

January 21, 2026

Arcadis Ref: 30257934 - 147221

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**Attention: Chloe Bullen**

Tel: 613-580-2424, ext. 76242  
City of Ottawa

**Re: Revised Stormwater Management (SWM) Brief  
PC2025-0197 (Site Plan) – Submission #2  
Owner: McDonald's Restaurants of Canada, Limited  
Location: 3340 Fallowfield Road, Nepean, City of Ottawa**

Arcadis Professional Services (Canada) Inc. (Arcadis) is submitting this Stormwater Management (SWM) and Water Service Brief in support of the Rural Small Site Plan Control Application (**No. PC2025-0197**) for the property located at 3340 Fallowfield Road, Nepean, City of Ottawa (City). Arcadis has been retained by McDonald's Restaurants of Canada, Limited (Owner). This letter is in support of the submitted **Site Grading Plan (C-1.0)**, dated September 5<sup>th</sup>, 2025.

The purpose of this brief is to provide site-specific information for the City's review with respect to infrastructure required to support the proposed development regarding stormwater quantity control.

More specifically, the letter will present the following:

- Demonstrate that post development flows are not exceeding pre-development flows using the Modified Rational Method;
- Check if additional stormwater storage is required;
- Report on the volume of stormwater storage (surface or below ground), release rates, ICD sizing (Inlet Control Device); and,
- Provide a stormwater drainage figure.

The following documents enclosed in **Appendix A** were available for reference:

- Topographical Plan of Part of Block 114, Registered Plan 4M-801, City of Ottawa by Annis, O'Sullivan, Vollebakk LTD., dated May 9<sup>th</sup>, 2011 (AOV 2011);
- Grading, Servicing, Drainage Areas and Erosion and Sediment Control by MRA Architecture + Design, dated February 11<sup>th</sup>, 2025 (MRA 2013); and,
- Geotechnical Investigation for Proposed North Addition to Existing Restaurant, 3340 Fallowfield Road, Ottawa, Ontario, by Inspec Sol Engineering Solutions dated September 26<sup>th</sup>, 2011 (Inspec-Sol 2011).

## Site Proposal

The proposed scope consists of a minor site alteration to the existing McDonald's Restaurant located at 3340 Fallowfield Road, Nepean, City of Ottawa. Part of the site's existing landscape will be used to accommodate new drive-through design to allow for two order-taking terminals.

## Site Grading

For the purpose of this study, focus is limited to the affected area of the site, which is referred to as CB#2 sub-catchment area approximately 340 m<sup>2</sup> (0.034 ha). The proposed grades will match current drainage patterns wherever feasible, and grades will be maintained along the sub-catchment area to the extent practical. Refer to **Site Grading Plan (C-1.0)** for site location, proposed grading and drainage details which is provided separately.

## Stormwater Drainage

### Existing Conditions

The sub-catchment area currently drains overland to CB#2 in south-east corner of the property. Run-off coefficients representing pre-development conditions were referenced from site plan (MRA 2013). The City's minimum Time of Concentration (T<sub>c</sub>) of 10 minutes was used.

### Post-Development Input Parameters

Catchment	Drainage Area (ha)	C	T <sub>c</sub> (min.)
CB#2 PRE	0.034	0.70	10

Allowable release rate is governed by existing ICD device (HYDROVEX 100 VHV-1) discharging at rate of 6.5 L/s at a head of 1.32m.

$$Q_{A1-Pre} = \frac{(A \times R) \times I_5}{360} = \frac{(0.034 \text{ ha} \times 0.70) \times 178.56 \text{ mm / hr}}{360} \times \left( \frac{1000 \text{ L}}{\text{m}^3} \right) = 11.8 \text{ L/s}$$

Under the 100-year event, the resulting runoff rate of 11.8 L/s requires a total storage of 3.2 m<sup>3</sup>. The maximum elevation for surface ponding is based on the surface spill point at elevation of 92.09 m located on the north side of existing McDonalds building. The latest site expansion plan (MRA 2013) identified surface ponding area of 80 m<sup>2</sup> and volume for localized storm storage of 5.9 m<sup>3</sup> based on surface spill point elevation. Note, that the previous plans did not account for storm structure storage capacity.

### Proposed Conditions

Overland flow for events, up to and including the 100-yr storm design event, will be captured within the site. Refer to **Site Grading Plan (C-1.0)**. Run-off coefficients representing post-development conditions were calculated based on proposed land-use characteristics. The City's minimum Time of Concentration (T<sub>c</sub>) of 10 minutes were used. The calculated input parameters are shown in **Table 1.1** below.

**Table 1.1 Post-Development Input Parameters**

Catchment	Drainage Area (ha)	C	T <sub>c</sub> (min.)
CB#2 POST	0.034	0.80	10

Proposed changes to the drive-through result in marginal increase of impervious surface. Capture area for CB#2 remains the same, but runoff coefficient is adjusted to reflect changes in imperviousness. As release rate is limited by existing ICD to 6.5 L/s, under proposed conditions the sub-catchment area will require a total of 4.2 m<sup>3</sup> to be stored.

$$Q_{A1-Post} = \frac{(A \times R) * I_5}{360} = \frac{(0.034\text{ha} \times 0.80) \times 178.56 \text{ mm / hr}}{360} \times \left( \frac{1000 \text{ L}}{\text{m}^3} \right) = 13.5 \text{ L/s}$$

The surface elevation of CB#2 grate requires adjustment to provide gentle slope across the drive-through area. The revised grate elevation is set 50 mm higher at 91.92 m. As surface ponding is limited by the lowest surface spill point elevation 92.09 m, the maximum ponding of 0.17 m will not exceed maximum allowable of 0.35 m. The surface storage volume calculated based on THE proposed grading plan ponding limits, with net area of 104 m<sup>2</sup>, excluding center island, and maximum ponding depth of 0.17 m, which results in maximum surface storage of 5.9 m<sup>3</sup>, excluding underground storm structure storage capacity.

Proposed design calculations and supporting information is enclosed in **Appendix B**.

### Erosion and Sediment Control

Sediment traps will be placed on all existing and proposed catchbasins. The filter fabric of the sediment traps will capture silt and other debris blocking them from entering the storm conveyance system.

The required ESC features are included in **Site Gading Plan (C-1.0)**. The ESC features shall be regularly monitored during construction and all necessary repairs shall be performed in a timely manner. All sediment trapped or localized in areas of intense erosion and sedimentation shall be safely disposed.

### Summary

In summary, a minor adjustment to the elevation of CB#2's grate by raising in 50mm is required, while no changes are required to inlet control device. The proposed grading plan provides adequate surface storage without increasing the hydraulic head acting on the ICD release flow.

Arcadis Professional Services (Canada) Inc.  
3340 Fallowfield Road, Nepean, City of Ottawa  
Prepared for McDonald's Restaurants of Canada, Limited

Yours sincerely,

**ARCADIS PROFESSIONAL SERVICES (CANADA) INC.**



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Enclosures:

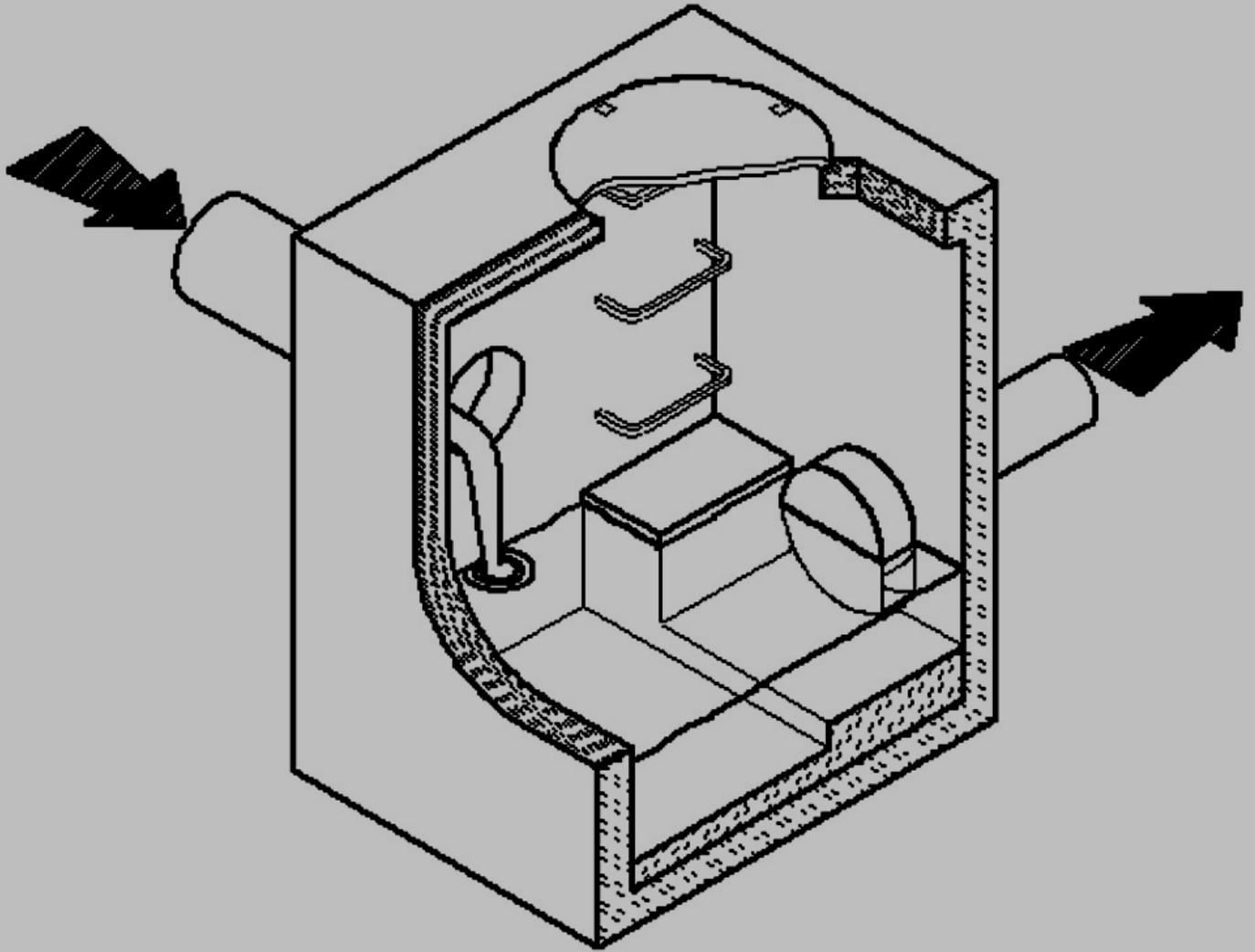
- Appendix A – Background Information
- Appendix B – Design Calculations

Arcadis Professional Services (Canada) Inc.  
3340 Fallowfield Road, Nepean, City of Ottawa  
Prepared for McDonald's Restaurants of Canada, Limited

# Appendix A







**HYDROVEX<sup>®</sup> VHV/SVHV**  
**Vertical Vortex Flow Regulator**  
*CSO, SSO, Stormwater Management*

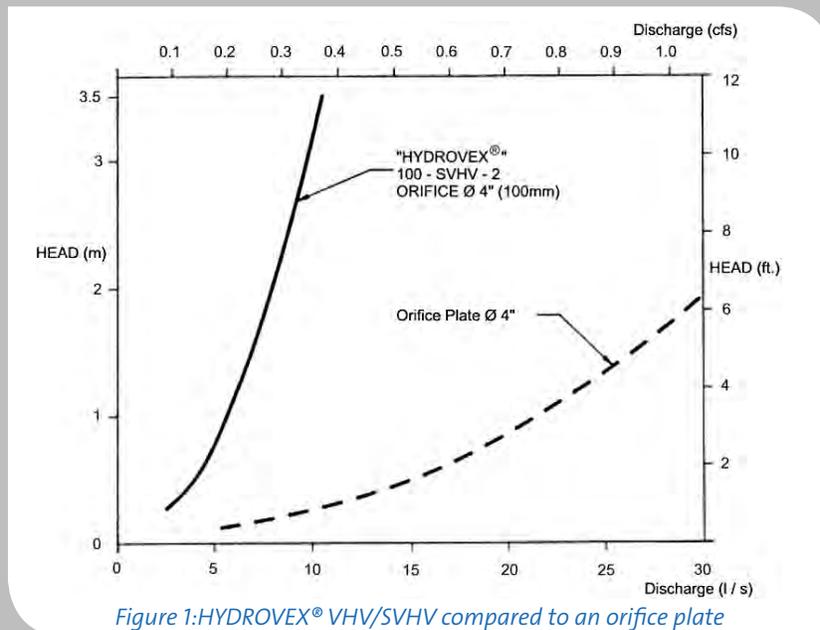
**WATER TECHNOLOGIES**

# HYDROVEX® VHV / SVHV Vertical Vortex Flow Regulator

## Application

One of the major problems of urban wet weather flow management is the runoff generated by heavy rainfall. During a storm event, uncontrolled flows may overload the drainage system and cause flooding. Wear and deterioration on the network are increased dramatically as a result of increased flow velocities. In a combined sewer system, the wastewater treatment plant will experience a significant increase in flows during storms, thereby losing its treatment efficiency. A simple means of managing excessive storm water runoff is to control the flows at their point of origin, the manhole.

The HYDROVEX® VHV / SVHV line of vortex flow regulators is ideal for point source control of low to medium stormwater flows in manholes, catch basins and other retention structures. The HYDROVEX® VHV / SVHV design is based on the fluid mechanics principle of the forced vortex. The discharge is controlled by an air-filled vortex which reduces the effective water passage area without physically reducing orifice size. This effect grants precise flow regulation without the use of moving parts or electricity, and allows for larger inlet and outlet openings compared to the basic orifice. Although the concept is quite simple, many years of research and testing have been invested to optimize the performance of our vortex technology.



Vortex valves have openings typically 4 to 6 times larger than an orifice plate for the same design. Larger opening sizes decrease the chance of blockage caused by sediments and debris found in storm water flows. Figure 1 shows

the discharge curve of a vortex regulator compared to an equally sized orifice plate. For an identical opening size, the flow is approximately four times smaller than the orifice plate for the same upstream water pressure.

## Advantages

- Large inlet/outlet openings reduce the chance of clogging
- Openings typically 4-6 times larger than the basic orifice (Figure 1)
- Outlet orifice always equal or larger than inlet
- Ideal for precise control of low to medium stormwater flow applications
- Submerged inlet for floatables control
- No moving parts or electricity required
- Durable and robust stainless steel construction
- Minimal maintenance
- Easy to install

## Selection

Selecting a VHV/SVHV regulator is easily achieved using Figure 3. Each selection is made using the maximum allowable flow rate and the maximum allowable upstream water pressure (head). The area in which the design point falls will designate the required model. The maximum design head is defined

as the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by a John Meunier Inc. representative prior to fabrication.

Design example:

- Maximum discharge: 6 L/s (0.2 cfs)\*
- Maximum design head 2m (6.56 ft.)\*\*
- Using Figure 3, model 75 VHV-1 is selected

*\*The selection chart provided assumes free flowing downstream conditions. Should the outlet pipe be >80% full at design flow, a larger pipe diameter should be used. In the above example, the minimum outlet pipe diameter and slope would be 150mm (6in), 0.3%.*

*\*\*The design head is defined as the difference between the maximum upstream water level and the outlet pipe invert.*

The HYDROVEX® VHV / SVHV vortex flow regulators can be installed in circular or square manholes. The table below lists the minimum dimensions and clearances required for each

regulator model. It is imperative to respect the minimum clearances shown to ensure ease of installation and proper functioning of the regulator.

Model	Regulator Diameter A (mm) [in]	CIRCULAR Minimum Manhole Diameter B (mm) [in]	SQUARE Minimum Chamber Width B (mm) [in]	Minimum Outlet Pipe Diameter C (mm) [in]	Minimum Clearance H (mm) [in]
25 SVHV-1	125 [5]	600 [24]	600 [24]	150 [6]	150 [6]
32 SVHV-1	150 [6]	600 [24]	600 [24]	150 [6]	150 [6]
40 SVHV-1	200 [8]	600 [24]	600 [24]	150 [6]	150 [6]
50 VHV-1	150 [6]	600 [24]	600 [24]	150 [6]	150 [6]
75 VHV-1	250 [10]	600 [24]	600 [24]	150 [6]	150 [6]
100 VHV-1	325 [13]	900 [36]	600 [24]	150 [6]	200 [8]
125 VHV-2	275 [11]	900 [36]	600 [24]	150 [6]	200 [8]
150 VHV-2	350 [14]	900 [36]	600 [24]	150 [6]	225 [9]
200 VHV-2	450 [18]	1200 [48]	900 [36]	200 [8]	300 [12]
250 VHV-2	575 [23]	1200 [48]	900 [36]	250 [10]	350 [14]
300 VHV-2	675 [27]	1600 [64]	1200 [48]	250 [10]	400 [16]
350 VHV-2	800 [32]	1800 [72]	1200 [48]	300 [12]	500 [20]

Figure 2a: Minimum dimensions and clearances, circular manhole

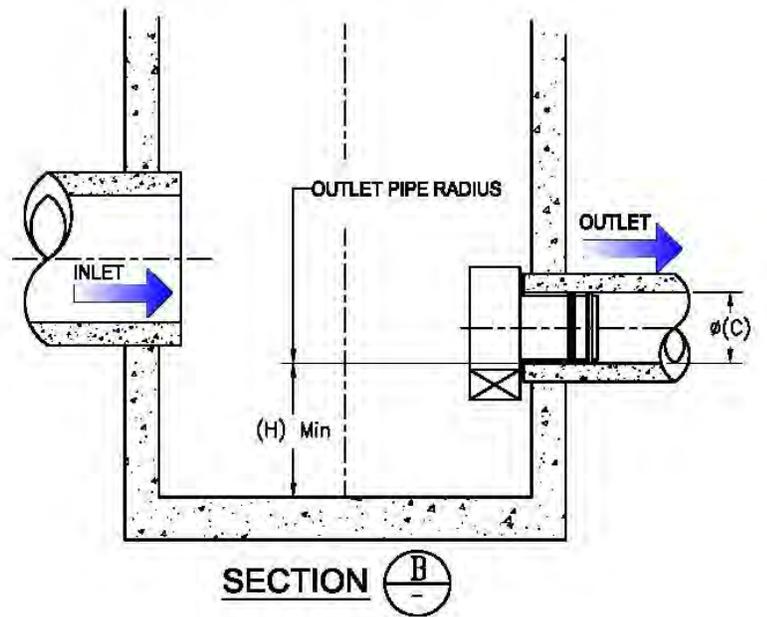
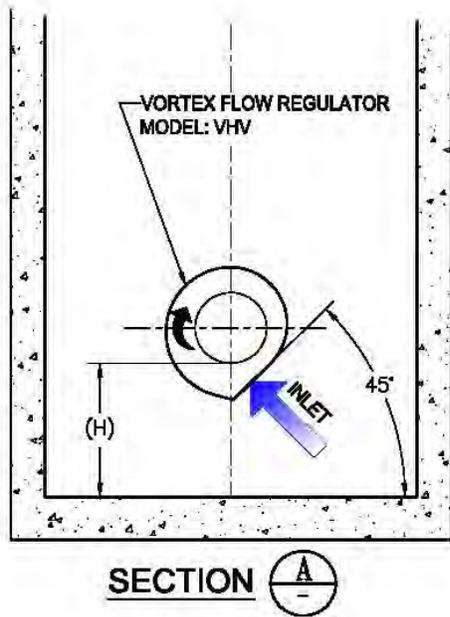
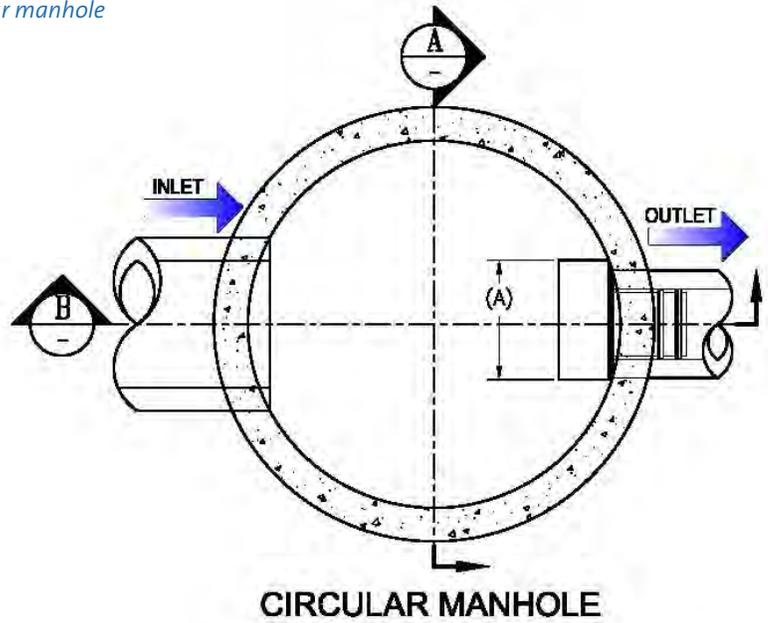
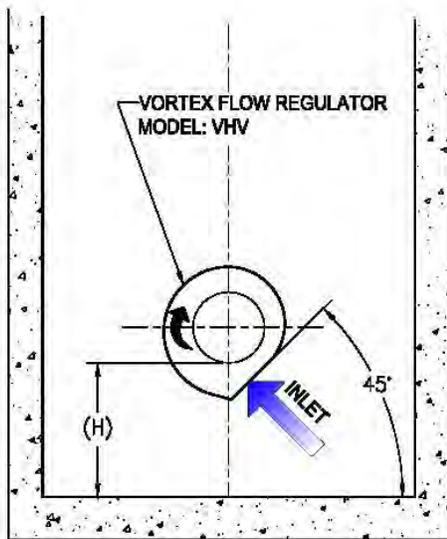
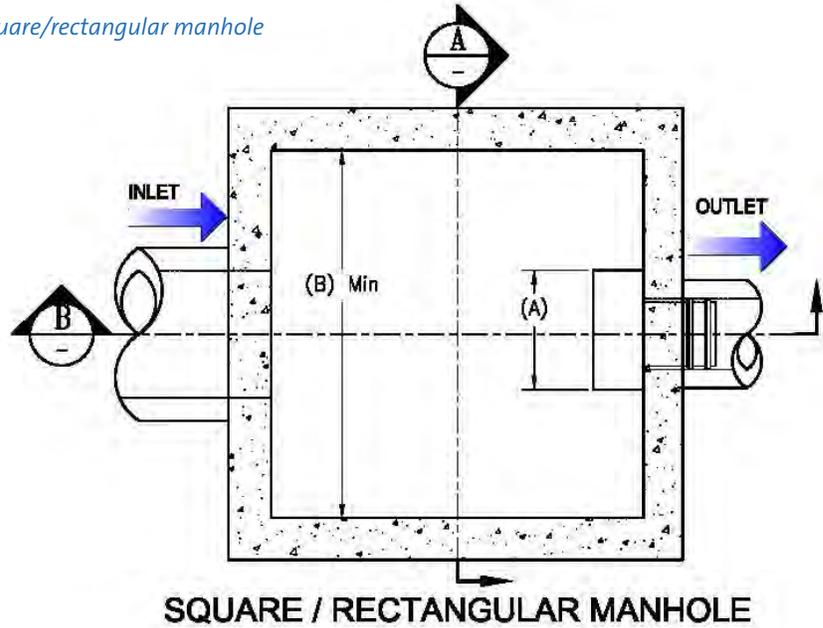
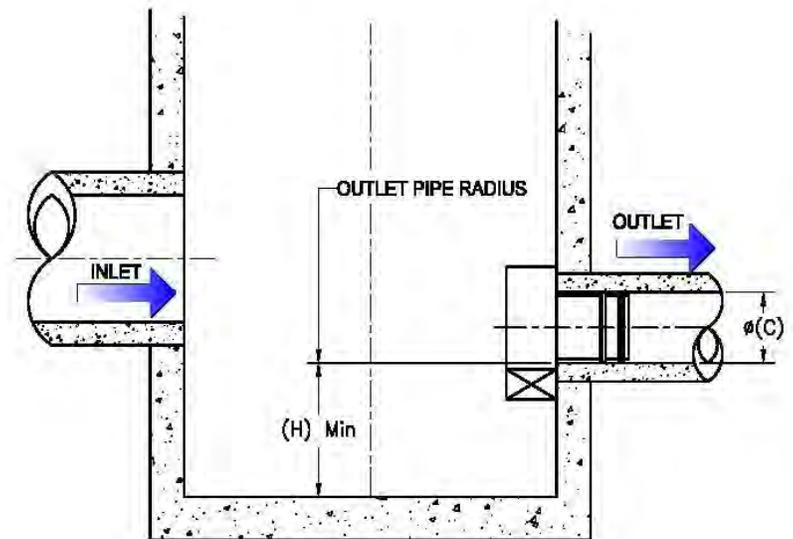


Figure 2b: Minimum dimensions and clearances, square/rectangular manhole



**SECTION A**



**SECTION B**

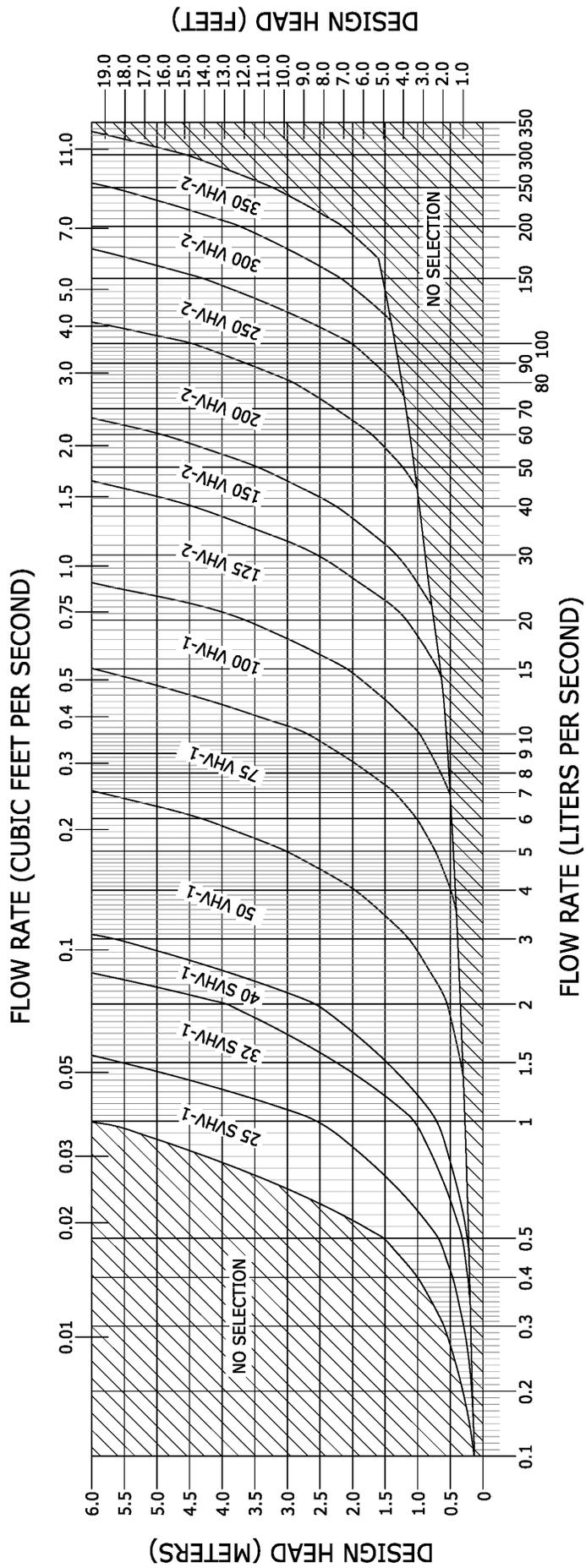


Figure 3 : HYDROVEX® VHV/SVHV Selection Chart

## Options

A variety of options are available for the HYDROVEX® VHV / SVHV vortex flow regulators, including:

- Type O: extended inlet for odor control
- FV-VHV: sliding plate mounted
- Gooseneck: for shallow or no sump installations
- Vent: for low slope applications

DT: roof drainage applications

## Specifications

In order to specify a HYDROVEX® VHV/SVHV flow regulator, the following parameters must be clearly indicated:

- Model number, ex: 75-VHV-1
- Outlet pipe diameter and type, ex:  $\varnothing$  150mm [6"], SDR 35
- Design discharge rate, ex: 6.0 L/s [0.21 CFS]
- Design head, ex: 2.0 m [6.56 ft] \*
- Manhole diameter, ex:  $\varnothing$  900 mm [ $\varnothing$  36"]
- Minimum clearance "H", ex: 150 mm [6 in]
- Construction material type (304 stainless steel standard)

*\*The design head is defined as the difference between the maximum upstream water level and the outlet pipe invert.*

## Installation

The installation of a HYDROVEX® VHV/SVHV flow regulator can be accomplished quickly and does not require any special tools. The sleeve of the vortex flow regulator is simply inserted into the outlet pipe of the manhole and the unit is then secured to the concrete wall using the supplied anchor.

## Maintenance

HYDROVEX® regulators are designed to minimize maintenance requirements. We recommend a periodic visual inspection in order to ensure that the unit is free of debris. The manhole sump beneath the unit should be inspected and cleaned with a vacuum truck periodically to remove accumulated sediments.

## Guaranty

The HYDROVEX® line of VHV / SVHV regulators are guaranteed against both design and manufacturing defects for a period of 5 years after sale. The unit will be modified or replaced should it be found to be defective within the guarantee period.

# Resourcing the world

## **Veolia Water Technologies**

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**GEOTECHNICAL INVESTIGATION  
PROPOSED NORTH ADDITION TO EXISTING  
RESTAURANT  
3340 FALLOWFIELD ROAD  
OTTAWA, ONTARIO  
(REFERENCE NO.: 40058)**

**Date : September 26, 2011**

**Ref. : Y060162-ON65**



INSPEC-SOL INC., 179 Colonnade Rd., Suite 400, Nepean (Ontario) K2E 7J4 ♦ Tel. : 613 727-0895 ♦ Fax : 613 727-0581 ♦ QMS ISO 9001 : 2008

Reference No.: Y060162-ON65

September 26, 2011

Mr. Mario Pouliot  
Les Restaurants McDonald du Canada ltée  
1325 route Transcanadienne  
Montréal (Dorval), Québec  
H9P 2V5

RE: Geotechnical Investigation  
Proposed North Addition to Existing Restaurant  
3340 Fallowfield Road, Ottawa, Ontario  
(Reference No.: 40058)

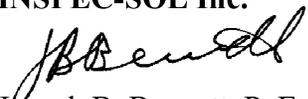
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Dear Mr. Pouliot,

As requested, Inspec-Sol Inc. (**Inspec-Sol**) has completed the Geotechnical Investigation for the above-mentioned project. We herein offer the following comments and recommendations for the design of the proposed building structure.

We trust that this information meets with your approval. Please do not hesitate to contact us, should any questions arise.

Yours truly,  
**INSPEC-SOL Inc.**

  
Joseph B. Bennett, P. Eng.  
Vice-President

SD/vl

Enclosures:

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Y060162-ON65-1

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Y060162-ON65-2

Recommended Perimeter Drainage Alternatives

Y060162-ON65-3

## **ENCLOSURES**

Borehole Logs – BH1 to BH2

Enclosure Nos. 1 - 2

## **APPENDICES**

Seismic Site Classification Calculation

Appendix A

Comparison of Laboratory Results

Appendix B

Maxxam Certificate of Analysis

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Notes on Borehole and Test Pit Logs

Appendix D

## 1.0 INTRODUCTION

At the request of McDonald's Restaurant of Canada Limited (**McDonald's**), Inspec-Sol Inc. (**Inspec-Sol**) completed a Geotechnical Investigation for a proposed addition to the north side of the existing restaurant located 3340 Fallowfield Road in Ottawa, Ontario (Site).

The purpose of the investigation, was to determine the subsoil stratigraphy at two (2) locations in the area of the proposed development and based upon the soil and groundwater conditions found at the borehole locations; provide recommendations concerning foundation type, depth and associated bearing capacity, as well as comment in the floor slab, drainage requirements and pavement structure, excavation, backfill, construction field review.

Chemical testing of soil samples was also completed for identification of contamination of the soil samples and to discuss possible soil disposal options. The results and information obtained from this investigation does not represent this Site's environmental setting, nor should it be interpreted as an assessment of environmental conditions of the Site.

This report has been prepared with the understanding that the design will be carried out in accordance with all applicable codes and standards. Any changes to the project described within this report will require that **Inspec-Sol** be retained to assess the impact of the changes on the report recommendations provided.

The scope of work for **Inspec-Sol** consisted of the following activities:

- **Borehole Location and Services Clearances:** Determination of two (2) borehole locations and contacting utility authorities to ensure clearance of underground services prior to drilling.
- **Field Exploration:** Advancement of two (2) boreholes near the proposed extension to practical refusal, with sampling at regular intervals and collection of three samples for chemical analysis, for soil handling discussions.
- **Analysis and Report:** Review of field results, laboratory testing, and preparation of geotechnical recommendations for design and construction of the proposed structure and discussion of environmental handling of excess soils.

## 2.0 SITE AND PROJECT DESCRIPTION

The Site is located at a municipal address of 3340 Fallowfield Road, in Ottawa Ontario. The restaurant is an unattached building located in a small strip mall complex. The existing building is a single storey with no basement level. To our understanding, the restaurant was constructed with conventional pad and strip footings and a conventional lightly loaded slab-on-grade.

According to the *Grading Plan Dwg, No.: GP-1* (Trow Consulting Engineers Ltd., Ref No. MP15154A, 02/11/01) with more recent hand-drawn sketches, the new addition will be constructed on the north and west sides of the existing restaurant. The L-shaped addition has an estimated footprint area of approximately 165 m<sup>2</sup>.

The topography of the Site is relatively flat and of similar grade with the adjacent roadways. Single-storey commercial buildings exist to the east and west of the Site, whereas there is a residential development to the south.

The location of the Site within the City of Ottawa is shown in the *Site Location Map* attached as *Dwg No.: Y060162-ON65-1*, at the end of this report.

## 3.0 FIELDWORK

The fieldwork component of this Geotechnical Investigation consisted of advancing two (2) boreholes, BH-1 and BH-2, within the footprint of the proposed addition. Borehole BH-1 was advanced to a depth of approximately 7.4 m below the existing ground surface, and Borehole BH-2 was advanced to a depth of approximately 6.7 m below the existing ground surface. Both boreholes met practical refusal to the augers and it is assumed that this was caused by cobbles, boulders or bedrock. The location of the boreholes is shown in the *Borehole Location Plan* attached as *Dwg No.: Y060162-ON65-2*, at the end of this report.

The borehole fieldwork program was undertaken on July 28, 2011 with a specialized truck mounted drill rig adapted for soil sampling, under the supervision of **InspeC-Sol** field staff. Boreholes were advanced into the overburden using hollow-stem continuous-flight auger equipment. Standard Penetration Tests (SPT) were performed at regular intervals using a 50 mm diameter split-spoon sampler and a 63.5 kg hammer free falling from a distance of

760 mm, to collect soil samples. The number of drops required to drive the sampler 0.3 m is recorded on the borehole logs as “N” value. Where applicable, the undrained shear strength of the soil was estimated using a field vane or a pocket-penetrometer. Boreholes were backfilled upon completion with the native soil cuttings.

Field Screening of the soil gas vapour was measured during advancement of the boreholes and had no recordable readings.

The elevations of the boreholes were determined by **Inspec-Sol** personnel using a self-leveling laser and receiver. Borehole elevations were related to a temporary benchmark which is defined as the floor slab of the existing building. This temporary benchmark was as reported to have an elevation of 92.35 m on the Trow Engineering Ltd. drawing.

#### **4.0 SUBSOIL CONDITIONS**

In general, the soils encountered at the boreholes locations consisted of surficial coverings and fill material followed by a native silty clay, native sands, and native till.

General descriptions of the subsurface conditions are summarized below with detailed descriptions at each of the borehole locations provided on the *Borehole Logs as Enclosure Nos: 1 and 2. Notes on Borehole and Test Pit Logs* are provided in *Appendix D*.

##### ***4.1 Surficial Coverings and Fill***

In both borehole locations, the boreholes penetrated the asphaltic concrete pavement which was found to vary in thickness from 75 mm in BH-1 to 100 mm in BH-2.

At location BH-1 an approximately 0.3 m crushed gravel base course was found to be underlying the asphalt. At location BH-2, the base course was found to be very thin. In both cases the base courses were found to be underlain by a sand and gravel fill, likely the subbase course layer of the pavement structure. This fill was compact in relative compaction and was recovered in a damp condition. This fill extended to a depth of approximately 1.0 m in both boreholes which corresponds to elevations of approximately 91.1 and 91.2 m, respectively.

The fill depths and descriptions found within this report and on the borehole logs should not be used for quantity take-offs or quality assessments.

#### **4.2 *Silty Clay***

The surficial fill soils were found to be underlain by a native silty clay soil. This cohesive layer is medium brown, very stiff in consistency, and was recovered in a moist condition. This deposit extended to a depth of approximately 3.0 m or elevation of approximately 89.1m.

#### **4.3 *Silty Sand to Silty Sand Till***

The silty clay layer was then found to be underlain by a native silty sand overlying a Sand Till. These deposits were, compact to dense in relative compaction, and was recovered in a wet condition. In borehole BH-2 a refusal to split-spoon advancement was met near 4m, suggesting that there may be cobbles or boulders within this deposit. These materials extended to a depth of approximately 7.4m and 6.8m m in boreholes BH-1 and BH-2, respectively where auger refusal was met.

#### **4.4 *Refusal***

In BH-1 and BH-2 practical auger refusal was encountered at depths of approximately 7.4 m and 6.8 m, respectively. This corresponds to elevations of approximately 84.7 m and 85.5 m, respectively. These depths could be inferred to be bedrock or cobbles/boulders within the till.

Based on the Geological Survey of Canada's Urban Geology of the National Capital Area Online Data, the bedrock in the area is reported to consist of an interbedded sandstone and dolomite of the March Formation. Bedrock is reported at a depths ranging from 5 m to 10 m, which is consistent with the findings of this Geotechnical Investigation,

### **5.0 GROUNDWATER**

One monitoring well was installed in borehole BH-2. This well was sealed into the native sand. On August 2, 2011, the groundwater level was measured at a depth of approximately 2.9 m below the existing ground surface. This corresponds to an elevation of approximately 89.3 m.

It is noted that groundwater levels are subject to seasonal fluctuations and in response to precipitation and snowmelt events. They are often at their highest during the spring.

## 6.0 CHEMICAL ANALYSIS

During the drilling fieldwork process, soil samples were field-screened based on visual and olfactory observations, such as sheen staining and odour, to identify the presence of petroleum affected soil. Based on the field screening, three (3) representative soil samples were submitted for further analysis. BH-1, SS-2; BH-2, SS2; and BH-2, SS-4, were selected.

The samples were submitted to Maxxam Analytics in Ottawa on July 28, 2011, under Chain of Custody (COC) No.: 17979. All three (3) samples were tested for the parameters of Petroleum Hydrocarbons [PHC(F1-F4)]; along with Benzene, Toluene, Ethylbenzene, and Xylene (BTEX); under Ontario Regulation (O. Reg.) 511 \ 09. All three (3) samples were also tested for metals parameters by the Toxicity Characteristic Leaching Procedure (TCLP); under O. Reg. 558 \ 00.

The results of the laboratory testing were received on August 5, 2011 under Report No.: B1B3981. The results of the chemical analysis are further discussed in *Section 8.0: Chemical Results*.

## 7.0 DISCUSSION AND RECOMMENDATIONS

### 7.1 *Project Description and General Considerations*

The recommendations contained within this report are based on **Inspec-Sol's** understanding of the proposed development, which is outlined as follows:

- The proposed addition consists of a one (1) storey slab-on-grade construction;
- There are no (0) basements or crawl spaces below the slab;
- The floor slab is of a lightly loaded commercial type;
- The finished floor elevation is anticipated to be at a elevation of approximately 92.35; and

- There are no (0) significant grade raises planned for this Site (i.e. grade raises in excess of 1.0 m).

If any of these assumptions are incorrect or these facts change through the design or construction phases, **Inspec-Sol** must be notified and retained to assess the impact on our recommendations.

Based on the subsurface conditions encountered in the boreholes, and assuming them to be representative of the subsurface conditions across the Site, the following recommendations are provided. The most significant geotechnical considerations for design and construction of the proposed structure are:

- **Interaction Between Adjacent Footings and Excavations:** Footings for the proposed addition should be placed at the same elevation as those of the existing building. Footings at varying elevations or adjacent to service pipes or structures should be constructed such that the new footings are placed such that they do not encroach within the 7V:10H zone of influence.
- **Preparation of Floor Slab Subgrade:** Evaluation should be done near the start of construction to assess whether the existing granular courses can be left in place below the proposed floor slab.

## **7.2 Site Preparation**

Site preparation and grading will require the removal of existing asphalt, concrete curbs, interlocking brick, and possibly some of the existing granular fill to expose the design subgrade surface. The exposed subgrade within the building footprint and pavement areas should be assessed by geotechnical personnel to identify “soft spots” or local anomalies. Any areas identified as unsuitable, will need to be sub-excavated and replaced with an appropriate fill as per the directions of the Geotechnical Engineer.

The Site should also be graded in the early stages of construction to encourage surface run-off away from excavations. In wet seasons, conventional types of ditching and pumping system may be required by Contractors in order to collect any surface run-off.

### **7.3 Excavation and Dewatering**

All excavations should be completed and maintained in accordance with the current Occupational Health and Safety Act (OHSA) Regulations for Construction. The following recommendations for excavations should be considered to be a supplement to, and not a replacement of the OHSA requirements.

Based on the results of the investigation, the native sands and clays encountered within the expected excavation depth (approximately 1.5 m) would be considered to be “Type 3 Soils”, as defined by the OHSA Regulations for Construction. Surface water and minor groundwater seepage is expected in the excavated areas, particularly at the upper fill/native interface. Water quantities will depend on seasonal conditions, depth of excavations, and the duration that excavations are left open. Conventional construction dewatering techniques should be taken during construction so as to prevent disturbing the subgrade soils and movement of soils in the excavation walls, such as pumping from sumps and or ditches.

### **7.4 Foundations**

The proposed addition will be adjacent to the north-west corner of the existing restaurant. The new foundations should be placed at the same elevation as the footings for the existing building which are typically expected to be at 1.5m below the existing ground surface due to frost cover requirements in the Ottawa area. Underpinning or shoring systems are not expected to be necessary. However, this should be verified by the Structural Engineers. All site activities must be executed with great care particularly in this area and any issues noted by the contractors should be brought to the immediate attention of the Client and their engineers.

#### **7.4.1 Bearing Capacity**

The Ontario Building Code (OBC-2006) requires buildings to be designed using the limit states design values of Serviceability Limit States (SLS) and Ultimate Limit States (ULS).

Based on the soils observed within the boreholes, it is recommended that foundations consist of shallow strip footings or shallow pad footings founded on the native undisturbed stiff clay. The recommended bearing capacity for strip footings up to 1.5 m wide and pad footings up to 2.0 m by 2.0 m in dimensions founded on the native undisturbed silty clay is 100 kPa for the SLS condition and 230 kPa for factored ULS conditions. The factored ULS value includes the

geotechnical resistance factor ( $\Phi$ ) of 0.5. These bearing capacities are based on the assumption that there are no (0) grade raises in excess of 1.0 m in this Site.

If footings are set at varying levels and/or constructed adjacent to utility trenches, they should be constructed such that the higher footings are set at a level below an imaginary line constructed 10H:7V from the base of the lower excavation

It is recommended that **Inspec-Sol** be retained to complete a review for compliance with our recommendations and during construction to verify suitability of subgrade materials.

#### ***7.4.2 Settlement***

The total settlement of footings founded within the native undisturbed silty clay and designed using the above recommended bearing pressures under SLS conditions is estimated to be less than 25 mm and the differential settlement between adjacent footings are not expected to exceed 19 mm. Again, these settlement estimates are based on the limitation that there are no (0) grade raises in excess of 1.0 m on this Site.

#### ***7.4.3 Frost Protection***

All exterior footings associated with heated areas of the building must be provided with at least 1.5 m of earth cover or its equivalent in insulation, in order to provide adequate protection against detrimental frost action. This cover depth should be increased to 1.8 m for footings in unheated or “stand-alone” structures such as entrance canopies.

The soils encountered in the boreholes are considered to be frost-susceptible. Should construction take place during winter, the exposed surfaces to support foundations must be protected by Contractors against freezing.

#### ***7.4.4 Seismic Site Classification***

In accordance with OBC-2006, the building and its structural elements must be designed to resist a minimum earthquake force. Based upon the results of the borehole program, we recommend that the building be designed to Site Class ‘D’, with respect to Table 4.1.8.4.A of the OBC-2006. The results of the geophysical testing program as well as the Site Class calculation can be found in *Seismic Site Classification* attached as *Appendix: A* at the end of this report.

### 7.5 *Permanent Drainage*

Under floor and perimeter drains are not considered necessary for a structure with no basement and a floor slab set at a minimum of 0.3 m above finished exterior grades. If the floor slab is set level with exterior grades then perimeter drainage, although not necessary would be prudent and installed around the proposed building. The *Recommended Perimeter Drainage Alternatives* are attached as *Dwg No.: Y060162-ON65-3*, at the end of this report. A composite drainage blanket could be used. If drains are installed, the drains should be connected to a frost-free outlet for year round drainage.

### 7.6 *Building Backfill*

The backfill placed against the foundation walls or around piers must meet the following requirements:

- Free-draining granular backfill should be used for the foundation wall;
- Backfill should not be placed in a frozen condition, or place on a frozen subgrade;
- Backfill should be placed and compacted in uniform lift thickness compatible with the selected construction equipment, but not thicker than 0.2 m. Backfill should be placed uniformly on both sides of the foundation walls to avoid build-up of unbalanced lateral pressures;
- At exterior flush door openings the underside of sidewalks should be insulated, or the sidewalk should be placed on frost walls to prevent heaving. Granular backfill should be used and extended laterally beneath the entire area of the entrance slab. The entrance slab should slope away from the building;
- For interior backfill that would the floor slab area, each lift should be uniformly compacted to at least 100% of its SPMDD;
- For backfill that would underlie paved areas, sidewalks or exterior slabs-on-grade, each lift should be uniformly compacted to at least 98% of its SPMDD;
- For backfill on the building exterior that would underlie landscaped areas, each lift should be uniformly compacted to at least 95% of its SPMDD;

- In areas on the building exterior where an asphalt or concrete pavement will not be present adjacent to the foundation wall, the upper 0.3 m of the exterior foundation wall backfill should be a low permeable soil to reduce surface water infiltration; and
- Exterior grades should be sloped away from the foundation wall, and roof drainage downspouts should be placed so that water flows away from the foundation wall.
- If perimeter drainage is not utilized, then the excavation side slopes must have frost tapers to minimize the effects of differential frost movements between the backfilled area and non-backfilled areas away from the building. Frost tapers are such that the the slope of excavations within 1.8 m of ground surface are backsloped at 10H:1V

### **7.7 Floor Slab**

Conventional slab-on-grade construction is considered suitable for the proposed building. We are assuming that the building will have light floor loadings only, i.e. considered to be less than 24kPa. Higher loading requirements will require additional consultation and analysis.

It may be possible to keep some of the existing granular courses within the building footprint, as stated earlier, subject to the evaluation by geotechnical personnel at the start of construction and again immediately prior to preparation for placement of under floor granulars. Any areas which are deemed unsuitable will need to be sub-excavated and replaced with an appropriate fill as per the directions of the Geotechnical Engineer.

A layer consisting of Granular 'A' at least 200 mm thick should underlie the slabs to support the floor slab and act as a capillary moisture barrier. This layer should be compacted to 100% of its SPMDD and placed on approved subgrade surfaces.

If floor coverings are to be used, vapour barriers are also recommended to be incorporated beneath the slab. Floor toppings are impacted by curing and moisture conditions of the concrete which are intern impacted by the presence/absence of vapour barriers. Floor finish manufacturer's specifications and requirements should be consulted and procedures outlined in the specifications should be followed.

The slabs should be free floating, and should not be tied into the foundation walls. The placement of construction and control joints in the concrete should be in accordance with generally accepted practice.

## **7.8 *Underground Services***

### **7.8.1 *Bedding and Cover***

Bedding and cover materials should conform in size and type to the City of Ottawa municipal requirements. Use of clear 19 mm stone is not recommended for use as bedding. The voids in the stone may result in a low gradient water flow and infiltration of fines from the surrounding soils and cover materials, causing settlement and loss of support to pipes and structures. Compaction equipment should be used in such a way that the utility pipes are not damaged during construction.

### **7.8.2 *Service Trench Backfill***

Backfill above the cover for buried utilities should be in accordance with the following recommendations:

- For service trenches under pavement areas, the backfill should be placed and compacted in uniform thickness compatible with the selected compaction equipment and not thicker than 200 mm. Each lift should be compacted to a minimum of 95% SPMDD.
- The backfill placed in the upper 300 mm below a pavement subgrade elevation should be compacted to a minimum of 100% SPMDD.
- To reduce the potential for differential settlement and frost heave, the selected backfill materials should reasonably match the existing soil profile within the frost penetration zone (1.5 m below finished grade). Alternatively, if imported backfill, including granular materials, are used then the excavation sides should have frost tapers as per OPSD 800 series which essentially indicates that there should be a backslope of 10:1 (H:V) from the bedding grade to the finished grade.

- If the native excavated soils are used as backfill, this material should be protected from moisture increases during construction. The native excavated soils may should be assessed and approved by a Geotechnical Engineer prior to placement.
- Excavated soils that are too wet (i.e. greater than 5% above the optimum moisture content based upon a Standard Proctor Test) will become problematic to compact and may not perform properly during construction period. If such conditions occur, the options include drying of the soils; compacting and leaving the area untraveled for a period of time; importation of more suitable material; or a combination of above and the use of geotextiles at the base and possibly additional layers within the pavement structure's granular base courses. The appropriate measures will need to be discussed during construction period and be such to achieve adequate performance from the pavement structure.

### **7.9    *Pavement Sections***

In order to prepare the site for the pavement area, it is necessary that the area be stripped of any existing cover materials such as surficial topsoil and associated root-mat, existing pavement surface courses and any fill soils or other deleterious materials deemed unsuitable by geotechnical personnel to expose a suitable subgrade. The exposed subgrade should be proof rolled in the presence of a Geotechnical Engineer. Any areas where “soft spots”, rutting, local anomalies, or appreciable deflection are noted should be excavated and replaced with suitable fill, and use of geotextiles may be warranted for strength improvement. The fill should be compacted to at least 95% of its SPMDD.

The new pavement sections described in Table 1 are recommended based upon the intended use and the existing conditions identified in the boreholes. Alternative designs would require review by **Inspecc-Sol**.

TABLE 1: Recommended Pavement Structure

Pavement Layer	Minimum Thickness	Heavy Duty (Access Roads)
HL3 Asphalt	50 mm	40 mm
HL8 Asphalt	n/r	50 mm
Granular 'A' Base Course**	150 mm	150 mm
Granular 'B', Type II Sub-Base Course**	250 mm	350 mm

\*\* the existing materials may be suitable to remain in place, subject to new grading and disturbance caused by construction activity.

In order to accommodate the recommended thicknesses, designers will need to review grades and determine where stripping or filling is necessary. Pavement materials and workmanship should conform to the appropriate OPSS.

Drainage of the pavement layers is important to assist in performance of a pavement. The subgrade surface and each layer of the pavement section should be provided with a suitable cross fall (approximately 2%) to prevent water from ponding on the pavement surface and beneath the pavement layers. Surface runoff should be directed to storm sewers, or allowed to flow into ditches. Designers should review any existing drainage aspects and determine if new drainage should be installed as part of this new construction project

Sufficient field-testing should be carried out during construction to assess compaction of each lift of the pavement layers. This should be accompanied by laboratory testing of the granular and asphalt materials. All granular base course materials should be compacted to 100% of its SPMDD.

The asphalt materials should be compacted as per OPSS 310.

Annual or regular maintenance will be required to achieve maximum life expectancy. Generally, the asphalt pavement maintenance will involve crack sealing and repair of local distress.

It should be noted that the pavement sections described within this report represent end-use conditions only, which includes light vehicular traffic and occasional garbage or service trucks. It may be necessary that these sections be temporarily over-built during the construction phase to withstand larger construction loadings such as loaded dump trucks or concrete trucks.

### **7.10 Construction Field Review**

The recommendations provided in this report are based on an adequate level of construction monitoring being conducted during construction phase of the proposed building. **Inspec-Sol** requests to be retained to review the drawings and specifications, once complete, to verify that the recommendations within this report have been adhered to, and to look for other geotechnical problems. Due to the nature of the proposed development, an adequate level of construction monitoring is considered to be as follows:

- Prior to construction of footings, the exposed foundation subgrade should be examined by a Geotechnical Engineer or a qualified Technologist acting under the supervision of a Geotechnical Engineer, to assess whether the subgrade conditions correspond to those encountered in the boreholes, and the recommendations provided in this report have been implemented.
- A qualified Technologist acting under the supervision of a Geotechnical Engineer should monitor placement of Engineered Fill underlying footings and floor slabs.
- Backfilling operations should be conducted in the presence of a qualified Technologist to ensure that proper material is employed and specified compaction is achieved.
- Placement of concrete should be periodically tested to ensure that job specifications are being achieved.

## **8.0 EXCESS SOIL DISPOSAL**

The purpose of the chemical analyses described in *Section 6.0* was to determine the suitability and classification of off-Site disposal of excess soils from excavations. Accordingly, there are a number of separate regulations that apply:

- O. Reg. 153/04 as amended by Reg 511/09 in and effective July 2011, (a bulk analysis), is used as a guideline and used to determine if, the material is classified as 'clean' and therefore could be reused on a separate site, or is considered 'contaminated' and therefore will require disposal at a licensed landfill site.
- O. Reg. 558/00 (a leachate analysis, reported in mass/liquid volume), which determines the waste classification of the material and therefore will assist in determining suitable licensed disposal sites of contaminated soils.

The results of the tested samples indicate that there were exceedances of Petroleum Hydrocarbon (PHC F4) "Table 1" Criteria in sample number BH1-SS2. There were no other exceedances found in the remaining of the tested samples. The implications of these results suggest that the soils, if left in-place meet the suggested standard as acceptable to remain on Site and does not require remediation. However, any soils that are represented by BH1/SS2 are excavated they will require to be either used elsewhere on Site or if considered as **excess soil, it will need to be considered as contaminated and will need to be disposed of according to current environmental legislation.**

In the case that this soil is being removed from Site, the soil samples have been subjected and tested to the requirements of the O. Reg. 558/00 and the toxicity characteristic leaching procedure (TCLP) criteria. The results indicate that the soils should be suitable for disposal at Ontario Ministry of Environment licensed landfill sites located in the Ottawa Region.

The test results contained herein should be given to any contractors bidding on this project to help determine the available disposal options but soil management planning (handling, volumes of soil and confirmatory testing) during construction should be considered to be requested as part of the tender/bidding process for the construction. It is recommended that an area be allocated on site, to allow stockpiling of soils that are from the area of BH1/SS2 and any other soils that show signs of contamination. Once the stockpiling is completed the soils could be sent to that landfill. Additional testing of the stockpile will dependent upon the agreement with the contractor and their excavation and disposal company.

## 9.0 LIMITATION OF THE INVESTIGATION

This report is intended solely for McDonald's Restaurant of Canada Limited and other parties explicitly identified in the report and is prohibited for use by others without **Inspec-Sol**'s prior written consent. This report is considered **Inspec-Sol**'s professional work product and shall remain the sole property of **Inspec-Sol**. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to **Inspec-Sol**. Client shall defend, indemnify and hold **Inspec-Sol** harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of Geotechnical Engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. 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.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, **Inspec-Sol** will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, **Inspec-Sol** is the Geotechnical Engineer of record. It is recommended that **Inspec-Sol** be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the two (2) borehole test locations only. The subsurface conditions confirmed at these test locations may vary at other locations. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction, which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by **Inspec-Sol** is completed.

We trust that this report meets with your requirements. Please do not hesitate to contact us, should any questions arise.

**INSPEC-SOL Inc.**

  
Shane Dunstan, B.A.Sc., É.I.T.

SD/vl

Enclosures:

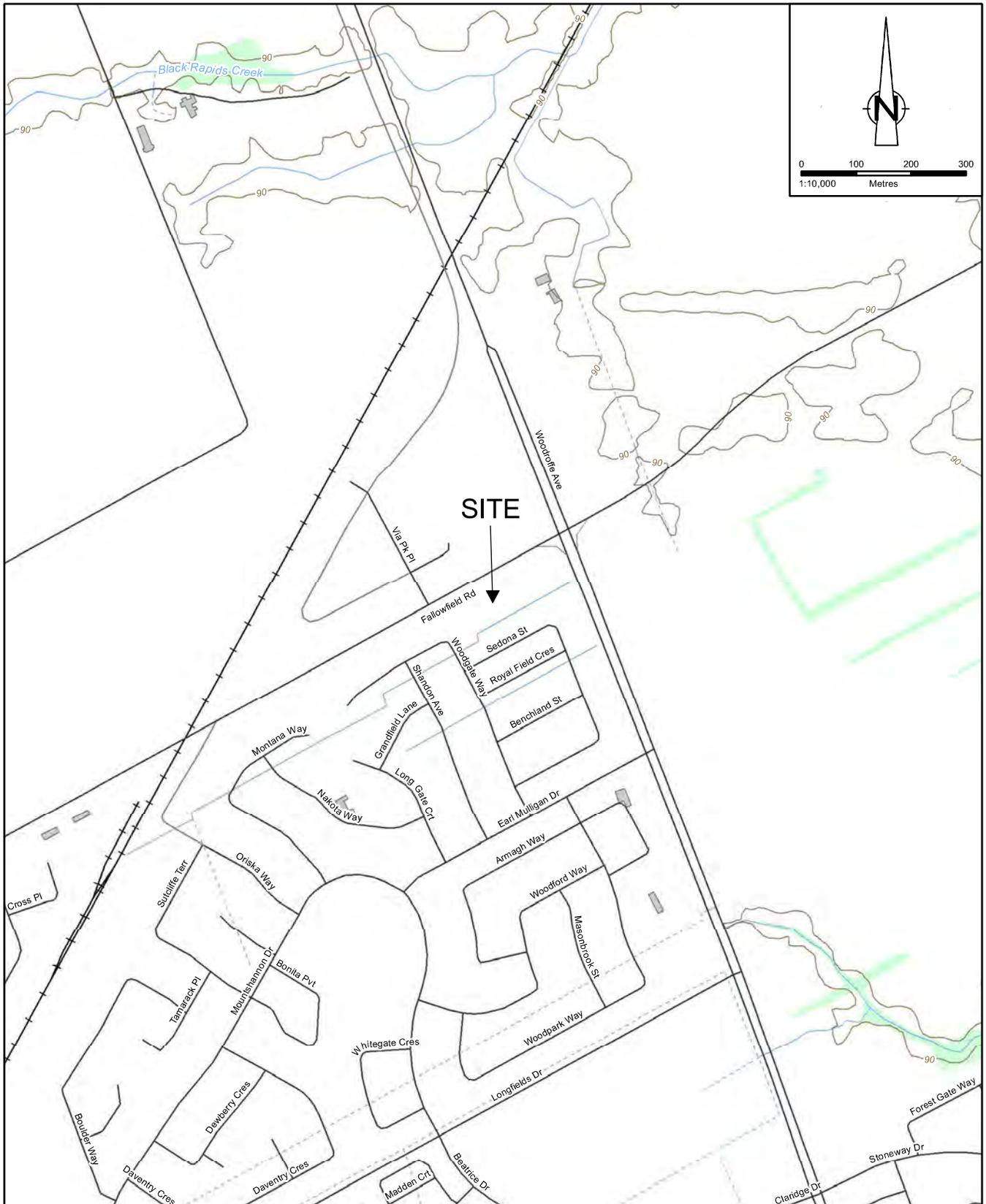
Dist: Mr. Mario Pouliot – Email - ([mario.pouliot@ca.med.com](mailto:mario.pouliot@ca.med.com))  
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Joseph B. Bennett, P. Eng.



**D R A W I N G S**

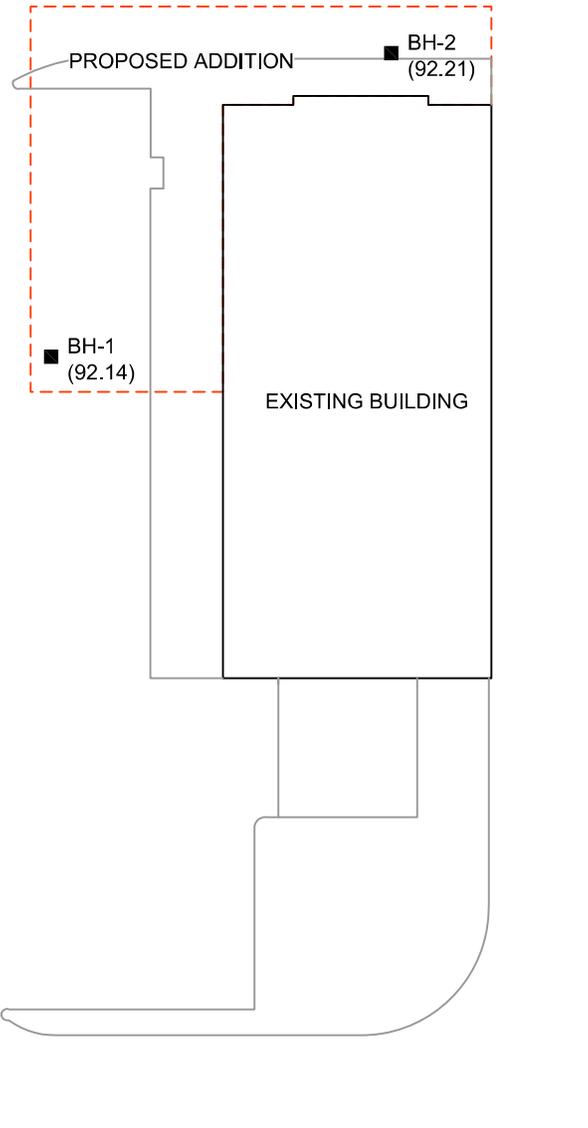
**SITE LOCATION MAP  
BOREHOLE LOCATION PLAN  
RECOMMENDED PERIMETER DRAINAGE ALTERNATIVES**



Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;  
 Coordinate System: NAD 1983 UTM Zone 18N



**SITE LOCATION MAP**  
**GEOTECHNICAL INVESTIGATION**  
**3340 FALLOWFIELD ROAD, OTTAWA, ONTARIO**  
**MCDONALDS RESTAURANTS OF CANADA LTD.**  
**Y060162-ON65-1**



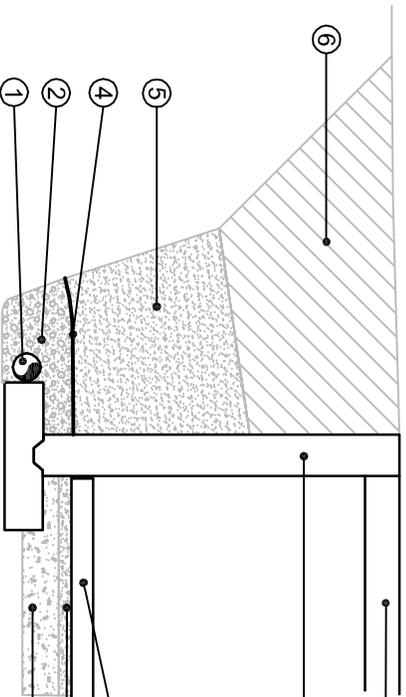
LEGEND

- BH-1 (99.63m) BOREHOLE LOCATION AND GROUND ELEVATION (m)



Y060162-ON65-2  
BOREHOLE LOCATION PLAN  
GEOTECHNICAL INVESTIGATION  
3340 FALLOWFIELD ROAD, OTTAWA, ONTARIO  
*McDonald's Restaurants of Canada Limited*

## SKETCH OF GRANULAR BACKFILL



1. DRAIN 100mm Ø MIRAPIPE c/w P50 SOCK OR EQUIVALENT SYSTEM LEADING TO FUNCTIONAL SUMP OR OUTLET. PIPE MAY BE PLACED ON FOOTING LEDGE OR BESIDE FOOTING AT LEAST 150 mm BELOW UNDERSIDE OF FLOOR SLAB AND WITH 150mm OF STONE TO ACT AS A BEDDING.

2. CRUSHED STONE 19 mm CLEAR CRUSHED STONE (OPSS 1004) OR WASHED GRAVEL TO A THICKNESS OF 150 mm ON TOP AND SIDES OF DRAIN PIPE.

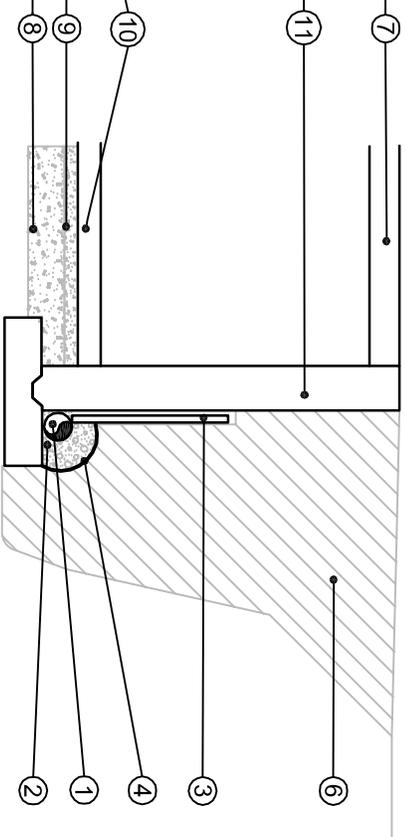
3. DRAINAGE BLANKET MIRADRAIN 6000 OR EQUIVALENT GEOTEXTILE ON PIPE MUST OVERLAP BLANKET TO PREVENT SOIL MOVEMENT INTO DRAINAGE SPACE. TOP OF DRAINAGE BLANKET TO EXTEND TO WITHIN 0.5m OF EXTERIOR GRADE.

4. GEOTEXTILE NON-WOVEN FILTER TYPE TERRAFIX 270R OR EQUIVALENT

5. SAND BACKFILL FREE-DRAINING SAND COMPACTED TO 90% (ASTM D-698) IN LANDSCAPED AREAS AND TO 95% IN PAVED AREAS. MINIMUM DEPTH OF SAND BACKFILL AGAINST POURED CONCRETE WALLS IS 1.2 m FROM THE BASE OF FOOTING. USE FULL-DEPTH SAND BACKFILL AGAINST CONCRETE BLOCK FOUNDATION WALLS.

6. LOCAL BACKFILL ORGANIC FREE NATIVE SOIL FROM FOUNDATION EXCAVATION COMPACTED TO 90% (ASTM D-698) IN LANDSCAPED AREAS. USE FREE-DRAINING SAND AND COMPACT TO 95% IN SIDEWALK, FROST, SENSITIVE PAVED AREAS. SLOPE BACKFILL AWAY FROM BUILDING FOR POSITIVE DRAINAGE.

## SKETCH OF COMPOSITE DRAINAGE BLANKET



7. ENTRANCE LEVEL FLOOR SEE PROJECT'S STRUCTURAL ENGINEER'S SPECIFICATION, BUT TYPICALLY BASEMENT WALLS MUST BE SUPPORTED AT THE ENTRANCE LEVEL AND AT ALL INTERMEDIATE LEVELS WITH THE FLOOR SYSTEM PRIOR TO BACKFILLING AND COMPACTING.

8. BASE COURSE CLEAR CRUSHED STONE 20 mm Ø OR SIMILAR FREE-DRAINING TO PREVENT MIGRATION OF MOISTURE TO THE UNDERSIDE OF SLAB. MINIMUM RECOMMENDED THICKNESS IS 150mm.

9. VAPOUR BARRIER DESIGNERS SHOULD MAKE AN ASSESSMENT FOR THE NEED OR DELETION OF A VAPOUR BARRIER - SEE GEOTECHNICAL REPORT.

10. FLOOR SLAB CONCRETE FLOOR SLAB POURED ON GRADE. DESIGNED AND CONSTRUCTED AS PER PROJECT STRUCTURAL ENGINEER. PROVIDE CONTROL JOINTS AT WALLS AND AROUND INTERIOR COLUMNS.

11. BASEMENT WALL POURED CONCRETE FOUNDATION WALL TO BE DAMP-PROOFED OR WATER-PROOFED, DEPENDING ON INTERIOR USE AND GROUNDWATER CONDITIONS. SEE GEOTECHNICAL REPORT OR CALL OFFICE FOR SPECIFIC DETAILS IF REQUIRED.

Y060162-ON65-3

RECOMMENDED PERIMETER DRAINAGE ALTERNATIVES  
 GEOTECHNICAL INVESTIGATION  
 3340 FALLOWFIELD ROAD, OTTAWA, ONTARIO  
*McDonald's Restaurants of Canada Limited*



**ENCLOSURES**

**BOREHOLE LOGS**

**ENCLOSURES NOS. 1 – 2**



**BOREHOLE No.:** BH-1

**ELEVATION:** 92.14 m

**BOREHOLE LOG**

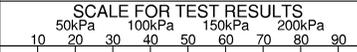
Page: 1 of 1

CLIENT: McDonald's Restaurants of Canada Ltd.  
 PROJECT: Geotechnical Investigation  
 LOCATION: 3340 Fallowfield Road, Ottawa, Ontario  
 DESCRIBED BY: H. Masroor CHECKED BY: J. Bennett  
 DATE (START): July 28, 2011 DATE (FINISH): July 28, 2011

**LEGEND**

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

SCALE		STRATIGRAPHY			SAMPLE DATA			
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	OVC	Penetration Index / RQD
meters	92.14		GROUND SURFACE			%	ppm	N
	92.1		ASPHALT (75mm)		GS1			
	91.8		GRANULAR BASE		GS2			
0.5			FILL - sand and gravel, damp, compact					
1.0	91.1		SILTY CLAY - cohesive, brown, very stiff, moist		SS1	50	0.0	31
1.5					SS2	83	0.0	17
2.0					SS3	53	0.0	R
2.5			- split spoon refusal on possible cobble or boulder					
3.0	89.1		SILTY SAND - trace gravel, compact to dense, wet		SS4	33	0.0	67
3.5					SS5	25	0.0	27
4.0					SS6	54		28
4.5								
5.0								
5.5								
6.0								
6.5			Coarse sand layer. Hydraulic uplift caused disturbance and lowered N-value.		SS7	50		13
6.5	85.4		SILTY SAND TILL - grey, dense, damp					
7.0								
7.5	84.7		Auger Refusal on Assumed Bedrock					
8.0								



BOREHOLE LOG Y060162-ON65(05-AUG-11)TS-OT001.GPJ INSPEC\_SOL.GDT 9/26/11

NOTES:



**BOREHOLE No.:** BH-2  
**ELEVATION:** 92.21 m

**BOREHOLE LOG**

Page: 1 of 1

CLIENT: McDonald's Restaurants of Canada Ltd.  
 PROJECT: Geotechnical Investigation  
 LOCATION: 3340 Fallowfield Road, Ottawa, Ontario  
 DESCRIBED BY: H. Masroor CHECKED BY: J. Bennett  
 DATE (START): July 28, 2011 DATE (FINISH): July 28, 2011

**LEGEND**

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

SCALE		STRATIGRAPHY		MONITOR WELL	SAMPLE DATA			
Depth BGS	Elevation (m)	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	OVC	Penetration Index / RQD
meters	92.21		GROUND SURFACE			%	ppm	N
0.5	92.1	ASPHALT (100mm) GRANULAR BASECOURSE FILL - sand and gravel, damp, compact			GS1			
1.0	91.2	SILTY CLAY - cohesive, brown, very stiff, moist		Backfill	SS1	58	0.0	15
2.0	1.83				SS2	83	0.0	14
2.5				Bentonite	SS3	100	0.0	10
3.0	89.2	SILTY SAND - brown, compact to dense, possible cobble/boulder, wet		WL 2.93 August 2, 2011 3.05	SS4	75	0.0	14
4.0					SS5	100	0.0	R
4.5	87.6	SILTY SAND TILL - cobbles, grey, very dense, moist		Filter sand	SS6	83	0.0	68
6.0					SS7	87		R
6.5	85.5	End of Borehole on Probable Bedrock		Backfill				

SCALE FOR TEST RESULTS  
 50kPa 100kPa 150kPa 200kPa  
 10 20 30 40 50 60 70 80 90

BOREHOLE LOG Y060162-ON65(05-AUG-11)TS-OT001.GPJ INSPEC\_SOL.GDT 9/26/11

NOTES:

## **APPENDICES**

## **APPENDIX A**

### **SEISMIC SITE CLASSIFICATION**

### Seismic Site Classification BH-1 (COHESIVE LAYER)

Site Classification for Seismic Site Response Calculations (Commentary J)

Depth Below Ground		Subsoil	Layer Thickness $\delta$ (m)	Undrained Shear Strength $s_u$ (kPa)	$\delta/s_u$
From (m)	To (m)				
1.5	2.2	Silty Clay	0.7	50	0.0140
2.2	3.0		0.8	90	0.0089
TOTAL =			1.5	Sum $\delta/s_u$ =	0.0229

(1)

#### NOTES:

(1) The founding depth is estimated at 1.5 m BGS to ensure frost protection.

The average undrained shear strength is calculated using the following formula:  
(as per OBC 2006 Table 4.1.8.4.A.):

$$s_u = \frac{\text{Total Thickness of all Layers}}{\sum \frac{\text{Layer Undrained Shear Strength } (s_u)}{\text{Layer Thickness } (L)}}$$

$$s_u = \frac{1.5}{0.0229} = 65.5$$

Average Undrained Shear Strength for the Site is 65.5 kPa which is less than 100 kPa.  
∴ Seismic Site Class = 'D' based on average undrained shear strength.

### Seismic Site Classification BH-1 (COHESIONLESS LAYER)

Site Classification for Seismic Site Response Calculations (Commentary J)

Depth Below Ground		Subsoil	Layer Thickness $\delta$ (m)	Measured N-Value $N$ ( )	Corrected N-Value $N_{60}$ ( )	$\delta/N_{60}$
From (m)	To (m)					
3.0	3.6	Silty Sand	0.6	67	50	0.0119
3.6	4.5		0.9	27	20	0.0444
4.5	5.6	Till	1.1	28	21	0.0524
5.6	7.5		1.9	13	10	0.1949
7.5	31.5	Bedrock	24.0	100	75	0.3200
TOTAL =			28.5	Sum $\delta/N_{60}$ =		0.6236

(1)

(2), (3)

#### NOTES:

(1) The founding depth is estimated at 1.5 m BGS to ensure frost protection.

(2) The N-Value of rock is conservatively taken as 100.

(3) The analysis is extended down to a depth of 30 m below the underside of footings.

The average standard penetration resistance is calculated using the following formula:  
(as per OBC 2006 Table 4.1.8.4.A.):

$$\text{Avg}(N_{60}) = \frac{\text{Total Thickness of all Layers}}{\sum \frac{\text{Layer Thickness } (L)}{\text{Layer Corrected N-Value } (N_{60})}}$$

$$\text{Avg}(N_{60}) = \frac{28.5}{0.6236} = 45.7$$

Average Standard Penetration Resistance for the Site is 45.7 which is less than 50.0.  
∴ Seismic Site Class = 'D' based on average standard penetration resistance.

### Seismic Site Classification BH-2 (COHESIVE LAYER)

Site Classification for Seismic Site Response Calculations (Commentary 4)

Depth Below Ground		Subsoil	Layer Thickness $t$ (m)	Undrained Shear Strength $s_u$ (kPa)	$t/s_u$	
From (m)	To (m)					
1.5	2.1	Silly Clay	0.6	180	0.0033	
2.1	3.0		0.9	90	0.0100	
TOTAL =					1.5	
					Sum $t/s_u$ =	0.0133

(1)

**NOTES:**

(1) The founding depth is estimated at 1.5 m BGS to ensure frost protection.

The average undrained shear strength is calculated using the following formula:  
(as per OBC 2006 Table 4.1.8.4.A.):

$$s_u = \frac{\text{Total Thickness of all Layers}}{\sum \frac{\text{Layer Thickness } (t)}{\text{Layer Undrained Shear Strength } (s_u)}}$$

$$s_u = \frac{1.5}{0.0133}$$

$$s_u = 112.5$$

Average Undrained Shear Strength for the Site is 112.5 kPa which is greater than 100 kPa.  
∴ Seismic Site Class = 'C' based on average undrained shear strength.

### Seismic Site Classification BH-2 (COHESIONLESS LAYER)

Site Classification for Seismic Site Response Calculations (Commentary J)

Depth Below Ground		Subsoil	Layer Thickness $t$ (m)	Measured N-Value $N$ ( )	Corrected N-Value $N_{60}$ ( )	$t/N_{60}$	
From (m)	To (m)						
3.0	4.5	Silly Sand Till	1.5	14	11	0.1429	
4.5	6.7		2.2	66	50	0.0444	
6.7	31.5	Bedrock	24.8	100	75	0.3307	
TOTAL =					28.5	Sum $t/N_{60}$ =	0.5180

(1)

(2), (3)

**NOTES:**

(1) The founding depth is estimated at 1.5 m BGS to ensure frost protection.

(2) The N-Value of rock is conservatively taken as 100.

(3) The analysis is extended down to a depth of 30 m below the underside of footings.

The average standard penetration resistance is calculated using the following formula:  
(as per OBC 2006 Table 4.1.8.4.A.):

$$\text{Avg}(N_{60}) = \frac{\text{Total Thickness of all Layers}}{\sum \frac{\text{Layer Thickness } (t)}{\text{Layer Corrected N-Value } (N_{60})}}$$

$$\text{Avg}(N_{60}) = \frac{28.5}{0.5180}$$

$$\text{Avg}(N_{60}) = 55.0$$

Average Standard Penetration Resistance for the Site is 55.0 which is greater than 50.0.  
∴ Seismic Site Class = 'C' based on average standard penetration resistance.

## **APPENDIX B**

### **COMPARISON OF LABORATORY RESULTS**



**INSPEC-SOL INC.**  
 179 Colonnade Rd., Suite 400  
 Ottawa, ON K2E 7J4  
 Tel.:(613) 727-0895 Fax: (613) 727-0581

Reference No.: Y060162-ON65  
 - Client: McDonalds Restraunts of Canada Ltd.  
 Project: 3340 Fallowfield Road, Ottawa, ON

**Table A: Comparison of Tested Soil Samples to Generic Criteria [O.Reg. 511/09]**

O.Reg. 511/09 Parameter	Units	O.Reg.511/09 TABLE1 commercial/ industrial/ community/ institutional/ parkland/ residential / road (Rev. Jan.13/2011)	O.Reg.511/09 TABLE 3 non-potable  industrial/ commercial / community / road (Rev. Jan 13/2011)	Sample ID: Date : Lab ID:  Description:  Depth (m):	BH1-SS2 7/28/2011 KJ1147  Native Silty Clay  1.7	BH2-SS2 7/28/2011 KJ1148  Native Silty Clay  1.7	BH2-SS4 7/28/2011 KJ1149  Native Silty Sand  3.3
<b>FUELS &amp; BTEX</b>							
PHC F1 (C6-C10)****	ug/g	25	(65) 55		ND	ND	ND
PHC F2 (>C10-C16)	ug/g	10	(250) 230		ND	ND	ND
<b>PHC F3 (&gt;C16-C34)</b>	<b>ug/g</b>	<b>240</b>	<b>(2500) 1700</b>		<b>60</b>	ND	ND
PHC F4 (>C34-C50)	ug/g	120	(6600) 3300		<b>130</b>	ND	ND
Benzene	ug/g	0.02	(0.4) 0.32		ND	ND	ND
Toluene	ug/g	0.2	(78) 68		ND	ND	ND
Ethylbenzene	ug/g	0.05	(19) 9.5		ND	ND	ND
Xylene Mixture	ug/g	0.05	(30) 26		ND	ND	ND
<b>INDICES</b>							
pH		-	5-9* or 5-11*		8.63	8.90	9.01

**Legend:**

<b>DETECTION OF CONTAMINANT</b>
TABLE 1 EXCEEDENCE
TABLE 3 EXCEEDENCE

**Notes:**

( ) Standard value in brackets applies to medium and fine textured soils

\* the site is automatically Environmentally Sensitive (a Table 1) if pH is outside the range of 5<pH<9 (shallow soils <1.5m) or 5<pH<11 (subsurface soils >1.5m)

\*\*\*\* F1 does not include BTEX, proponent may subtract BTEX from the analytical result



**INSPEC-SOL INC.**  
 179 Colonnade Rd., Suite 400  
 Ottawa, ON K2E 7J4  
 Tel.:(613) 727-0895 Fax: (613) 727-0581

**Reference No.:** Y060162-ON65  
**Client:** McDonalds Restraunts of Canada Ltd.  
**Project:** 3340 Fallowfield Road, Ottawa, ON

**Table B: Comparison of Tested Soil Samples to TCLP Criteria [O.Reg. 558/00]**

O. Reg. 558/00 Parameter	Units	O.Reg. 558/00 Criteria	Sample ID: Date : Lab ID: Depth (m):	BH1-SS2 7/28/2011 KJ1147 1.7	BH2-SS2 7/28/2011 KJ1148 1.7	BH2-SS4 7/28/2011 KJ1149 3.3
<b>FUELS &amp; BTEX</b>						
Mercury	mg/L	0.1		ND	ND	ND
Arsenic	mg/L	2.5		ND	ND	ND
<b>Barium</b>	<b>mg/L</b>	<b>100</b>		<b>0.5</b>	<b>0.3</b>	<b>0.6</b>
<b>Boron</b>	<b>mg/L</b>	<b>500</b>		<b>0.1</b>	<b>0.1</b>	<b>0.1</b>
Cadmium	mg/L	0.5		ND	ND	ND
Chromium	mg/L	5		ND	ND	ND
Fluoride	mg/L	150		ND	ND	ND
Lead	mg/L	5		ND	ND	ND
Selenium	mg/L	1		ND	ND	ND
Silver	mg/L	5		ND	ND	ND
Uranium	mg/L	10		ND	ND	ND

**Legend:**

<b>DETECTION OF CONTAMINANT</b>
<b>EXCEEDENCE OF REGULATION</b>

**APPENDIX C**

**MAXXAM CERTIFICATE OF ANALYSIS**

Your Project #: Y020162-0N65  
 Your C.O.C. #: 17979

**Attention: Joe Bennett**

Inspec-Sol Inc  
 179 Colonnade Rd  
 Suite 400  
 Nepean, ON  
 CANADA K2E 7J4

**Report Date: 2011/08/05**

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B1B3981**

**Received: 2011/07/28, 17:05**

Sample Matrix: Soil  
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Soil	3	2011/07/29	2011/07/30	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	3	2011/07/30	2011/08/02	OTT SOP-00001	CCME CWS
Mercury (TCLP Leachable) (mg/L) ☺	3	N/A	2011/08/03	CAM SOP-00453	EPA 7470
Total Metals in TCLP Leachate by ICPMS ☺	3	2011/08/03	2011/08/04	CAM SOP-00447	EPA 6020
MOISTURE	3	N/A	2011/08/03	CAM SOP-00445	MOE HANDBOOK(1983)
TCLP - % Solids ☺	3	2011/08/02	2011/08/03	CAM SOP-00401	EPA 1311 modified
TCLP - Extraction Fluid ☺	3	N/A	2011/08/03	CAM SOP-00401	EPA 1311 modified
TCLP - Initial and final pH ☺	3	N/A	2011/08/03	CAM SOP-00401	EPA 1311 modified

**Remarks:**

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

../2

Your Project #: Y020162-0N65  
Your C.O.C. #: 17979

**Attention: Joe Bennett**

Inspec-Sol Inc  
179 Colonnade Rd  
Suite 400  
Nepean, ON  
CANADA K2E 7J4

**Report Date: 2011/08/05**

**CERTIFICATE OF ANALYSIS**

-2-

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Analytics Mississauga

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JULIE CLEMENT, Ottawa Customer Service  
Email: JClement@maxxam.ca  
Phone# (613) 274-3549

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B1B3981  
 Report Date: 2011/08/05

 Inspec-Sol Inc  
 Client Project #: Y020162-0N65

**O'REG 153 PETROLEUM HYDROCARBONS (SOIL)**

Maxxam ID		KJ1147	KJ1148	KJ1149		
Sampling Date		2011/07/28	2011/07/28	2011/07/28		
COC Number		17979	17979	17979		
	<b>Units</b>	<b>BH1-SS2</b>	<b>BH2-SS2</b>	<b>BH2-SS4</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>						
Moisture	%	26	29	19	0.2	2567721
<b>BTEX &amp; F1 Hydrocarbons</b>						
Benzene	ug/g	ND	ND	ND	0.02	2566984
Toluene	ug/g	ND	ND	ND	0.02	2566984
Ethylbenzene	ug/g	ND	ND	ND	0.02	2566984
o-Xylene	ug/g	ND	ND	ND	0.02	2566984
p+m-Xylene	ug/g	ND	ND	ND	0.04	2566984
Total Xylenes	ug/g	ND	ND	ND	0.04	2566984
F1 (C6-C10)	ug/g	ND	ND	ND	10	2566984
F1 (C6-C10) - BTEX	ug/g	ND	ND	ND	10	2566984
<b>F2-F4 Hydrocarbons</b>						
F2 (C10-C16 Hydrocarbons)	ug/g	ND	ND	ND	10	2567723
F3 (C16-C34 Hydrocarbons)	ug/g	60	ND	ND	10	2567723
F4 (C34-C50 Hydrocarbons)	ug/g	130	ND	ND	10	2567723
Reached Baseline at C50	ug/g	Yes	Yes	Yes		2567723
<b>Surrogate Recovery (%)</b>						
1,4-Difluorobenzene	%	98	96	98		2566984
4-Bromofluorobenzene	%	102	100	96		2566984
D10-Ethylbenzene	%	69	68	81		2566984
D4-1,2-Dichloroethane	%	61	61	96		2566984
o-Terphenyl	%	88	95	78		2567723
ND = Not detected RDL = Reportable Detection Limit QC Batch = Quality Control Batch						

Maxxam Job #: B1B3981  
 Report Date: 2011/08/05

Inspec-Sol Inc  
 Client Project #: Y020162-0N65

**O'REG 558 TCLP LEACHATE PREPARATION (SOIL)**

Maxxam ID		KJ1147	KJ1148	KJ1149		
Sampling Date		2011/07/28	2011/07/28	2011/07/28		
COC Number		17979	17979	17979		
	<b>Units</b>	<b>BH1-SS2</b>	<b>BH2-SS2</b>	<b>BH2-SS4</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Inorganics</b>						
Final pH	pH	5.03	4.93	5.42		2569458
Initial pH	pH	8.63	8.90	9.01		2569458
TCLP - % Solids	%	100	100	100	0.2	2569454
TCLP Extraction Fluid	N/A	FLUID 1	FLUID 1	FLUID 1		2569457

RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B1B3981  
 Report Date: 2011/08/05

Inspec-Sol Inc  
 Client Project #: Y020162-0N65

### O'REG 558 TCLP METALS (SOIL)

Maxxam ID		KJ1147	KJ1148	KJ1149		
Sampling Date		2011/07/28	2011/07/28	2011/07/28		
COC Number		17979	17979	17979		
	<b>Units</b>	<b>BH1-SS2</b>	<b>BH2-SS2</b>	<b>BH2-SS4</b>	<b>RDL</b>	<b>QC Batch</b>

<b>Metals</b>						
Leachable Mercury (Hg)	mg/L	ND	ND	ND	0.001	2569380
Leachable Arsenic (As)	mg/L	ND	ND	ND	0.2	2569624
Leachable Barium (Ba)	mg/L	0.5	0.3	0.6	0.2	2569624
Leachable Boron (B)	mg/L	0.1	0.1	0.1	0.1	2569624
Leachable Cadmium (Cd)	mg/L	ND	ND	ND	0.05	2569624
Leachable Chromium (Cr)	mg/L	ND	ND	ND	0.1	2569624
Leachable Lead (Pb)	mg/L	ND	ND	ND	0.1	2569624
Leachable Selenium (Se)	mg/L	ND	ND	ND	0.1	2569624
Leachable Silver (Ag)	mg/L	ND	ND	ND	0.01	2569624
Leachable Uranium (U)	mg/L	ND	ND	ND	0.01	2569624

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B1B3981  
Report Date: 2011/08/05

Inspec-Sol Inc  
Client Project #: Y020162-0N65

### Test Summary

**Maxxam ID** KJ1147  
**Sample ID** BH1-SS2  
**Matrix** Soil  
**Collected** 2011/07/28  
**Shipped**  
**Received** 2011/07/28

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2566984	2011/07/29	2011/07/30	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2567723	2011/07/30	2011/08/02	LYNDSEY HART
Mercury (TCLP Leachable) (mg/L)	CVAA	2569380	N/A	2011/08/03	LAWRENCE CHEUNG
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2569624	2011/08/03	2011/08/04	GRACE BU
MOISTURE	BAL	2567721	N/A	2011/08/03	LYNDSEY HART
TCLP - % Solids	BAL	2569454	2011/08/02	2011/08/03	JIAN (KEN) WANG
TCLP - Extraction Fluid		2569457	N/A	2011/08/03	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2569458	N/A	2011/08/03	JIAN (KEN) WANG

**Maxxam ID** KJ1148  
**Sample ID** BH2-SS2  
**Matrix** Soil  
**Collected** 2011/07/28  
**Shipped**  
**Received** 2011/07/28

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2566984	2011/07/29	2011/07/30	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2567723	2011/07/30	2011/08/02	LYNDSEY HART
Mercury (TCLP Leachable) (mg/L)	CVAA	2569380	N/A	2011/08/03	LAWRENCE CHEUNG
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2569624	2011/08/03	2011/08/04	GRACE BU
MOISTURE	BAL	2567721	N/A	2011/08/03	LYNDSEY HART
TCLP - % Solids	BAL	2569454	2011/08/02	2011/08/03	JIAN (KEN) WANG
TCLP - Extraction Fluid		2569457	N/A	2011/08/03	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2569458	N/A	2011/08/03	JIAN (KEN) WANG

**Maxxam ID** KJ1149  
**Sample ID** BH2-SS4  
**Matrix** Soil  
**Collected** 2011/07/28  
**Shipped**  
**Received** 2011/07/28

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2566984	2011/07/29	2011/07/30	STEVE ROBERTS
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2567723	2011/07/30	2011/08/02	LYNDSEY HART
Mercury (TCLP Leachable) (mg/L)	CVAA	2569380	N/A	2011/08/03	LAWRENCE CHEUNG
Total Metals in TCLP Leachate by ICPMS	ICP1/MS	2569624	2011/08/03	2011/08/04	GRACE BU
MOISTURE	BAL	2567721	N/A	2011/08/03	LYNDSEY HART
TCLP - % Solids	BAL	2569454	2011/08/02	2011/08/03	JIAN (KEN) WANG
TCLP - Extraction Fluid		2569457	N/A	2011/08/03	JIAN (KEN) WANG
TCLP - Initial and final pH	PH	2569458	N/A	2011/08/03	JIAN (KEN) WANG

Maxxam Job #: B1B3981  
Report Date: 2011/08/05

Inspec-Sol Inc  
Client Project #: Y020162-0N65

**GENERAL COMMENTS**

Custody seal was not present on the cooler.

**Results relate only to the items tested.**

Inspec-Sol Inc  
 Attention: Joe Bennett  
 Client Project #: Y020162-0N65  
 P.O. #:  
 Site Location:

### Quality Assurance Report

Maxxam Job Number: TB1B3981

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits	
2566984 STE	Matrix Spike	1,4-Difluorobenzene	2011/07/29		98	%	60 - 140	
		4-Bromofluorobenzene	2011/07/29		118	%	60 - 140	
		D10-Ethylbenzene	2011/07/29		92	%	30 - 130	
		D4-1,2-Dichloroethane	2011/07/29		95	%	60 - 140	
		Benzene	2011/07/29		77	%	60 - 140	
		Toluene	2011/07/29		89	%	60 - 140	
		Ethylbenzene	2011/07/29		91	%	60 - 140	
		o-Xylene	2011/07/29		97	%	60 - 140	
		p+m-Xylene	2011/07/29		90	%	60 - 140	
		F1 (C6-C10)	2011/07/29		100	%	60 - 140	
	Spiked Blank	1,4-Difluorobenzene	2011/07/29		99	%	60 - 140	
		4-Bromofluorobenzene	2011/07/29		120	%	60 - 140	
		D10-Ethylbenzene	2011/07/29		91	%	30 - 130	
		D4-1,2-Dichloroethane	2011/07/29		96	%	60 - 140	
		Benzene	2011/07/29		74	%	60 - 140	
		Toluene	2011/07/29		85	%	60 - 140	
		Ethylbenzene	2011/07/29		88	%	60 - 140	
		o-Xylene	2011/07/29		94	%	60 - 140	
		p+m-Xylene	2011/07/29		86	%	60 - 140	
		F1 (C6-C10)	2011/07/29		101	%	60 - 140	
	Method Blank	1,4-Difluorobenzene	2011/07/29		103	%	60 - 140	
		4-Bromofluorobenzene	2011/07/29		104	%	60 - 140	
		D10-Ethylbenzene	2011/07/29		89	%	30 - 130	
		D4-1,2-Dichloroethane	2011/07/29		99	%	60 - 140	
		Benzene	2011/07/29	ND, RDL=0.02		ug/g		
		Toluene	2011/07/29	ND, RDL=0.02		ug/g		
		Ethylbenzene	2011/07/29	ND, RDL=0.02		ug/g		
		o-Xylene	2011/07/29	ND, RDL=0.02		ug/g		
		p+m-Xylene	2011/07/29	ND, RDL=0.04		ug/g		
		Total Xylenes	2011/07/29	ND, RDL=0.04		ug/g		
		F1 (C6-C10)	2011/07/29	ND, RDL=10		ug/g		
		F1 (C6-C10) - BTEX	2011/07/29	ND, RDL=10		ug/g		
		RPD	Benzene	2011/07/29	NC		%	50
Toluene	2011/07/29		NC		%	50		
Ethylbenzene	2011/07/29		NC		%	50		
o-Xylene	2011/07/29		NC		%	50		
p+m-Xylene	2011/07/29		NC		%	50		
Total Xylenes	2011/07/29		NC		%	50		
F1 (C6-C10)	2011/07/29		NC		%	50		
F1 (C6-C10) - BTEX	2011/07/29		NC		%	50		
Moisture	2011/08/03		4.8		%	50		
2567721 LHR	Matrix Spike		o-Terphenyl	2011/08/02		81	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2011/08/02		130	%	60 - 130	
		F3 (C16-C34 Hydrocarbons)	2011/08/02		130	%	60 - 130	
		F4 (C34-C50 Hydrocarbons)	2011/08/02		130	%	60 - 130	
		Spiked Blank	o-Terphenyl	2011/08/02		73	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2011/08/02		111	%	60 - 130	
		F3 (C16-C34 Hydrocarbons)	2011/08/02		111	%	60 - 130	
		F4 (C34-C50 Hydrocarbons)	2011/08/02		111	%	60 - 130	
		Method Blank	o-Terphenyl	2011/08/02		83	%	30 - 130
			F2 (C10-C16 Hydrocarbons)	2011/08/02	ND, RDL=10		ug/g	
			F3 (C16-C34 Hydrocarbons)	2011/08/02	ND, RDL=10		ug/g	
		RPD	F4 (C34-C50 Hydrocarbons)	2011/08/02	ND, RDL=10		ug/g	
			F2 (C10-C16 Hydrocarbons)	2011/08/02	5.3		%	50
			F3 (C16-C34 Hydrocarbons)	2011/08/02	8.2		%	50

Inspec-Sol Inc  
 Attention: Joe Bennett  
 Client Project #: Y020162-0N65  
 P.O. #:  
 Site Location:

### Quality Assurance Report (Continued)

Maxxam Job Number: TB1B3981

QA/QC Batch	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
2567723 LHR	RPD	F4 (C34-C50 Hydrocarbons)	2011/08/02	NC		%	50
2569380 LCH	Matrix Spike	Leachable Mercury (Hg)	2011/08/03		105	%	75 - 125
	Leachate Blank	Leachable Mercury (Hg)	2011/08/03	ND, RDL=0.001		mg/L	
	Spiked Blank	Leachable Mercury (Hg)	2011/08/03		107	%	80 - 120
	Method Blank	Leachable Mercury (Hg)	2011/08/03	ND, RDL=0.001		mg/L	
	RPD	Leachable Mercury (Hg)	2011/08/03	NC		%	25
2569624 GBU	Matrix Spike	Leachable Arsenic (As)	2011/08/04		88	%	75 - 125
		Leachable Barium (Ba)	2011/08/04		NC	%	75 - 125
		Leachable Boron (B)	2011/08/04		85	%	75 - 125
		Leachable Cadmium (Cd)	2011/08/04		86	%	75 - 125
		Leachable Chromium (Cr)	2011/08/04		87	%	75 - 125
		Leachable Lead (Pb)	2011/08/04		85	%	75 - 125
		Leachable Selenium (Se)	2011/08/04		85	%	75 - 125
		Leachable Silver (Ag)	2011/08/04		80	%	75 - 125
		Leachable Uranium (U)	2011/08/04		83	%	75 - 125
	Leachate Blank	Leachable Arsenic (As)	2011/08/04	ND, RDL=0.2		mg/L	
		Leachable Barium (Ba)	2011/08/04	ND, RDL=0.2		mg/L	
		Leachable Boron (B)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Cadmium (Cd)	2011/08/04	ND, RDL=0.05		mg/L	
		Leachable Chromium (Cr)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Lead (Pb)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Selenium (Se)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Silver (Ag)	2011/08/04	ND, RDL=0.01		mg/L	
		Leachable Uranium (U)	2011/08/04	ND, RDL=0.01		mg/L	
	Spiked Blank	Leachable Arsenic (As)	2011/08/04		95	%	85 - 115
		Leachable Barium (Ba)	2011/08/04		96	%	85 - 115
		Leachable Boron (B)	2011/08/04		92	%	85 - 115
		Leachable Cadmium (Cd)	2011/08/04		95	%	85 - 115
		Leachable Chromium (Cr)	2011/08/04		95	%	85 - 115
		Leachable Lead (Pb)	2011/08/04		92	%	85 - 115
		Leachable Selenium (Se)	2011/08/04		97	%	85 - 115
		Leachable Silver (Ag)	2011/08/04		90	%	85 - 115
		Leachable Uranium (U)	2011/08/04		90	%	85 - 115
	Method Blank	Leachable Arsenic (As)	2011/08/04	ND, RDL=0.2		mg/L	
		Leachable Barium (Ba)	2011/08/04	ND, RDL=0.2		mg/L	
		Leachable Boron (B)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Cadmium (Cd)	2011/08/04	ND, RDL=0.05		mg/L	
		Leachable Chromium (Cr)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Lead (Pb)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Selenium (Se)	2011/08/04	ND, RDL=0.1		mg/L	
		Leachable Silver (Ag)	2011/08/04	ND, RDL=0.01		mg/L	
		Leachable Uranium (U)	2011/08/04	ND, RDL=0.01		mg/L	
	RPD	Leachable Arsenic (As)	2011/08/04	NC		%	25
		Leachable Barium (Ba)	2011/08/04	NC		%	25
		Leachable Boron (B)	2011/08/04	NC		%	25
		Leachable Cadmium (Cd)	2011/08/04	NC		%	25
		Leachable Chromium (Cr)	2011/08/04	NC		%	25
		Leachable Lead (Pb)	2011/08/04	NC		%	25
		Leachable Selenium (Se)	2011/08/04	NC		%	25
		Leachable Silver (Ag)	2011/08/04	NC		%	25
		Leachable Uranium (U)	2011/08/04	NC		%	25

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Inspec-Sol Inc  
Attention: Joe Bennett  
Client Project #: Y020162-0N65  
P.O. #:  
Site Location:

### Quality Assurance Report (Continued)

Maxxam Job Number: TB1B3981

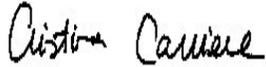
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.  
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.  
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was not sufficiently significant to permit a reliable recovery calculation.  
NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

## Validation Signature Page

Maxxam Job #: B1B3981

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



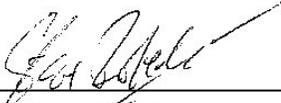
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CRISTINA CARRIERE, Scientific Services



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PAUL RUBINATO, Analyst, Maxxam Analytics



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STEVE ROBERTS, Lab Supervisor, Ottawa

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Arcadis Professional Services (Canada) Inc.  
3340 Fallowfield Road, Nepean, City of Ottawa  
Prepared for McDonald's Restaurants of Canada, Limited

# Appendix B

**3340 Fallowfield, Ottawa**

McDonald's Corporation

**Post-Development Runoff Coefficients**

Project Name: 3340 Fallowfield, Ottawa

Project Number: 147221

Date: 05-Sep-25

Designed By: Dumitru Liubeznii, P.Eng

Pre-Development - To CB#2 (A1-Pre)				
Conventional Roof	0	0.0%	0.90	0.00
Green Roof:	0	0.0%	0.50	0.00
Landscaping:	105	30.9%	0.25	0.08
Permeable Pavers:	0	0.0%	0.55	0.00
Impervious:	235	69.1%	0.90	0.62
Total Area:	340	100%		0.70

Post-Development - To CB#2 (A1-Post)				
Conventional Roof	0	0.0%	0.90	0.00
Green Roof:	0	0.0%	0.50	0.00
Landscaping:	53	15.6%	0.25	0.04
Permeable Pavers:	0	0.0%	0.55	0.00
Impervious:	287	84.4%	0.90	0.76
Total Area:	340	100%		0.80



**Rational Method - 100 Year Storm**

**3340 Fallowfield, Ottawa**

**Site Flow and Storage Summary**

McDonald's Corporation

PRE-DEVELOPMENT



$$I_{100\text{-year}} = \frac{1735.688}{(Tc+6.014)^{0.820}} = 178.56 \text{ mm/hr}$$

Project Name:	3340 Fallowfield, Ottawa	Area of Site =	0.034 ha	
Project Number:	147221	Weighed Runoff Coefficient =	0.70	
Date:	2025-09-05	Orifice Discharge (L/s) =	6.5	
Time (min)	Intensity (mm/hr)	Q-100 (L/s)	Q-stored (L/s)	Storage Vol. (m <sup>3</sup> )
0	0.0	0.000	0.000	0.000
10	178.6	11.792	5.292	3.175
20	120.0	7.922	1.422	1.706
30	91.9	6.067	0.000	0.000
40	75.1	4.963	0.000	0.000
50	64.0	4.224	0.000	0.000
60	55.9	3.691	0.000	0.000

Storage Volume Required (cu.m) = **3.2**

Storage Volume Provided (cu.m) = **5.9**

HGL Depth (m) = 1.32

Existing ICD = HYDROVEX 100 VHV-1

**Rational Method - 100 Year Storm**

**3340 Fallowfield, Ottawa**

**Site Flow and Storage Summary**

McDonald's Corporation

POST-DEVELOPMENT



$$I_{100\text{-year}} = \frac{1735.688}{(Tc+6.014)^{0.820}} = 178.56 \text{ mm/hr}$$

Project Name:	3340 Fallowfield, Ottawa	Area of Site =		0.034 ha
Project Number:	147221	Weighed Runoff Coefficient =		0.80
Date:	2025-09-05	Orifice Discharge (L/s) =		6.5
<b>Time (min)</b>	<b>Intensity (mm/hr)</b>	<b>Q-100 (L/s)</b>	<b>Q-stored (L/s)</b>	<b>Storage Vol. (m<sup>3</sup>)</b>
0	0.0	0.000	0.000	0.000
10	178.6	13.491	6.991	4.195
20	120.0	9.063	2.563	3.076
30	91.9	6.941	0.441	0.794
40	75.1	5.678	0.000	0.000
50	64.0	4.832	0.000	0.000
60	55.9	4.223	0.000	0.000

Storage Volume Required (cu.m) = **4.2**

Storage Volume Provided (cu.m) = **5.9**

HGL Depth (m) = 1.32

Existing ICD = HYDROVEX 100 VHV-1