellent” quality based on the Rock Quality Designation RQD value which ranged between 0 and 100 percent. The uniaxial compressive strength of the bedrock was established to vary between 111.9 MPa and 151.8 MPa indicating a very strong rock (Canadian Foundation engineering manual, 4th edition, 2006). The unit weight of the bedrock ranged between 26.6 kN/m^3 and 26.8 kN/m^3.

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4 Procedure

The fieldwork for the geotechnical investigation was undertaken on June 22nd, 2016 and comprised the excavation of fourteen (14) test pits using a rubber-tired backhoe and a small excavator (Test Pit Nos. 1 to 14 inclusive) to refusal depths ranging between 0.1 m and 1.6 m, i.e. Elevation 107.79 m to 109.04 m. The locations and elevations of the test pits were established in the field by a survey crew from Fairhall Moffat and Woodland Limited (Ontario Land Surveyors) and are shown on the Site Plan, Figure No. 1.

The fieldwork was supervised by a geotechnician from **exp** on a full-time basis. Representative bulk samples were collected from various depths from all the test pits.

All the soil samples were visually examined in the field, logged, preserved in plastic bags and identified. On completion of the fieldwork, the soil samples were transported to the **exp** laboratory in the City of Ottawa, Ontario where they were examined by a senior geotechnical engineer and testpits logs prepared

Laboratory testing comprised of performing moisture content on all the soil samples. In addition, limited environmental testing comprising of ICP metal scan was performed on selected soil samples.

5 Subsurface and Groundwater Condition

A summary of the findings encountered in the fourteen (14) test pits excavated at the site is given on Table No. I. The description of test pits and related information depicts 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 also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted. It should be noted that the soil boundaries indicated on the test pits description are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change.

A review of Table No. I indicates that the surficial soils at the locations of all the test pits comprised of topsoil ranging in thickness between 100 mm and 380 mm with the exception of Test Pit Nos. 4 to 6 where 200 to 300 mm thick crusher-run granular was encountered surficially. The fill has a natural moisture content of about 1 percent.

The topsoil in Test Pit Nos. 3, 7, 8, 11, 13 and 14 is underlain by a sandy silt to silty sand layer which extends to the surface of the bedrock contacted at depths of 0.3 m to 1.6 m, i.e. Elevation 107.79 m to 108.94 m. The silty sand to sandy silt layer has variable proportions of gravel and clay. It contains pieces of wood, organic matters and rootlets. The presence of cobbles, boulders were also observed in this layer. Its natural moisture content ranged between 7 and 28 percent.

The topsoil in Test Pit Nos. 1, 2, 9, 10 and 12 and the fill in Test Pit Nos. 4 to 6 are overlain by limestone bedrock/weathered bedrock which was contacted at depths of 0.1 m to 1.6 m, i.e. Elevation 107.79 m to 109.04 m.

Review of the previous geotechnical investigation completed by **exp** at the site on May 2006 revealed that the bedrock underlying the site comprised of limestone of the Ottawa Formation (section 3).

All the tests pits remained dry during or upon completion of the excavations. The groundwater table is subject to seasonal fluctuations and may be at a higher level during wet weather periods.

Table No. I: Summary of Findings in Test Pits

TEST PIT No.	TP Elevation (m)	TOPSOIL Thickness (mm)	FILL Thickness (mm)	SILTY SAND to SANDY SILT Depth (m)	Weathered Bedrock/Bedrock	
					Depth (m)	Elevation (m)
1	109.34	250	-	-	0.3	109.04
2	109.24	380	-	-	0.4	108.84
3	109.64	350	-	0.4 – 0.7	0.7	108.94
4	109.06	-	300	-	0.3	108.76
5	109.15	-	200	-	0.2	108.95
6	109.22	-	200	-	0.2	109.02
7	109.51	150	-	0.2 – 1.6	1.6	107.91
8	109.75	200	-	0.2 – 1.5	1.5	108.25
9	108.48	100	-	-	0.1	108.38
10	108.53	130	-	-	0.1	108.43
11	109.04	200	-	0.2 – 0.4	0.4	108.64
12	108.83	100	-	-	0.1	108.73
13	108.09	150	-	0.2 - 0.3	0.3	107.79
14	108.86	250	-	0.3 - 1.0	1.0	107.86

6 Site Grading

Design information for the proposed office building and surface parking facility were not available at the time of the preparation of this report. However, it has been assumed that the finished floor slab of the proposed building will be set at Elevation 109.5 m. The finished grades for the proposed surface parking facility have been assumed to match the grades of the nearby gravel road, i.e. Elevation 109.12 to 109.76. This office should be contacted once the finished design grades for the proposed building and parking facility are set in order to update/revise any of the recommendations stated in this report as necessary.

Based on the existing site grades under the building envelope (Elevation 108.5 m to 110.1 m) and assumed finished grades, up to 1 m of grade raise is anticipated at the site. This grade raise is considered acceptable from a geotechnical point of view.

As part of the site preparation for the proposed building, all topsoil, fill, and organic stained overburden should be removed from the area of the proposed building envelop and replaced with engineered fill.

In the areas of the proposed footings, the excavation should extend to the surface of the bedrock and all overburden should be removed. It may be possible to leave some of the overburden material under the proposed floor slab pending further field review. The excavation for the footing should extend to a sufficient distance beyond the limits of the proposed building to accommodate a 1.0 m wide bench of engineered fill around the perimeter of the structure, which is thereafter sloped at an inclination of 1H to 1V. Following approval of the subgrade for the footings and slab on grade, free draining Granular B, Type II fill should be placed in 300 mm lift thickness and each lift compacted to 100 percent of the Standard Proctor Maximum Dry Density (SPMDD) under the footings and to 98 percent of the SPMDD under the slab on grade. The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. In-place density tests should be undertaken on each lift of the engineered fill to ensure that it is properly compacted prior to placement of subsequent lift.

For budgeting purposes, it should be assumed that all existing overburden soils need to be removed from the envelope of the proposed building.

Along the proposed parking areas, all topsoil and organic stained overburden should be removed and the area proof-rolled using a heavy vibratory roller (10 tonnes) in the presence of a geotechnical engineer. Any soft areas detected should be sub-excavated and replaced with approved material that should be placed in 300 mm lifts and each lift compacted to 95 percent of the SPMDD. Following approval of the subgrade, approved fill preferably conforming to OPSS 1010 requirement of a Select Subgrade Material (SSM) should be placed in 300 mm lift and each lift and compacted to 95 percent of the SPMDD to subgrade level.

7 Foundation Considerations

The investigation has revealed the site of the proposed building is underlain by overburden soils (topsoil and/or fill and/silty sand) which to depths ranging between 0.1 m to 1.6 m, i.e. Elevation 107.79 m to 109.04 m. These overburden soils are underlain by weathered bedrock/limestone bedrock.

The proposed structure may be founded on strip and spread and/or strip footings set on engineered fill pad or on the sound limestone bedrock. Footings should not be founded partly on the engineered fill and partly on the bedrock.

Based on a finished floor slab assumed at Elevation 109.5 m, the footings for the proposed building are anticipated to be set at Elevation 108.0 m. Any service pits, etc., will be set at lower levels.

7.1 Foundation on Engineered Fill Pad

The proposed structure may be founded on spread and strip footings set on engineered fill pad prepared as described in Section 6.0 of this report and designed for a Serviceability Limit State (SLS) bearing pressure and factored geotechnical resistance at Ultimate Limit State (ULS) of 150 kPa and 225 kPa respectively.

Settlements of the footings designed for the SLS/ULS bearing pressures recommended above and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements.

7.2 Foundations on Sound bedrock

The proposed building may be founded on spread and strip footings designed to bear on sound limestone bedrock beneath any cap or weathered rock and designed for a factored ULS bearing pressure of 1,000 kPa. A higher factored ULS bearing pressure of the bedrock may be available but requires additional inspection and testing during construction. This can be provided by **exp** if requested.

The SLS bearing pressure of the bedrock, required to produce 25 mm settlements of the structure, will be much larger than the recommended value for factored bearing capacity at ULS. Therefore, the factored bearing capacity at ULS will govern the design. The SLS and ULS coefficient of friction may be taken as 0.67 and 0.55 respectively for sound limestone bedrock.

7.3 General Comments

All the footing beds should be examined by a geotechnical engineer to ensure that all soft/loose soils and loose weathered rock are removed. Sub-excavation may be undertaken to the underlying more competent bedrock. Alternatively, the footings may be redesigned to a reduced allowable bearing pressure.

In areas where the footings will be founded partly in the bedrock and partly in the engineered fill, it is recommended that a transition zone be provided at the interface to minimize high stress concentration. The transition zone treatment may consist of sub-excavating 600 mm of the bedrock at a slope of 10H:1V and backfilling the area with Granular A fill compacted to 100 percent SPMDD.

The recommended bearing capacities have been calculated by **exp** from the test pit 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 test pits when foundation construction is underway. The interpretation between test pits 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.

7.4 Foundation Frost Cover Requirement

A minimum of 1.5 m of earth cover should be provided to all the exterior footings of heated structures founded on the engineered fill to protect them from damage due to frost penetration. Footings of unheated structures should be provided with a cover of 2.1 m if snow would not be cleared from their vicinity. If the snow would be cleared from the vicinity of the footings, they should be provided with 2.4 m of earth cover. For footing founded on bedrock, the requisite earth cover may be reduced to 1.2 for heated structure and 1.5 m for unheated structures.

Where earth cover is less than the minimum required, an equivalent combination of earth fill and rigid polystyrene insulation (e.g. Styrofoam HI-60) should be provided. The Styrofoam should be placed along the exterior foundation wall from the finished exterior grade to top of footing, on top and sides of the footing and should extend laterally for a sufficient distance from the edge of the footings. Additional design data on the required thickness and extend of the required insulation can be provided by **exp** once the final design grades have been finalized.

8 Floor Slab and Drainage Requirement

The floor of the proposed basementless building may be constructed as a slab-on-grade provided it is set on a bed of well compacted 19 mm clear stone at least 200 mm thick placed on the engineered fill pad prepared as described in Section 6.0 of this report. 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.

Based on the groundwater conditions and the proposed finished floor elevation, perimeter or underfloor drainage system will not be required for the proposed structure; however, the finished exterior grade should be sloped away from the building at an inclination of two percent to prevent surface ponding of water close to the exterior walls.

9 Seismic Site Classification

The subsoil and groundwater information at the site has been examined in relation to Section 4.1.8.4 of the National Building Code (NBC) 2010. The subsoils (topsoil, fill, silty sand layer) at this site extends to the surface of the weathered bedrock/bedrock surface contacted at depths varying from 0.1 m and 1.6 m below the existing ground surface i.e. Elevation 107.94 m and 109.75 m.

The site can be classified as **Class C** for seismic site response in accordance with the 2010 NBC. A higher class is likely available but requires that a shear-wave velocity measurements be undertaken at the site for the upper 30 m of the overburden (soil) and bedrock.

10 Excavations

Excavations at the site for the construction of the footings are expected to extend to surface of the bedrock, i.e. depths of 0.1 m and 1.6 m below the existing ground surface. Excavations for installation of any underground services may extend to deeper levels and will likely be through the bedrock. Excavation of the overburden soils at the site may be undertaken with conventional mechanical equipment. The majority of the soil to be excavated from the site is sandy silt to silty sand with different proportions of gravel and clay mixed with cobbles, boulders, and rock fragments.

Excavations at the site should comply at all times with the requirements of the latest edition of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects, Ontario Regulations 213/91 and should be cut back at a slope of 1H to 1V. Any weathered bedrock and loose fragments must be removed from the bedrock surface in the areas of the proposed footings. If excavation of the bedrock is required, it may be undertaken with near vertical sides.

Excavation of the limestone bedrock, if required, would necessitate the use of blasting, which should be carefully planned and closely monitored. It is recommended that the blasting contractor should retain the services of a blast specialist to provide him with a blasting plan. The contractor should have a licensed blaster on site at all times during the blasting and a vibrations engineer on retainer,

A condition survey of all the existing structures and services in the vicinity of the site should be undertaken prior to commencement of construction. Vibration monitoring should be carried out in the adjacent structures during blasting operations. The blast charge should be such that the peak particle velocity should not exceed 50 mm per second at the property lines.

Many geologic materials deteriorate rapidly upon exposure to meteorological elements. Unless otherwise specifically indicated in this report, walls and floors of excavations must be protected from moisture, desiccation, and frost action throughout the course of construction.

Seepage of surface water into the excavations should be anticipated. However, it should be possible to collect any water entering the excavations in ditches and to remove it by pumping from sumps.

Although this investigation has estimated the groundwater levels at the time of the field work and commented on dewatering and general construction problems, conditions may be present that are difficult to establish from standard boring techniques and which may affect the type and nature of dewatering procedures used by the contractor in practice. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile, thin layers of soil with large or small permeabilities compared with the soil mass, etc. Only carefully controlled tests using pumped wells and observation wells will yield the quantitative data on groundwater volumes and pressures that are necessary to adequately engineer construction-dewatering systems.

11 Backfilling Requirements and Suitability of On-Site Soils for Backfilling Purposes

The backfill in footing trenches and service trenches inside the building should conform to Ontario Provincial Standard Specifications for Granular B, Type II. The backfill in service trenches outside the building and any fill required to raise the grade at the site should be compactable (free of organics, debris, cobbles and boulders) and with a moisture content that is within two percent of the optimum value. All backfill should be compacted to 95 percent of the SPMDD.

The on-site fill is not suitable for backfilling purposes in the interior of the building. However, it can be used for general grading purposes in the landscaped areas provided any cobbles, boulders are removed from it. The on-site silty sand layer, which is free of organic matters, debris, roots, cobbles, boulders and bedrock fragments, may be used for backfilling of trenches outside the building areas and as subgrade fill provided its natural moisture content is maintained within +/- two percent of the optimum value.

Based on the observations made, it is considered that the amount of material available on-site for backfilling purposes is expected to be of limited quantity. Therefore, it is anticipated that the majority of the material required for backfilling of the structure and for subgrade fill would have to be imported and should be preferably conform to the following requirement;

- Engineered fill under footings - OPSS 1010 Granular 'B', Type II
- Underfloor fill and backfill in footing trenches and service trenches inside the building and Exterior of building - OPSS 1010 Granular 'B', Type I or II
- Trench backfill outside the building and subgrade fill for access roads and parking areas - OPSS 1010 Select Subgrade Material (SSM)

12 Pavement Structures Design

The subgrade soil at the site is expected to be existing fill, silty sand to sandy silt layer and/or limestone bedrock.

The recommended asphalt pavement for parking areas is given on Table No. II. The recommendations are based upon the assumption that the subgrade will be prepared as recommended in Section 6 of this report and assuming a functional design life of fifteen to twenty years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

Table No. II: Recommended Asphalt Pavement Structure Thicknesses

Pavement Layer	Compaction Requirements	Subgrade Material	
		Limestone Bedrock	Overburden
Asphaltic Concrete – PG 58-34	92-96% MRD[2]	65 mm HL3	65 mm HL3
OPSS Granular A Base (crushed limestone)	100% SPMDD[1]	150	150
OPSS Granular B Sub-Base	100% SPMDD[1]	200	400

Notes:
1. SPDD denotes Standard Proctor Maximum Dry Density, ASTM, D-698.
2. Maximum Relative Density, ASTM D2041
3. Any subgrade fill must be compacted to 95 percent SPMDD for at least the upper 300 m

Additional comments on the construction of parking areas and access roadways are as follows:

1. Subgrade preparation should be undertaken as per the recommendations stated in Section 6 of this report.

2. The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Drainage ditches must be installed to intercept excess subsurface moisture and to prevent subgrade softening.

3. The finished pavement surface should be free of depressions and should be sloped (preferably at a minimum cross fall of two percent) to provide effective surface drainage towards catch basins. Surface water should not be allowed to pond adjacent to the outside edges of paved areas.

4. The granular materials used for pavement construction should conform to OPSS for Granular A and Granular B, Type II and should be compacted to 100 percent of the SPMDD. The asphaltic

concrete used and its placement should meet OPSS requirements. It should be compacted to 97 percent of the Marshall Density or 92 to 96 of the maximum relative density.

It is recommended that **exp** be retained to review the final pavement structure design and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

13 Additional Comments

All earthwork activities from placement and compaction of fill in the service trenches to subgrade preparation, placement and compaction of granular materials and asphaltic concrete should be inspected by qualified geotechnicians to ensure that construction of the sewers and pavement proceeds according to the specifications. All the footing beds should also be examined by a geotechnical engineer to ensure that the design bearing pressure is available at the founding level and that the footing beds have been properly cleaned.

It is also recommended that an additional investigation should be performed if deemed required once the final design at the site has been completed. The purpose of the additional investigation would be to collect additional data on the elevation of the bedrock at the site.

14 Limited Environmental Testing

As part of the geotechnical investigation undertaken on June 22, 2016 at the subject site for NPDO, a limited environmental testing comprising of ICP metal scan was completed on selected soil samples recovered from the site. The results of this testing are presented as follows.

14.1 Introduction

Given that excess soil will likely be generated during this proposed project and to assess the quality of these soils from an environmental perspective, laboratory analyses were undertaken on eight (8) selected soil samples taken from the test pits. Five test pit samples were located in the proposed building area (TP1, TP3, TP4, TP7 and TP9) and three test pit samples were located in the proposed parking area (TP11, TP13, and TP14). The soil observed in the test pits was either sand with some silt, sand and gravel, sand and silt topsoil, or crushed limestone. The depth to bedrock in the test pits ranged from 0.1 m to 1.6 m.

14.2 Assessment Criteria

The assessment criteria, Site Condition Standards (SCS), applicable to a given site in Ontario are established under subsection 168.4(1) of the Environmental Protection Act. Tabulated generic criteria are provided in *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, *Ontario Ministry of the Environment and Climate Change* (MOECC), July 2011. These criteria are based on site sensitivity (sensitive or non-sensitive), groundwater use (potable or non-potable), property use (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil type (coarse or medium to fine textured) and restoration depth (full or stratified restoration). In addition, site specific criteria may be established on the basis of the findings of a Risk Assessment carried out in accordance with Part IX and Schedule C of Ontario Regulation 153/09 (O. Reg. 153/09).

For assessment purposes, **exp** selected the Table 7 site condition standards (SCS) for this site. The Table 7 SCS were selected as a standard which represents an acceptable level of impact for the type of land use being considered. The Table 7 SCS are based on the following site specific factors: institutional land use; coarse grained soil; shallow depth to bedrock, and the fact that groundwater in the area is not used as a source of potable water. The Table 1.A background concentrations were selected for comparison purposes. Parameters meeting these concentrations would be considered “clean” and thus any excess soil generated would not require any special handling or disposal methods. Both the MOECC Tables 1 and 7 SCS are included, along with the laboratory results obtained, in the attached table for comparison and assessment purposes.

14.3 Laboratory Analyses

Given that no unusual field observations in terms of staining or odours were noted in any of the collected soil samples which could be indicative of organic contamination (i.e. petroleum), the soil samples were submitted for a general metals scan.

14.4 Laboratory Results

The results are summarized in Table A.1 (Appendix A). Laboratory Certificate of Analysis are also presented in Appendix A.

All of the soil samples had concentrations of the analyzed metals that were less than the MOECC Table 7 SCS. Therefore, the soil is acceptable for re-use at the subject site.

All of the soil samples had concentrations of the analyzed metals that were less than the MOECC Table 1 background concentrations. Therefore, if excess soil is generated during the proposed project, all soils would be considered "clean fill" and thus would not require special handling and disposal procedures.

14.5 Limitation of Liability, Scope of Report, and Third Party Reliance

14.5.1 Basis of Report

This report ("Report") is based on site conditions known or inferred by the investigation undertaken as of the date of the Report. Should changes occur which potentially impact the condition of the site the recommendations of **exp** may require re-evaluation. Where special concerns exist, or Bowling Green Logistics Incorporated ("the Client") has special considerations or requirements, these should be disclosed to **exp** to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and **exp**'s recommendations. Any reduction in the level of services recommended will result in **exp** providing qualified opinions regarding the adequacy of the work. **Exp** can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

14.5.2 Reliance on Information Provided

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to **exp** by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. **Exp** has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to **exp**. If new information about the environmental conditions at the Site is found, the information should be provided to **exp** so that it can be reviewed and revisions to the conclusions and/or recommendations can be made, if warranted.

14.5.3 Standard of Care

The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances and locale. No other warranty, expressed or implied, is made. Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

14.5.4 Complete Report

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment form part of the Report. This material includes, but is not limited to, the terms of reference given to **exp** by the Client, communications between **exp** and the Client, other reports, proposals or documents prepared by **exp** for the Client in connection with the site described in the Report. In order to properly

understand the suggestions, recommendations and opinions expressed in the Report, reference must be made to the Report in its entirety. **Exp** is not responsible for use by any party of portions of the Report.

14.5.5 Use of Report

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the written consent of **exp**. Any use of the Report, or any portion of the Report, by a third party are the sole responsibility of such third party. **Exp** is not responsible for damages suffered by any third party resulting from unauthorised use of the Report.

Where **exp** has submitted both electronic file and a hard copy of the Report, or any document forming part of the Report, only the signed and sealed hard copy shall be the original documents for record and working purposes. In the event of a dispute or discrepancy, the hard copy shall govern. Electronic files transmitted by **exp** utilize specific software and hardware systems. **Exp** makes no representation about the compatibility of these files with the Client's current or future software and hardware systems. Regardless of format, the documents described herein are **exp**'s instruments of professional service and shall not be altered without the written consent of **exp**.

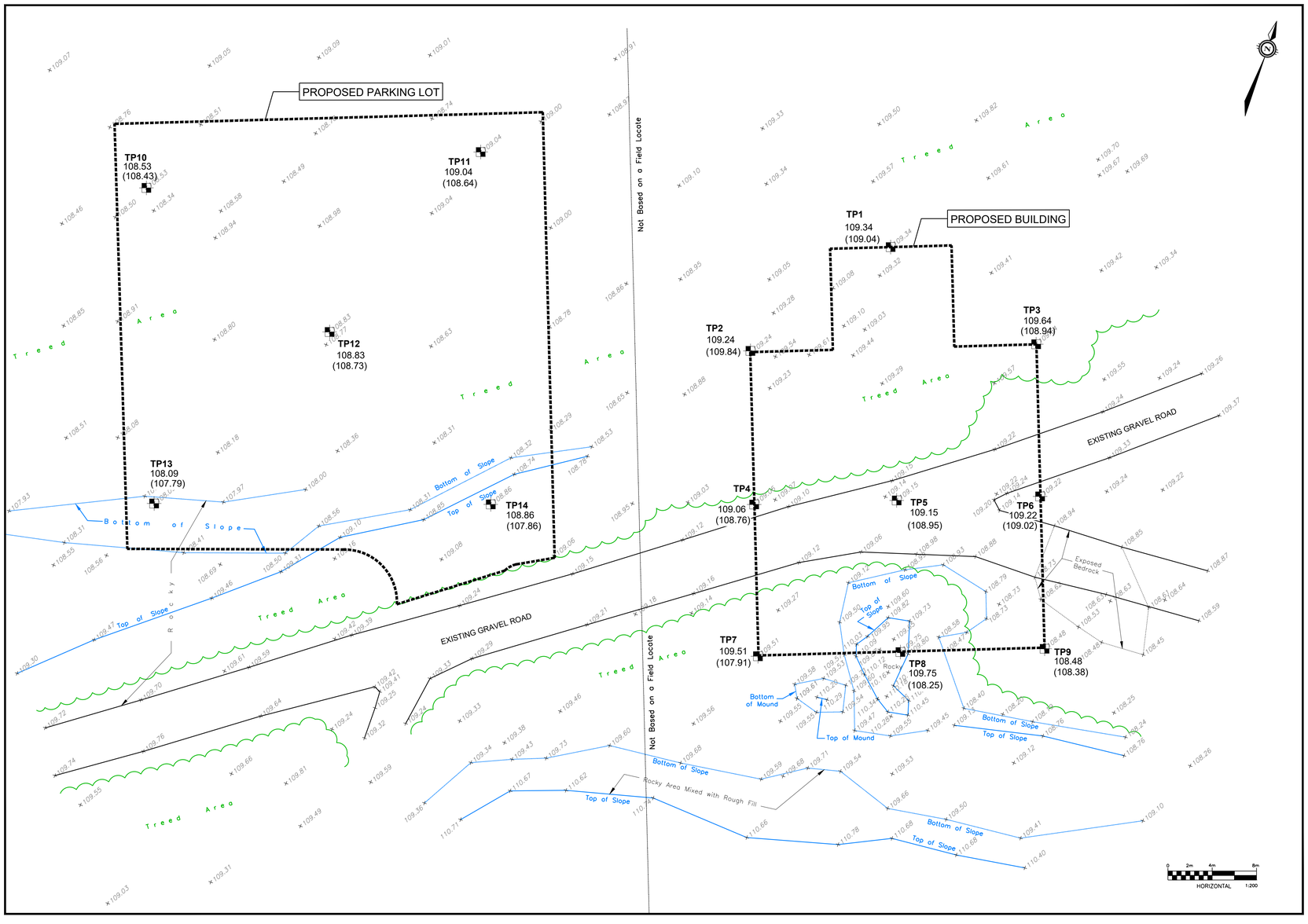
15 General Comments

The comments given in this report are intended only for the guidance of design engineers. The number of test pits required to determine the localized underground conditions, between test pits 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 test pit results, so that they may 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. Should specific information be required, including for example, the presence of pollutants, contaminants or other hazards in the soil, additional testing may be required.

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

Figures



LEGEND

TP5	TEST-PIT LOCATION AND NUMBER
109.15	GEODETIC ELEVATION
(108.95)	BEDROCK ELEVATION

TESTPIT AND BOREHOLE

NOTES :

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT TEST PIT AND BOREHOLE LOCATIONS. BETWEEN TEST PITS AND BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE TEST PIT AND BOREHOLE LOCATIONS.
4. TEST PIT ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN OBTAINED FROM FAIRHALL, MOFFATT AND WOODLAND LIMITED, ONTARIO LAND SURVEYORS, DATED JUNE 07, 2016.

REVISIONS

exp Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7337
100-2650 Queensview Drive
Ottawa, ON K2B8H6
Canada
www.exp.com

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

CLIENT

NPDO BUILDING

PROJECT

PROPOSED BUILDING
AND SURFACE PARKING FACILITY
OTTAWA, ON

TITLE

TEST PIT LOCATION PLAN

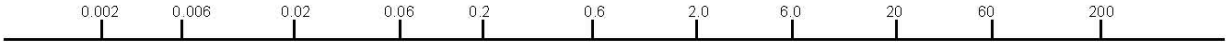
design by	Z.G.	project no.	OTT-00233252-A0
drawn by	J.R.	drawing no.	FIG 1
checked by	I.T.		
date	July 2017		
scale	1:200		

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		



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.

Appendix A: Table A.1 and Laboratory Certificate of Analysis

Table1.A.Metals Results in Soil

(ug/g)

Parameter	**MOECC Table 1**[1]	**MOECC Table 7**[2]	**TP1**	**TP3**	**TP4**	**TP7**	**TP9**	**TP11**	**TP13**	**TP14**
Sample Date (d/m/y)	**Background**	**Non-potable groundwater**	22/06/16	22/06/16	22/06/16	22/06/16	22/06/16	22/06/16	22/06/16	22/06/16
Sample Number			Grab 1	Grab 2	Grab 1	Grab 2	Grab 1	Grab 2		
Sample Depth (mbsg)			0 – 0.3	0.4 – 0.7	0 – 0.3	0.2- 0.6	0-0.1	0.2-0.4	0.2-0.3	0.3 – 0.6
Aluminum	NV	NV	13500	15800	5140	14200	11600	15000	11600	15900
Antimony	1.3	7.5	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	18	18	9	5	2	7	4	6	3	5
Barium	220	390	107	140	129	138	98	118	170	164
Beryllium	2.5	4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	36	120	<5	<5	9	<5	6	6	<5	<5
Cadmium	1.2	1.2	0.8	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	0.6
Cobalt	21	22	8.6	11.7	5.6	12.3	7.6	11.8	6.8	11
Chromium	70	160	21	26	10	25	20	24	21	27
Copper	92	140	21	14	8	18	13	18	19	21
Iron	NV	NV	28100	23000	9520	23000	17500	22000	16700	22700
Lead	120	120	28	17	8	18	20	15	10	20
Manganese	NV	NV	954	942	400	1120	584	943	486	1080
Molybdenum	2	6.9	1.3	1.4	0.6	1.9	1	1.4	1	1.2
Nickel	82	100	20	25	11	28	17	26	18	31
Phosphorus	NV	NV	571	419	715	655	597	541	625	567
Selenium	1.5	2.4	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	0.5	20	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Strontium	NV	NV	83	43	811	76	117	49	94	323
Thallium	1	1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Titanium	NV	NV	22	378	68	389	282	323	387	307
Uranium	2.5	23	<0.50	0.53	<0.50	0.59	<0.50	0.52	<0.50	0.58
Vanadium	86	86	20	32	8	31	23	28	26	29
Zinc	290	340	82	49	24	45	54	49	33	70
Zirconium	NV	NV	1.8	2.7	1.8	2.9	1.5	2.1	2.5	2.4

NOTES:

1	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 15, 2011 Table 1, background concentrations*
2	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 15, 2011 Table 7 non-potable groundwater, institutional land use, shallow bedrock, coarse grained soil*
NV	no value provided in specified Guideline for noted parameter.
BOLD	Concentration exceeds MOECC Table 1 background concentration
Shaded	Concentration exceeds MOECC Table 7 site condition standard.

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: Zohra Guetif

PROJECT: OTT-233252-A

AGAT WORK ORDER: 16Z111990

SOIL ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Jul 12, 2016

PAGES (INCLUDING COVER): 5

VERSION*: 1

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

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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: 16Z111990

PROJECT: OTT-233252-A

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Zohra Guetif

SAMPLING SITE:

SAMPLED BY:

Metals Scan (Soil)

DATE RECEIVED: 2016-07-05

DATE REPORTED: 2016-07-12

		SAMPLE DESCRIPTION:		BH 1 Grab 1	BH 3 Grab 2	BH 4 Grab 1	BH 7 Grab 2	BH 9 Grab 1	BH 11 Grab 2	BH 13	BH 14
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016	6/22/2016
Parameter	Unit	G / S	RDL	7680584	7680589	7680590	7680591	7680592	7680593	7680594	7680595
Aluminum	µg/g		5	13500	15800	5140	14200	11600	15000	11600	15900
Antimony	µg/g		0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g		1	9	5	2	7	4	6	3	5
Barium	µg/g		2	107	140	129	138	98	118	170	164
Beryllium	µg/g		0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/g		5	<5	<5	9	<5	6	6	<5	<5
Cadmium	µg/g		0.5	0.8	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	0.6
Cobalt	µg/g		0.5	8.6	11.7	5.6	12.3	7.6	11.8	6.8	11.0
Chromium	µg/g		2	21	26	10	25	20	24	21	27
Copper	µg/g		1	21	14	8	18	13	18	19	21
Iron	µg/g		50	28100	23000	9520	23000	17500	22000	16700	22700
Lead	µg/g		1	28	17	8	18	20	15	10	20
Manganese	µg/g		5	954	942	400	1120	584	943	486	1080
Molybdenum	µg/g		0.5	1.3	1.4	0.6	1.9	1.0	1.4	1.0	1.2
Nickel	µg/g		1	20	25	11	28	17	26	18	31
Phosphorus	µg/g		5	571	419	715	655	597	541	625	567
Selenium	µg/g		0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g		0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Strontium	µg/g		5	83	43	811	76	117	49	94	323
Thallium	µg/g		0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Titanium	µg/g		5	22	378	68	389	282	323	387	307
Uranium	µg/g		0.50	<0.50	0.53	<0.50	0.59	<0.50	0.52	<0.50	0.58
Vanadium	µg/g		1	20	32	8	31	23	28	26	29
Zinc	µg/g		5	82	49	24	45	54	49	33	70
Zirconium	µg/g		0.5	1.8	2.7	1.8	2.9	1.5	2.1	2.5	2.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(All)

7680584-7680595

Certified By:

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: 16Z111990

PROJECT: OTT-233252-A

ATTENTION TO: Zohra Guetif

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jul 12, 2016			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
Metals Scan (Soil)															
Aluminum	7680584	7680584	13500	12800	5.3%	< 5	84%	70%	130%	92%	80%	120%	102%	70%	130%
Antimony	7680584	7680584	< 0.8	< 0.8	NA	< 0.8	127%	70%	130%	108%	80%	120%	104%	70%	130%
Arsenic	7680584	7680584	9	9	0.0%	< 1	107%	70%	130%	98%	80%	120%	100%	70%	130%
Barium	7680584	7680584	107	102	4.8%	< 2	101%	70%	130%	99%	80%	120%	103%	70%	130%
Beryllium	7680584	7680584	0.5	0.5	NA	< 0.5	96%	70%	130%	92%	80%	120%	105%	70%	130%
Boron	7680584	7680584	< 5	< 5	NA	< 5	103%	70%	130%	106%	80%	120%	119%	70%	130%
Cadmium	7680584	7680584	0.8	0.8	NA	< 0.5	102%	70%	130%	99%	80%	120%	99%	70%	130%
Cobalt	7680584	7680584	8.6	8.6	0.0%	< 0.5	98%	70%	130%	101%	80%	120%	98%	70%	130%
Chromium	7680584	7680584	21	20	4.9%	< 2	107%	70%	130%	93%	80%	120%	107%	70%	130%
Copper	7680584	7680584	21	21	0.0%	< 1	108%	70%	130%	97%	80%	120%	101%	70%	130%
Iron	7680584	7680584	28100	26800	4.7%	< 50	102%	70%	130%	89%	80%	120%	83%	70%	130%
Lead	7680584	7680584	28	29	3.5%	< 1	110%	70%	130%	97%	80%	120%	100%	70%	130%
Manganese	7680584	7680584	954	944	1.1%	< 5	101%	70%	130%	95%	80%	120%	119%	70%	130%
Molybdenum	7680584	7680584	1.3	1.37	NA	< 0.5	106%	70%	130%	104%	80%	120%	108%	70%	130%
Nickel	7680584	7680584	20	20	0.0%	< 1	100%	70%	130%	98%	80%	120%	101%	70%	130%
Phosphorus	7680584	7680584	571	585	2.4%	< 5	83%	80%	120%	93%	80%	120%	108%	70%	130%
Selenium	7680584	7680584	< 0.8	< 0.8	NA	< 0.8	79%	70%	130%	99%	80%	120%	111%	70%	130%
Silver	7680584	7680584	< 0.4	< 0.4	NA	< 0.4	116%	70%	130%	106%	80%	120%	101%	70%	130%
Strontium	7680584	7680584	83	84	1.2%	< 5	100%	70%	130%	98%	80%	120%	108%	70%	130%
Thallium	7680584	7680584	< 0.4	< 0.4	NA	< 0.4	103%	70%	130%	93%	80%	120%	99%	70%	130%
Titanium	7680584	7680584	22	21	NA	< 5	88%	70%	130%	88%	80%	120%	97%	70%	130%
Uranium	7680584	7680584	< 0.50	< 0.50	NA	< 0.50	105%	70%	130%	82%	80%	120%	88%	70%	130%
Vanadium	7680584	7680584	20	19	5.1%	< 1	77%	70%	130%	98%	80%	120%	104%	70%	130%
Zinc	7680584	7680584	82	82	0.0%	< 5	100%	70%	130%	96%	80%	120%	107%	70%	130%
Zirconium	7680584	7680584	1.8	1.75	NA	< 0.5	95%	70%	130%	94%	80%	120%	101%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

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: 16Z111990

PROJECT: OTT-233252-A

ATTENTION TO: Zohra Guetif

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Iron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Manganese	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Phosphorus	MET-93-6103	EPA SW 846-3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Strontium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Titanium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zirconium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS