



# SPECIFICATIONS

**SOLICITATION #:** 22-58153

**BUILDING:** 1200 Montreal Road,  
Ottawa, Ontario

**PROJECT:** Sanitary and Storm Sewer Separation,  
Phase 4

**PROJECT #:** 5097

**Date:** March 2023



# **SPECIFICATION**

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## Construction Tender Form

**Project Identification**    **Sanitary and Storm Sewer Separation, Phase 4**

**Tender No.:**    **22-58153**

**1.2 Business Name and Address of Tenderer**

**Name** \_\_\_\_\_

**Address** \_\_\_\_\_

\_\_\_\_\_

**Contact Person(Print Name)** \_\_\_\_\_

**Telephone** (\_\_\_\_\_) \_\_\_\_\_    **Fax:** (\_\_\_\_\_) \_\_\_\_\_

**1.3 Offer**

I/We the Tenderer, hereby offer to His Majesty the King in Right of Canada (hereinafter referred to as "His Majesty") represented by the National Research Council Canada to perform and complete the work for the above named project in accordance with the Plans and Specifications and other Tender Documents, at the place and in the manner set out therein for the Total Tender Amount (to be expressed in numbers only) of: \$ \_\_\_\_\_ . \_\_\_\_\_ **in lawful money of Canada (excluding GST/HST)**

The above amount is inclusive of all applicable (\*) Federal, Provincial and Municipal taxes except that in the event of a change in any tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property, that occurs

- .1        after the date this tender was mailed or delivered, or
- .2        if this tender is revised, after the date of the last revision

the amount of this offer shall be decreased or decreased in the manner provided for in GC22 of the General Conditions of the Contract Documents.

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National Research Council Canada	Conseil national de recherches Canada
Finance and Procurement Services Branch	Direction des services financiers et d'approvisionnement

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### **1.3.1 Offer (continued)**

(\* ) For the purpose of this tender, the Goods and Services Tax (GST) is not to be considered as an applicable tax.

In the province of Quebec, the Quebec Sales Tax is not to be included in the tender amount because the Federal Government is exempt from this tax. Tenderers shall make arrangements directly with the provincial Revenue Department to recover any tax they may pay on good and services acquired in the performance of this contract. However, tenderers should include in their tender amount Quebec Sales Tax for which an Input Tax Refund is not available.

### **1.4 Acceptance and Entry into Contract**

I/We undertake, within fourteen (14) days of notification of acceptance of my/our offer, to sign a contract for the performance of the work provided I/we are notified, by the Department, of the acceptance of my/our offer within 30 days of the tender closing date.

### **1.5 Construction Time**

I/We Agree to complete the work within the time stipulated in the specification from the date of notification of acceptance of my/our offer.

### **1.6 Bid Security**

I/We herewith enclose tender security in accordance with Article 5 of the General Instruction to Tenderers.

I/We understand that if a security deposit is furnished as tender security and if I/we refuse to enter into a contract when called upon to do so, my/our security deposit shall be forfeited but the Minister may, if it is in the public interest, waive the right of His Majesty to forfeit the security deposit.

I/We understand that if the security furnished is not in the approved form as described in Article 5 of the General Instructions to Tenderers, my/our tender is subject to disqualification.



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National Research Council      Conseil national de recherches  
Canada                              Canada

Finance and Procurement      Direction des services financiers  
Services Branch                    et d'approvisionnement

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**1.7      Contract Security**

Within fourteen (14) days after receipt of written notification of the acceptance of my/our offer, I/we will furnish contract security in accordance with the Contract Conditions "F" of the Contract Documents.

I/We understand that the contract security referred to herein, if provided in the form of a bill of exchange, will be deposited into the Consolidated Revenue Fund of Canada.

**1.8      Appendices**

This Tender Form includes Appendix No. \_\_\_\_\_N/A\_\_\_\_\_.

**1.9      Addenda**

The Total Tender Amount provides for the Work described in the following Addenda:

NUMBER	DATE	NUMBER	DATE

**(Tenderers shall enter numbers and dates of addenda)**

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National Research Council Canada	Conseil national de recherches Canada
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Finance and Procurement Services Branch	Direction des services financiers et d'approvisionnement
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**1.10 Execution of Tender**

The Tenderer shall refer to Article 2 of the General Instructions to Tenderers.

**1.11 Pricing Table**

**SIGNED, ATTESTED TO AND DELIVERED on the \_\_\_\_\_ day of  
\_\_\_\_\_ on behalf of**

\_\_\_\_\_  
(Type or print the business name of the Tenderer)

AUTHORIZED SIGNATORY (IES)

\_\_\_\_\_  
(Signature of Signatory)

\_\_\_\_\_  
(Print name & Title of Signatory)

\_\_\_\_\_  
(Signature of Signatory)

\_\_\_\_\_  
(Print name & Title of Signatory)

**SEAL**

### Pricing Table

ITEM	DESCRIPTION	PRICE
A	Proponent's lump sum bid	\$ _____
B	* Additional contingency	\$ 500,000
C	<b>BID TOTAL</b> (A + B = C)	\$ _____

\* An additional contingency in the amount of \$500,000 is hereby established for possible additional unforeseen services that may be identified during performance of the work covered by this Agreement and which are within the general work parameters of this Agreement. Such contingency may only be released upon written authorization by the NRC contracting authority and does not represent a formal commitment other than its purpose.

## BUY AND SELL NOTICE

### Sanitary and Storm Sewer Separation, Phase 4

You are invited to submit **one** electronic Technical Proposal and **one** electronic Tender Form in two separate attachments to fulfil the following requirement forming part of this Request for Proposal. One attachment **must** be clearly marked 'Technical Proposal' and the other attachment **must** be marked 'Tender Form'. All financial information **must** be fully contained in the Tender Form, and only in the Tender Form. Vendors who provide financial information in the technical proposal will be disqualified. **All proposals should include the front page of this RFP duly completed.**

The National Research Council Canada, 1200 Montreal Road Ottawa, has a requirement for a project that includes:

The proposed scope of work under this contract covers the Sanitary and Storm Sewer Separation – Phase 4 at 1200 Montreal Road, Ottawa, Ontario of the National Research Council.

#### MANDATORY CRITERIA:

The Technical Proposal will be evaluated to determine if all mandatory requirements detailed in this Table "Mandatory Criteria" have been met.

Any Tender Form which fails to meet any of the mandatory requirements will be considered non-compliant and will not be given further consideration.

In the table below include the page number(s) of your bid form that demonstrates you meet that specific requirement.

### MANDATORY CRITERIA

	Mandatory Criteria	Bid Form Page # (s) (Proponent to Insert)
1	The Proponent must have a minimum of ten (10) years' experience in the execution of road building and sewer projects, and as a contractor providing construction services comparable to this tender. Provide two project examples, including approximate value of work and a client reference. Provide a company profile and relevant history. A total of four pages (letter size) maximum for this criteria.	
2	The Proponent must supply the CV for the proposed company construction site supervisor. The proposed construction site supervisor must possess a minimum of 5 years' experience in contract/construction administration, as a site supervisor or similar position. The 5 years' minimum experience must be related to the project's field of work. Two pages (letter size) maximum for this criteria.	

3	The Proponent must supply the CV for the proposed company project manager. The proposed project manager must possess a minimum of 5 years' experience in contract/construction administration, as a site supervisor or similar position. The 5 years' minimum experience must be related to the project's field of work. Two pages (letter size) maximum for this criteria.	
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## 1. GENERAL

Questions regarding any aspect of the project are to be addressed to and answered only by the Departmental Representative (or his designate) or the Contracting Authority.

Any information received other than from the Departmental Representative (or his designate) or the Contracting Authority will be disregarded when awarding the contract and during construction.

Firms intending to submit tenders on this project should obtain tender documents through the Buyandsell.gc.ca TMA services provider. Addenda, when issued, will be available from the Buyandsell.gc.ca TMA service provider. Firms that elect to base their bids on tender documents obtained from other sources do so at their own risk and will be solely responsible to inform the tender calling authority of their intention to bid. Tender packages are not available for distribution on the actual day of tender closing.

## 2. MANDATORY SITE VISIT

It is mandatory that the bidder attends one of the site visits at the designated date and time. At least one representative from bidders that intend to bid must attend.

The site visits will be held on April 4<sup>th</sup> and April 5<sup>th</sup> 2023 at **9:30 am**. Meet Benoit Huot at Building M-19, Main Entrance, 1200 Montreal Road, Ottawa, ON. Bidders who, for any reason, cannot attend at the specified date and time will not be given an alternative appointment to view the site and their tenders, therefore, will be considered as non-responsive. **NO EXCEPTIONS WILL BE MADE.**

As proof of attendance, at the site visit, the Contracting Authority will have an Attendance Form which **MUST** be signed by the bidder's representative. It is the responsibility of all bidders to ensure they have signed the Mandatory Site Visit Attendance form prior to leaving the site. Proposals submitted by bidders who have not attended the site visit or failed to sign the Attendance Form will be deemed non-responsive.

## 3. CLOSING DATE

Closing date is April 26<sup>th</sup>, 2023, 14:00

## 4. TENDER RESULTS

Following the Tender closing, proposals will be evaluated and notice of individual results will be sent by email to all Contractors who submitted a tender.

## 5. SECURITY REQUIREMENT FOR CANADIAN CONTRACTORS

### 5.1 MANDATORY SECURITY REQUIREMENT:

This procurement contains a mandatory security requirement as follows:

1. The Contractor must, at all times during the performance of the Contract, hold a valid Designated Organization Screening (DOS), issued by the Canadian Industrial Security Director (CISD), Public Works Government Services Canada.
2. The Contractor personnel requiring access to sensitive work site(s) must EACH hold a valid RELIABILITY STATUS, granted or approved by CISD/PWGSC.
3. The Contractor must comply with the provisions of the:
  - a. Security Requirements Checklist attached at Appendix "D"
  - b. Industrial Security Manual (Latest Edition) available at: <https://www.tpsgc-pwgsc.gc.ca/esc-src/msi-ism/index-eng.html>

## **5.2 VERIFICATION OF SECURITY CLEARANCE AT BID CLOSING**

1. The Bidder must hold a valid Designated Organization Screening (DOS) issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC), **TO BE INCLUDED WITH THEIR TENDER OR PROVIDED WITHIN 48 HOURS FROM THE DATE AND TIME OF TENDER CLOSING.** Verifications will be made through CISD to confirm the security clearance status of the Bidder. Failure to comply with this requirement will render the bid non-compliant and no further consideration will be given to the bid.
2. Within 72 hours of tender closing, the General Contractor must name all of his sub-contractors, each of whom must hold a valid **RELIABILITY STATUS**, granted or approved by CISD/PWGSC, or any other Federal Department or Agency along with the names and birthdates or security clearance certificate numbers of all personnel who will be assigned to the project.
3. It is to be noted that any subcontractor required to perform any part of the work during the performance of the subsequent contract must also adhere to the mandatory security requirement of the contract. As well, no personnel without the required level of security will be allowed on site. It will be the responsibility of the successful bidder to ensure that the security requirement is met throughout the performance of the contract. The Crown will not be held liable or accountable for any delays or additional costs associated with the contractor's non-compliance to the mandatory security requirement. Failure to comply with the mandatory security requirement will be grounds for being declared in default of contract.
4. For any enquiries concerning the project security requirement during the bidding period, the Bidder/Tenderer must contact the Security Officer @ 613-993-8956.

## **6. WSIB (WORKPLACE SAFETY AND INSURANCE BOARD)**

All Bidders must provide a valid WSIB certificate with their Tender or prior to contract award.

## **7. OFFICE OF THE PROCUREMENT OMBUDSMAN**

1. Clause for solicitation documents and regret letters for unsuccessful bidders

The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent venue for Canadian bidders to raise complaints regarding the award of federal contracts under \$25,300 for goods and under \$101,100 for services. Should you have any issues or concerns regarding the award of a federal contract below these dollar amounts, contact OPO by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), by telephone at 1-866-

734-5169, or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca). For more information about OPO, including the available services, please visit the OPO website.

## 2. Contract Administration

The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1 (1) of the Department of Public Works and Government Services Act will review a complaint filed by the complainant respecting the administration of the Contract if the requirements of Subsection 22.2(1) of the Department of Public Works and Government Services Act and Sections 15 and 16 of the Procurement Ombudsman Regulations have been met.

To file a complaint, the Office of the Procurement Ombudsman may be contacted by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), by telephone at 1-866-734-5169, or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca).

## 3. Dispute Resolution

The Parties agree to make every reasonable effort, in good faith, to settle amicably all disputes or claims relating to or arising from the Contract, through negotiations between the Parties' representatives authorized to settle. If the Parties do not reach a settlement within 10 working days, each party hereby consents to fully participate in and bear the cost of mediation led by the Procurement Ombudsman pursuant to Subsection 22.1(3)(d) of the Department of Public Work and Government Services Act and Section 23 of the Procurement Ombudsman Regulations.

The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169, by e-mail at [boa.opo@boa-opo.gc.ca](mailto:boa.opo@boa-opo.gc.ca), or by web at [www.opo-boa.gc.ca](http://www.opo-boa.gc.ca).

The Departmental Representative or his designate for this project is: Benoit Huot  
[Benoit.Huot@nrc-cnrc.gc.ca](mailto:Benoit.Huot@nrc-cnrc.gc.ca)  
Telephone: (613) 808-3650

Contracting Authority for this project is: Collin Long  
[Collin.Long@nrc-cnrc.gc.ca](mailto:Collin.Long@nrc-cnrc.gc.ca)

## INSTRUCTIONS TO BIDDERS

### Article 1 – Receipt of Tender

- 1a) Tender must be received **by email only** not later than the specified tender closing time. Electronic bids received after the indicated closing time - NRC servers received time - will be irrevocably rejected. Bidders are urged to send their proposal sufficient time in advance of the closing time to prevent any technical issues. NRC will not be held responsible for bids sent before closing time but received by the NRC servers after the closing time. Tenders received after this time are invalid and shall not be considered, regardless of any reason for their late arrival.  
**\*The maximum file size that NRC can receive in a single email is 10MB\*\***  
**\*\*Bidders are urged to send their proposals well before the bid closing time\*\***
- 1b) A letter of printed telecommunication from a bidder quoting a price shall not be considered as a valid tender unless a formal tender has been received on the prescribed Tender Form.
- 1c) Bidders may amend their tenders by **email only** provided that such amendments are received not later than the specified tender closing time.
- 1d) Any amendments to the tender which are transmitted by **email only** must be signed and must clearly identify the tenderer.

All such amendments are to be addressed to:  
National Research Council of Canada  
Collin Long, Senior Contracting Officer

[Collin.Long@nrc-cnrc.gc.ca](mailto:Collin.Long@nrc-cnrc.gc.ca)

### Article 2 – Tender Form & Qualifications

- 1) All tenders must be submitted on the Construction Tender Form and the tender must be signed in compliance with the following requirements:
  - a) Limited Company: The full names of the Company and the name(s) and status of the authorized signing officer(s) must be printed in the space provided for that purpose. The signature(s) of the authorized officer(s) and the corporate seal must be affixed.
  - b) Partnership: The firm name and the name(s) of the person(s) signing must be printed in the space provided. One or more of the partners must sign in the presence of a witness who must also sign. An adhesive colored seal must be affixed beside each signature.
  - c) Sole Proprietorship: The business name and the name of the sole proprietor must be printed in the space provided. The sole proprietor must sign in the presence of a witness who must also sign. An adhesive coloured seal must be affixed beside each signature.
- 2) Any alterations in the printed part of the Construction Tender Form or failure to provide the information requested therein, may render the tender invalid.
- 3) All space in the Construction Tender Form must be completed and any handwritten or typewritten corrections to the parts so completed must be initialed immediately to the side of the corrections by the person or persons executing the tender on behalf of the tenderer.



- 4) Tenders must be based on the plans, specifications and tender documents provided.
- 5) A proposal submitted by a bidder who's Board of Directors or proprietor (s) are in majority the same as a former vendor who has declared bankruptcy while performing work for NRC over the last 7-years from the date of issuance of this RFP may be rejected and not eligible for award at NRC's sole discretion. In such case, NRC will advise the ineligible bidder(s).
- 6) A proposal submitted by a bidder who has had a previous contracts cancelled by NRC due to lack of performance within 3 years from the issuance date of this RFP may be rejected and not eligible for award at NRC's sole discretion. In such case, NRC will advise the ineligible bidder (s).
- 7) If there is discrepancy between the English version and the French version of this document and any of the attachments and amendments, the English version will takes precedence.
- 8) The Council does not bind itself to accept the lowest or any tender.

#### Article 3 - Contract

- 1) The Contractor will be required to sign a contract similar to the Standard Contract Form for Fixed Price Construction Contracts, a blank specimen of which is enclosed in the package for reference purposes.

#### Article 4 – Tender Destination

- 1a) Tenders are to be submitted **by email only**:  
National Research Council Canada

[Collin.Long@nrc-cnrc.gc.ca](mailto:Collin.Long@nrc-cnrc.gc.ca)

Endorsed "Tender for (insert title of work as it appears in the drawings and specifications)" and must bear the name and address of the tenderer.

- 1b) Unless otherwise specified, the only documents required to be submitted with the tender are the Tender form and the Bid Security.

#### Article 5 - Security

- 1a) Bid Security is required and must be submitted in one of the following forms:
  - i) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**
  - ii) a bid bond.
- 1b) Regardless of the Bid Security submitted, it should never be more than \$250,000 maximum, calculated at 10% of the first \$250,000 of the tendered price, plus 5% of any amount in excess of \$250,000.
- 1c) Bid Security shall accompany each tender or, if forwarded separately from the tender, shall be provided not later than the specified tender closing time. Bid bond or E-bond Security must be in

the ORIGINAL form. PDF via email is acceptable. FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.

- 1d) The successful tenderer is required to provide security within 14 days of receiving notice of tender acceptance. The tenderer must furnish EITHER:
- i) a Security Deposit as described in 1(b) above together with a Labour and Material Payment Bond in the amount of at least 50% of the amount payable under the contract, OR
  - ii) a Performance Bond and a Labour and Material Payment Bond – each in the amount of 50% of the amount payable under the contract.
- 1e) Bonds must be in an approved form and from the companies whose

bonds are acceptable to the Government of Canada. Samples of the approved form of Bid Bond, Performance Bond and Labour and Material Payment Bond and a list of acceptable Bonding Companies may be obtained from the Contracting Officer, National Research Council, Building M-58, Montreal Road, Ottawa, Ontario, K1A 0R6.

#### Article 7 – Sales Tax

- 1) The amount of the tender shall include all taxes as levied under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act or the Customs Tariff, in force or applicable at the time.
- 1) In Quebec, the Provincial Sales Tax should not be included in the Tender Price as the Federal Government is exempt. Tenderers should contact the Provincial Revenue Minister to recover all taxes paid for goods and services rendered under this contract.

Tenderers must include in their Tender Price the amount of Provincial Sales Tax for which the exemption does not apply.

#### Article 8 – Examination of Site

- 1) All parties tendering shall examine the sites of the proposed work before sending in their tender and make themselves thoroughly acquainted with the same and obtain for themselves any and all information that may be necessary for the proper carrying out of the Contract. No after claim will be allowed or entertained for any work or material that may be requisite and necessary for the proper execution and completion of this Contract with the exception of that provided for under GC 35 in the General Conditions of the General Specification.

#### Article 9 – Discrepancies, Omissions, Etc.

- 1a) Bidders finding discrepancies in, or omissions from, drawings, specifications or other documents, or having any doubt as to the meaning or intent of any part thereof, should at once notify the Engineer who will send written instructions or explanation to all bidders.
- 1b) Neither the Engineer nor the Council will be responsible for oral instructions.
- 1c) Addenda or corrections issued during the time of the bidding shall be covered in the proposal. However, the contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work and made prior to the date of the contract.

#### Article 10 – No additional Payments for Increased Costs

- 1) The only other adjustments in the contract price allowed are those specified in the General Conditions of the General Specification. The contract price will not be amended for change in freight rates, exchange rates, wage rates or cost of materials, plant or services.

#### Article 11 – Awards

- 1a) The Council reserves the power and right to reject tenders received from parties who cannot show a reasonable acquaintance with and preparation for the proper performance of the class of work herein specified and shown on plans. Evidence of such competence must be furnished by the tenderers if required to do so.
- 1b) A tenderer may be required to furnish to the Contracting Office, National Research Council of Canada, Building M-58, 1200 Montreal Road, Ottawa, Ontario, K1A 0R6, Canada, unsigned copies of the insurance requirements as covered by the Insurance Conditions of the General Specification.
- 1c) The Council will accept the Lowest Compliant Bid for Contract Award.

#### Article 12 – Harmonized Sales Tax

- 1) The Harmonized Sales Tax (HST) which is now in effect shall be considered an applicable tax for the purpose of this tender. However, the bidder shall NOT include any amount in the bid price for said HST. The successful contractor will indicate on each application for payment as a separate amount the appropriate HST the Owner is legally obliged to pay. This amount will be paid to the Contractor in addition to the amount certified for payment under the Contract in addition to the amount certified for payment under the Contract and will therefore not affect the Contract Price. The Contractor agrees to remit any HST collected or due to Revenue Canada.

## Non-resident contractors

RST guide 804

Published August 2006

ISBN: 1-4249-2007-8 (Print), **1-4249-2009-4 (PDF)**, **1-4249-2008-6 (HTML)**

## Publication Archived

**Notice to the reader: For Retail Sales Tax (RST)** – On July 1, 2010 the 13 per cent Harmonized Sales Tax (HST) took effect in Ontario replacing the existing provincial Retail Sales Tax (RST) and combining it with the federal Goods and Services Tax (GST). As a result, RST provisions described on this page and in other publications ended on June 30, 2010.

Effective July 1, 2010 this publication was archived for RST purposes **only**. Use caution when you refer to it, since it reflects the law in force for RST at the time it was released and may no longer apply.

- The information in this Guide explains the Retail Sales Tax (RST) responsibilities of a non-resident contractor who is awarded a construction contract to perform work in Ontario and their Ontario customers. Please note that this Guide replaces the previous version dated March 2001.

## Non-Resident Contractor Defined

A non-resident contractor is a contractor located outside Ontario who has been awarded a construction contract to perform work in Ontario, and who has not maintained a permanent place of business in Ontario continuously for twelve months immediately prior to signing the contract, or which is not a company incorporated under the laws of Ontario. A construction contract is a contract for the erection, remodelling or repair of a building or other structure on land.

A contractor is a person who is in the business of constructing, altering, repairing or improving real property and includes, but is not limited to,

1. a general contractor and subcontractor,
2. a carpenter, bricklayer, stonemason, electrician, plasterer, plumber, painter, decorator, paver, and bridge builder,
3. a sheet metal, tile and terrazzo, heating, air conditioning, insulation, ventilating, papering, road, roofing and cement contractor, who installs or incorporates items into real property. (See RST [Guide 206 - Real Property and Fixtures](#)).

## Registration and Guarantee Deposit

Non-resident contractors who are awarded a construction contract in Ontario are required to register with the Ministry of Finance (ministry), Centralized Programs Unit and post a guarantee equal to 4 per cent of the total of each Ontario contract. The guarantee can be paid in cash, by certified cheque (payable to the Minister of Finance), letter of credit or by a guarantee bond.

To register with the ministry and to obtain further information on posting a guarantee, contractors should contact the ministry's Centralized Programs Unit, 33 King Street West, PO Box 623, Oshawa, Ontario, L1H 8H7, toll-free 1 866 ONT-TAXS (1 866 668-8297) or fax to 905 435-3617.

Non-resident contractors who sell taxable goods on a supply only basis to Ontario customers, or provide taxable services in Ontario, may obtain a regular Vendor Permit to collect and remit RST on their sales. Non-resident contractors who have been issued a regular Vendor Permit must still register separately with the ministry and post a guarantee if they are awarded a construction contract in Ontario.

## Letter of Compliance

After receiving the guarantee, the ministry mails out two copies of a "letter of compliance" to the contractor certifying the Retail Sales Tax (RST) requirements have been met. Contractors must give a copy of the letter to their customers.

If a copy of the compliance letter is not provided, the customer must withhold 4 per cent of all amounts payable to the non resident contractor and pay the withheld amounts to the Minister of Finance (minister). Details relating to the contract should be sent along with the payments to the Centralized Programs Unit. Customers may give the minister a guarantee bond equal to 4 per cent of the total contract price instead of making the 4 per cent payments.

Note: Customers who do not follow these requirements may be held liable for 4 per cent of all amounts payable to the non resident contractor or any other amount that the Ministry deems to be the RST payable resulting from the performance of the contract.

## Calculation of RST

### ***Fair Value***

RST is payable on the "fair value" of materials, purchased or brought into Ontario, to be used for work performed in Ontario. "Fair value" includes:

- the purchase price in Canadian funds;
- all charges by the supplier for handling and delivery, and
- any federal customs duties and excise taxes paid (but not the federal Goods and Services Tax (GST)).

Contractors are also required to pay RST to Ontario suppliers on the purchase, rental or lease of taxable services, materials, machinery, or equipment.

### ***Machinery and Equipment - Leased***

If machinery or equipment is leased from a supplier outside Ontario and brought into the province, RST is payable on the lease payments for the period the machinery or equipment is in Ontario.

### ***Machinery and Equipment - Owned by Contractor***

If machinery or equipment is owned by the contractor, RST may be calculated in one of the following ways:

- a. If a contractor brings machinery and equipment into Ontario for less than 12 months' use, RST is to be calculated using the following formula:

$$1/36 \times \text{net book value at date of import} \times \text{number of months in Ontario} \times \text{tax rate}$$

For the purpose of this formula, RST is payable for each month or part of a month that the goods are in Ontario. A month is considered 31 consecutive days and a part month is considered more than 12 days. The RST payable is based on the number of days the machinery and equipment are located in Ontario and not the number of days the items are actually used.

Example: Equipment is brought into Ontario on March 28 and taken out on May 8. The items were in the province for 41 days. RST is payable on the first 31 days' temporary stay in Ontario vs. use of the equipment. Since the remainder (10 days) is not considered part of a month, no RST is payable on this portion.

- b. If, at the time the goods are brought into Ontario, it is expected that the machinery or equipment will be in Ontario for more than twelve months, contractors must pay Retail Sales Tax (RST) on the following basis:

net book value at date of import x tax rate

If, at the time of import, the length of time is not known, vendors may use the formula under (a). If they later find it necessary to keep the machinery and equipment in Ontario for more than 12 months, the RST paid under (a) may be deducted from the RST payable under (b).

Using formula (a) or (b) above, contractors will calculate and remit the RST payable on the return that is filed when the contract is finished.

(See Completion of Contract section)

## M a n u f a c t u r i n g   f o r   O w n   U s e

Contractors may need to manufacture items, such as doors and windows, for their construction contracts. Manufacturing is work done in a factory away from a construction site, or in a mobile unit or workshop that is on or near the construction site. Manufacturing occurs when raw materials are changed into manufactured goods for use in real property contracts.

Contractors are considered to be manufacturing contractors if they produce goods:

1. for their own use in real property contracts, and
2. the manufactured cost of the goods is more than \$50,000 a year.

(See RST Guide 401 - Manufacturing Contractors)

## C o n t r a c t s   w i t h   t h e   F e d e r a l   G o v e r n m e n t

Where a non-resident contractor enters into a construction contract with the federal government, for the construction of a building and/or the installation of equipment, the nature of the equipment will determine whether the contract should be let on a tax-included or tax excluded basis.

Contracts for the construction of a building and the installation of equipment that directly services that building (i.e., elevators, escalators, light fixtures, central heating and air conditioning, etc.) should be tendered on a tax -included basis. Contractors are the consumers of the materials used in fulfilling these contracts and must pay or account for RST on the materials used to complete the contracts. There is NO exemption just because the contract is with the federal government.

Contracts for the installation of equipment that becomes a fixture and does not directly service a building (i.e., material handling equipment, production machinery, communication equipment, training equipment) may be tendered on a tax-excluded basis. Contractors engaged in contracts of this nature are permitted to make tax exempt purchases of such equipment by issuing a valid Purchase Exemption Certificate (PEC) to their supplier. Only non-resident contractors who have registered with the ministry and posted a guarantee may issue a PEC.

## E x e m p t i o n s

Contractors may supply and install equipment or materials for certain customers that may be entitled to an exemption from RST (e.g., manufacturers, Indian band councils, farmers and diplomatic organizations). The equipment or materials, when installed, becomes real property if it is permanently attached to land, or a fixture if it is permanently attached to a building or real property structure. Since

contractors are liable for RST, they should contact the ministry to find out if the customer qualifies for exemption before tendering the contract on a tax-excluded basis.

## Status Indians, Indian Bands and Band Councils

Non-resident contractors may purchase building materials exempt from Retail Sales Tax (RST) for certain buildings and structures situated on reserves. The cost of such projects must be paid by the band council, and the buildings must provide a community service for the reserve. Contracts for the construction of an exempt community building project should be made on an RST-excluded basis. Non-resident contractors may purchase the materials exempt from RST by providing suppliers with a valid Purchase Exemption Certificate (PEC). As noted previously, only non-resident contractors who have registered with the ministry and posted a guarantee may issue a PEC. (See RST Guide [204 - Purchase Exemption Certificates](#)).

Non-resident contractors must pay RST on items purchased for incorporation into a building or structure built for individual status Indians on a reserve. (See RST [Guide 808 - Status Indians, Indian Bands and Band Councils](#)).

### Completion of Contract

When a contract is completed, non-resident contractors who were required to post a guarantee must complete a [Non-Resident Contractor Retail Sales Tax Return \[PDF - 92 KB\]](#) that is provided by the ministry.

If a contractor's guarantee was given in cash or by certified cheque, the amount of the deposit can be deducted from the RST liability owed by the contractor. If the liability is greater than the deposit, the amount remaining must be paid by the contractor. If the deposit is more than the liability, the contractor will receive a refund.

If a guarantee bond was posted instead of cash, the bond will be discharged once the RST liability is paid in full.

All returns are subject to audit.

### Legislative References

- Retail Sales Tax Act, Subsections 19(2) and 39(3)(4) and (5)
- Regulation 1012 under the Act, Subsections 15.3(1)(2)(5)(6) and (7)
- Regulation 1013 under the Act, Sections 1 and 3

### For More Information

The information contained in this publication is only a guideline. For more information, please contact the Ontario Ministry of Finance at 1 866 ONT-TAXS (1 866 668-8297) or visit our website at [ontario.ca/finance](http://ontario.ca/finance).

## **Acceptable Bonding Companies**

Published September 2010

The following is a list of insurance companies whose bonds may be accepted as security by the government.

### **1. Canadian Companies**

- ACE INA Insurance
- Allstate Insurance Company of Canada
- Ascentus Insurance Ltd. (Surety only)
- Aviva Insurance Company of Canada
- AXA Insurance (Canada)
- AXA Pacific Insurance Company
- Canadian Northern Shield Insurance Company
- Certas Direct Insurance Company (Surety only)
- Chartis Insurance Company of Canada (formerly AIG Commercial Insurance Company of Canada)
- Chubb Insurance Company of Canada
- Commonwealth Insurance Company
- Co-operators General Insurance Company
- CUMIS General Insurance Company
- The Dominion of Canada General Insurance Company
- Echelon General Insurance Company (Surety only)
- Economical Mutual Insurance Company
- Elite Insurance Company
- Everest Insurance Company of Canada
- Federated Insurance Company of Canada
- Federation Insurance Company of Canada
- Gore Mutual Insurance Company
- Grain Insurance and Guarantee Company
- The Guarantee Company of North America
- Industrial Alliance Pacific General Insurance Corporation
- Intact Insurance Company
- Jevco Insurance Company (Surety only)
- Lombard General Insurance Company of Canada
- Lombard Insurance Company
- Markel Insurance Company of Canada
- The Missisquoi Insurance Company
- The Nordic Insurance Company of Canada
- The North Waterloo Farmers Mutual Insurance Company (Fidelity only)
- Novex Insurance Company (Fidelity only)
- The Personal Insurance Company
- Pilot Insurance Company
- Quebec Assurance Company
- Royal & Sun Alliance Insurance Company of Canada
- Saskatchewan Mutual Insurance Company
- Scottish & York Insurance Co. Limited
- The Sovereign General Insurance Company
- TD General Insurance Company
- Temple Insurance Company
- Traders General Insurance Company



- Travelers Guarantee Company of Canada
- Trisura Guarantee Insurance Company
- The Wawanesa Mutual Insurance Company
- Waterloo Insurance Company
- Western Assurance Company
- Western Surety Company

## 2. Provincial Companies

Surety bonds issued by the following companies may be accepted provided that the contract of suretyship was executed in a province in which the company is licensed to do business as indicated in brackets.

- AXA Boreal Insurance Company (P.E.I., N.B., Que., Ont., Man., B.C.)
- AXA Boreal Insurance Company (P.E.I., N.B., Que., Ont., Man., B.C.)
- ALPHA, Compagnie d'Assurances Inc. (Que.)
- Canada West Insurance Company (Ont., Man., Sask, Alta., B.C., N.W.T.) (Surety only)
- The Canadian Union Assurance Company (Que.)
- La Capitale General Insurance Inc. (Nfld. & Lab., N.S., P.E.I., Que.(Surety only), Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- Coachman Insurance Company (Ont.)
- Continental Casualty Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- GCAN Insurance Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- The Insurance Company of Prince Edward Island (N.S., P.E.I., N.B.)
- Kingsway General Insurance Company (N.S., N.B., Que., Ont., Man., Sask., Alta., and B.C.)
- Liberty Mutual Insurance Company (Nfld. & Lab., N.S., P.E.I., N.B., Que., Ont., Man., Sask., Alta., B.C., Nun., N.W.T., Yuk.)
- Manitoba Public Insurance Corporation (Man.)
- Norgroupe Assurance Générales Inc.
- Orleans General Insurance Company (N.B., Que., Ont.)
- Saskatchewan Government Insurance Office (Sask.)
- SGI CANADA Insurance Services Ltd. (Ont., Man., Sask., Alta.)
- L'Unique General Insurance Inc. (Nfld. & Lab., N.S., P.E.I., N.B., Que.(Surety only), Ont.(Surety only), Man., Sask., Alta., B.C.(Surety only), Nun., N.W.T., Yuk.)

## 3. Foreign Companies

- Aspen Insurance UK Limited
- Compagnie Française d'Assurance pour le Commerce Extérieur (Fidelity only)
- Eagle Star Insurance Company Limited
- Ecclesiastical Insurance Office Public Limited Company (Fidelity only)
- Lloyd's Underwriters
- Mitsui Sumitomo Insurance Company, Limited
- NIPPONKOA Insurance Company, Limited
- Sompo Japan Insurance Inc.
- Tokio Marine & Nichido Fire Insurance Co., Ltd.
- XL Insurance Company Limited (Surety only)
- Zurich Insurance Company Ltd

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## Articles of Agreement

Standard Construction Contract – Articles of Agreement  
(23/01/2002)

- A1 Contract Documents
- A2 Date of Completion of Work and Description of Work
- A3 Contract Amount
- A4 Contractor's Address
- A5 Unit Price Table

---

## Articles of Agreement

**These Articles of Agreement** made in duplicate this      day of      .

Between

**His Majesty the King**, in right of Canada (referred to in the contract documents as “His Majesty”) represented by the National Research Council Canada (referred to in the contract documents as the “Council”)

and

(referred to in the contract documents as the “Contractor”)

Witness that in consideration for the mutual promises and obligations contained in the contract, Her Majesty and the Contractor covenant and agree as follows:

A1      Contract Documents

**(23/01/2002)**

- 1.1      Subject to A1.4 and A1.5, the documents forming the contract between His Majesty and the Contractor, referred to herein as the contract documents, are
  - 1.1.1    these Articles of Agreement,
  - 1.1.2    the document attached hereto, marked “A” and entitled “Plans and Specifications”, referred to herein as the Plans and Specifications,
  - 1.1.3    the document attached hereto, marked “B” and entitled “Terms of Payment”, referred to herein as the Terms of Payment,
  - 1.1.4    the document attached hereto, marked “C” and entitled “General Conditions”, referred to herein as the General Conditions,
  - 1.1.5    the document attached hereto, marked “D” and entitled “Labour Conditions”, referred to herein as the Labour Conditions,
  - 1.1.6    the document attached hereto, marked “E” and entitled “Insurance Conditions”, referred to herein as the Insurance Conditions,
  - 1.1.7    the document attached hereto, marked “F” and entitled “Contract Security Conditions”, referred to herein as the Contract Security Conditions, and
  - 1.1.8    any amendment or variation of the contract documents that is made in accordance with the General Conditions.
  - 1.1.9    the document entitled Fair Wage Schedules for Federal Construction Contracts referred to herein as Fair Wage Schedules
  - 1.1.10

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## Articles of Agreement

The Council hereby designates \_\_\_\_\_ of \_\_\_\_\_ of the Government of Canada as the Engineer for the purposes of the contract, and for all purposes of or incidental to the contract, the Engineer's address shall be deemed to be:

### 1.2 In the contract

1.3.1 "Fixed Price Arrangement" means that part of the contract that prescribes a lump sum as payment for performance of the work to which it relates; and

1.3.2 "Unit Price Arrangement" means that part of the contract that prescribes the product of a price multiplied by a number of units of measurement of a class as payment for performance of the work to which it relates.

1.3 Any of the provisions of the contract that are expressly stipulated to be applicable only to a Unit Price Arrangement are not applicable to any part of the work to which a Fixed Price Arrangement is applicable.

1.4 Any of the provisions of the contract that are expressly stipulated to be applicable only to a Fixed Price Arrangement are not applicable to any part of the work to which a Unit Price Arrangement is applicable.

### A2 Date of Completion of Work and Description of Work

**(23/01/2002)**

2.1 The contractor shall, between the date of these Articles of Agreement and the \_\_\_\_\_, \_\_\_\_\_, in the careful and workmanlike manner, diligently perform and complete the following work:

which work is more particularly described in the Plans and Specifications.

---

## Articles of Agreement

### A3 Contract Amount

**(23/01/2002)**

3.1 Subject to any increase, decrease, deduction, reduction or set-off that may be made under the Contract, His Majesty shall pay the Contractor at the times and in the manner that is set out or referred to in the Terms of Payment

3.1.1 the sum of (GST/HST extra), in consideration for the performance of the work or the part thereof that is subject to Fixed Price Arrangement, and

3.1.2 a sum that is equal to the aggregate of the products of the number of units of Measurement of each class of labour, plant and material that is set out in a Final Certificate of Measurement referred to in GC44.8 multiplied in each case by the appropriate unit price that is set out in the Unit Price Table in consideration for the performance of the work or the part thereof that is subject to a Unit Price Arrangement.

3.2 For the information and guidance of the Contractor and the persons administering the contract on behalf of His Majesty, but not so as to constitute a warranty, representation or undertaking of any nature by either party, it is estimated that the total amount payable by His Majesty to the Contractor for the part of the work to which a Unit Price Arrangement is applicable will be approximately \$N/A

3.3 A3.1.1 is applicable only to a Fixed Price Arrangement.

3.4 A3.1.2 and A3.2 applicable only to a Unit Price Arrangement.

### A4 Contractor's Address

**(23/01/2002)**

4.1 For all purposes of or incidental to the contract, the Contractor's address shall be deemed to be:

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## Articles of Agreement

### A5 Unit Price Table

(23/01/2002)

5.1 His Majesty and the Contractor agree that the following table is the Unit Price Table for the purposes of the contract.

<b>Column 1</b> Item	<b>Column 2</b> Class of Labour Plant  Or Material	<b>Column 3</b> Unit of Measurement	<b>Column 4</b> Estimated Total Quantity	<b>Column 5</b> Price per Unit	<b>Column 6</b> Estimated Total Price
		N/A			

5.2 The Unit Price Table that is set out in A5.1 designates the part of the work to which a Unit Price Arrangement is applicable.

5.3 The part of the work that is not designated in the Unit Price Table referred to in A5.2 is the part of the work to which a Fixed Price Arrangement is applicable.

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**Articles of Agreement**

Signed on behalf of His Majesty by

\_\_\_\_\_

as Senior Contracting Officer

and \_\_\_\_\_

as \_\_\_\_\_

of the **National Research Council Canada**

on the \_\_\_\_\_

day of \_\_\_\_\_

Signed, sealed and delivered by

\_\_\_\_\_

as \_\_\_\_\_ and  
Position

by \_\_\_\_\_

as \_\_\_\_\_ and  
Position

of

on the \_\_\_\_\_

day of \_\_\_\_\_

**Seal**

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APPENDIX A: Geotechnical Report, Houle Chevrier Engineering, March 11, 2016

APPENDIX B: Supplemental Geotechnical Report, Houle Chevrier Engineering, December 22, 2016

APPENDIX C: Construction Photographic Documentation Service

APPENDIX D: Existing Septic Tank Information

**END OF SECTION**



## DRAWINGS

The following is a list of drawings which accompany these specifications and which form part of the Contract Documents for the Work:

<u>DRAWING NO.</u>	<u>DRAWING TITLE</u>
5097-C400-1	PHASE 4 – COVERSHEET
5097-C401-1	PHASE 4 – LEGEND
5097-C402-1	PHASE 4 – NOTES
5097-C402-2	PHASE 4 – NOTES
5097-C405-1A	PHASE 4 - TOPOGRAPHICAL SURVEY ALIGNMENT "H" 70+000 TO 70+300
5097-C405-1B	PHASE 4 - TOPOGRAPHICAL SURVEY "MARION STREET"
5097-C405-4	PHASE 4 - TOPOGRAPHICAL SURVEY ALIGNMENT "G" 110+000 TO 110+190
5097-C406-1A	PHASE 4– GEOMETRY, GRADING, AND PAVEMENT MARKINGS ALIGNMENT "H" 70+000 TO 70+300
5097-C406-1B	PHASE 4– GEOMETRY, GRADING, AND PAVEMENT MARKINGS "MARION STREET"
5097-C406-4	PHASE 4– GEOMETRY, GRADING, PAVEMENT MARKINGS ALIGNMENT "G" 110+000 TO 110+190
5097-C407-1	PHASE 4 - PLAN VIEW AND PROFILE ALIGNMENT "H" 70+000 TO 70+150
5097-C407-2	PHASE 4 - PLAN VIEW AND PROFILE ALIGNMENT "H" 70+150 TO 70+300
5097-C407-6	PHASE 4 - PLAN VIEW AND PROFILE ALIGNMENT "G" 110+000 TO 110+090
5097-C407-7	PHASE 4 - PLAN VIEW AND PROFILE ALIGNMENT "G" 110+090 TO 110+190
5097-C408-1	PHASE 4 - DETAILS

**END OF SECTION**

**1. SCOPE OF WORK**

- .1 Work under this contract covers the Sanitary and Storm Sewer Separation – Phase 4 at 1200 Montreal Road, Ottawa, Ontario of the National Research Council.

**2. DRAWINGS**

- .1 Refer to Section 00 01 50 – List of Drawings for the drawings forming part of this contract.

**3. COMPLETION**

- .1 Complete all work by **December 15, 2023.**

**4. GENERAL**

- .1 The word "provide" in this Specification means to supply and install.
- .2 Provide items mentioned in either the drawings or the specification.

**5. SPECIFIED ACCEPTABLE & ALTERNATIVE EQUIPMENT & MATERIALS**

- .1 Materials and equipment scheduled and/or specified on the drawings or in the specifications have been selected to establish a performance and quality standard. In most cases, acceptable manufacturers are stated for any material or equipment specified by manufacturer's name and model number. Contractors may base their tender price on materials and equipment supplied by any of the manufacturers' names as acceptable for the particular material or equipment.
- .2 In addition to the manufacturers specified or named as acceptable, you may propose alternative manufacturers of materials or equipment to the Departmental Representative for acceptance. For a product to be considered as an alternative product substitute, make a written application to the Departmental Representative during the tender period, not later than ten (10) working days before tender closing.
- .3 Certify in writing that the alternative meets all requirements of the specified material or equipment. In addition, it shall be understood that all costs required by or as a result of acceptance or proposed alternatives, will be borne by the Contractor.
- .4 Approval of alternatives will be signified by issue of an Addendum to the Tender Documents.
- .5 Any alternative manufacturers or materials submitted which are incomplete and cannot be evaluated, or are later than ten (10) working days before tender closing date or after the tender period, will not be considered.

**6. MINIMUM STANDARDS**

- .1 Conform to or exceed minimum acceptable standards of the various applicable federal, provincial and municipal codes such as The National Building Code, The National Fire

Code, Canadian Plumbing Code, Canadian Electrical Code, Canadian Code for Construction Safety and the Provincial Construction Safety Act.

- .2 Work to conform to referenced standards and codes as reaffirmed or revised to date of specification.

**7. WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)**

- .1 The General Contractor shall comply with Federal and Provincial legislation regarding the WHMIS. The Contractor's responsibilities include, but are not limited to the following:
  - .1 To ensure that any controlled product brought on site by the Contractor or sub-contractor is labeled;
  - .2 To make available to the workers and the Departmental Representative, Material Safety Data Sheets (MSDS) for these controlled products;
  - .3 To train own workers about WHMIS, and about the controlled products that they use on site;
  - .4 To inform other Contractors, sub-contractors, the Departmental Representative, authorized visitors and outside inspection agency personnel about the presence and use of such products on the site.
  - .5 The site foreman or superintendent must be able to demonstrate, to the satisfaction of the Departmental Representative, that he/she has had WHMIS training and is knowledgeable in its requirements. The Departmental Representative can require replacement of this person if this condition or implementation of WHMIS is not satisfactory

**8. REQUIREMENTS OF BILL 208, SECTION 18(a)**

Under the requirements of Bill 208 of the Ontario Ministry of Labour Occupational Health & Safety Act, the following designated substances may be encountered while performing the work described in these contract documents:

- .1 Acrylonitrile, Isocyanates, Arsenic, Lead, Asbestos, Mercury, Benzene, Silica, Coke Oven Emissions, Vinyl Chloride, and Ethylene Oxide
  - .1 It is the responsibility of the General Contractor to ensure that each prospective sub-contractor for this project has received a copy of the above list.
  - .2 In addition to the above designated substances, the following may also be present: mercury.
  - .3 The general contractor is to take the appropriate precautions when dealing with the above substances.

**9. COST BREAKDOWN**

- .1 Submit, for approval by the Departmental Representative, a cost breakdown of tender 72 hours after the contract is awarded.
- .2 Use the approved cost breakdown as the basis for submitting all claims.

.3 Request Departmental Representative's verbal approval to amount of claim prior to preparing and submitting the claim in its final form.

.4 Contractor costs associated with compliance with occupational health and safety requirements (Canada Labour Code) related to the Coronavirus/COVID-19 pandemic must be included in the initial bid price. These costs may include, but are not limited to, the provision of additional personal protective equipment (PPE) and social distancing requirements as required to complete the project. Contractor must review and incorporate into initial bid pricing compliance with any Coronavirus/COVID-19 related health and safety guidance issued by the local Medical Officer of Health (applicable in the jurisdiction of the project), the Public Health Agency of Canada, Health Canada and/or the provincial Ministry of Health, as applicable.

**10. SUB-TRADES**

.1 Submit no later than 72 hours after tender closing, a complete list of sub trades for the Departmental Representative's review.

**11. PERSONNEL SECURITY AND IDENTIFICATION**

.1 All persons employed by the Contractor, or by any sub-contractor and present on the site must be security cleared in accordance with the requirements of the Section entitled Special Instructions to Tenderers.

.2 All such persons must wear and keep visible identification badges as issued by the Security Office of NRC.

**12. WORKING HOURS AND SECURITY**

.1 Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays.

.2 At all other times, special written passes are required for access to the building site.

.3 Before scheduling any work outside normal working hours, obtain permission from the Departmental Representative to perform the specific tasks.

.4 An escort may be required whenever working outside normal hours. Contractor to bear the associated costs.

**13. SCHEDULE**

.1 The Contractor shall prepare a detailed schedule, fixing the date for commencement and completion of the various parts of the work and update the said schedule. Such schedule shall be made available to the Departmental Representative not later than two weeks after the award of the contract and prior to commencement of any work on site.

.2 Notify Departmental Representative in writing of any changes in the schedule.

- .3 Five (5) days before the scheduled completion date, arrange to do an interim inspection with the Departmental Representative.

**14. PROJECT MEETINGS**

- .1 Hold regular project meetings at times and locations approved by the Departmental Representative.
- .2 Notify all parties concerned of meetings to ensure proper coordination of work.
- .3 Departmental Representative will set times for project meetings and assumes responsibility for recording and distributing minutes.

**15. SHOP DRAWINGS**

- .1 Submit to Departmental Representative for review, shop drawings, product data and samples specified within two (2) weeks after contract award.
- .2 Submit to Departmental Representative for review a complete list of all shop drawings, product data and samples specified and written confirmation of corresponding delivery dates within one (1) week after shop drawings, product data and samples approval date. This list shall be updated on a bi-weekly basis and any changes to the list shall be immediately notified in writing to the Departmental Representative.
- .3 Review shop drawings, data sheets and samples prior to submission.
- .4 Submit one (1) electronic copy of all shop drawings and product data and samples for review, unless otherwise specified.
- .5 Review of shop drawings and product data by the Departmental Representative does not relieve the Contractor of the responsibility for errors and omissions and for the conformity with contract documents.

**16. SAMPLES AND MOCK-UPS**

- .1 Submit samples in sizes and quantities as specified.
- .2 Where colour, pattern or texture is criterion, submit full range of samples.
- .3 Construct field samples and mock-ups at locations acceptable to Departmental Representative.
- .4 Reviewed samples or mock-ups will become standards of workmanship and material against which installed work will be checked on the project.

**17. MATERIALS AND WORKMANSHIP**

- .1 Install only new materials on this project unless specifically noted otherwise.

- .2 Only first class workmanship will be accepted, not only with regard to safety, efficiency, durability, but also with regard to neatness of detail and performance.

**18. WORK & MATERIALS SUPPLIED BY OWNER**

- .1 Work and materials not included in this contract are described on drawings and in this specification.
- .2 Deliver to a storage place, as directed by the Departmental Representative, all materials returned to the Owner.
- .3 Unless otherwise specified, accept owner-supplied materials at their storage location and provide all transportation as required.
- .4 General Contractor's duties:
  - .1 Unload at site.
  - .2 Promptly inspect products and report damaged or defective items.
  - .3 Give written notification to the Departmental Representative for items accepted in good order.
  - .4 Handle at site, including uncrating and storage.
  - .5 Repair or replace items damaged on site.
  - .6 Install, connect finished products as specified.

**19. SITE ACCESS**

- .1 Make prior arrangements with the Departmental Representative before starting work or moving materials and equipment on site.
- .2 Obtain approval of Departmental Representative for regular means of access during the construction period.
- .3 Obtain approval of Departmental Representative before temporarily suspending operations on site; before returning to the site and before leaving the site at the end of the job.
- .4 Provide and maintain access to site.
- .5 Build and maintain temporary roads and provide snow removal during period of work.
- .6 Provide snow clearing and removal as required during the contract period.
- .7 Make good any damage and clean up dirt, debris, etc., resulting from Contractor's use of existing roads.

**20. USE OF SITE**

- .1 Restrict operations on the site to the areas approved by the Departmental Representative
- .2 Locate all temporary structures, equipment, storage, etc., to the designated areas.

- .3 Restrict parking to the designated areas.

**21. ACCEPTANCE OF SITE**

- .1 Inspect the site before commencing work, review any unexpected conditions with the Departmental Representative.
- .2 Commencement of work will imply acceptance of existing conditions.

**22. SITE OFFICE & TELEPHONE**

- .1 Contractor to erect a temporary site office at his own expense.
- .2 Install and maintain a telephone, if necessary.
- .3 Use of NRC phones is not permitted unless in the case of an emergency.

**23. SANITARY FACILITIES**

- .1 Provide sanitary facilities, and bear all associated costs.

**24. TEMPORARY SERVICES**

- .1 A source of temporary power will be made available in the area. Bear all costs to make connections to the power source and perform distribution on site.
- .2 Provide all load centres, breakers, conduit, wiring, disconnects, extension cords, transformers, as required from the source of power.
- .3 Power is to be used only for power tools, lighting, controls, motors, and not for space heating.
- .4 A source of temporary water will be made available if required.
- .5 Bear all costs associated with distributing the water to the required locations.
- .6 Comply with NRC requirements when connecting to existing systems in accordance with the articles entitled "Co-operation" and "Service Interruptions" of this section.

**25. DOCUMENTS REQUIRED AT WORK SITE**

- .1 The Contractor shall keep on the site, one (1) up-to-date copy of all contract documents, including specifications, drawings, addenda, shop drawings, change notices, schedule and any reports or bulletins pertaining to the work, in good order, available to the Departmental Representative and to his / her representatives at all times.
- .2 At least one (1) copy of specifications and drawings shall be marked by the Contractor to show all work "As Built" and shall be provided to the Departmental Representative with the Application for Payment and for the Final Certificate of Completion.

**26. CO-OPERATION**

- .1 Co-operate with NRC staff in order to keep disruption of normal research work to an absolute minimum.
- .2 Work out in advance, a schedule for all work which might disrupt normal work in the building.
- .3 Have schedule approved by the Departmental Representative.
- .4 Notify the Departmental Representative in writing, 72 hours prior to any intended interruption of facilities, areas, corridors, mechanical or electrical services and obtain requisite permission.

**27. PROTECTION AND WARNING NOTICES**

- .1 Provide all materials required to protect existing equipment.
- .2 Erect dust barriers to prevent dust and debris from spreading through the building.
- .3 Place dust protection in the form of cover sheets over equipment and furniture and tape these sheets to floors, to ensure no dust infiltration.
- .4 Repair or replace any and all damage to Owner's property caused during construction, at no cost to the Owner and to the satisfaction of the Departmental Representative.
- .5 Protect the buildings, roads, lawns, services, etc. from damage which might occur as a result of this work.
- .6 Plan and co-ordinate the work to protect the buildings from the leakage of water, dust, etc.
- .7 Ensure that all doors, windows, etc., that could allow transfer of dust, noise, fumes, etc., to other areas of the building are kept closed.
- .8 Be responsible for security of all areas affected by the work under the Contract until acceptance by NRC. Take all necessary precautions to prevent entry to the work area by unauthorized persons and guard against theft, fire and damage by any cause. Secure working area at the end of each day's work and be responsible for same.
- .9 Provide and maintain adequate safety barricades around the work sites to protect NRC personnel and the public from injury during the construction.
- .10 Post warnings, in all instances where possible injury could occur such as Work Overhead, Hard Hat Areas, etc. or as required by the Departmental Representative.
- .11 Provide temporary protective enclosures over building entrances and exits to protect pedestrians. All enclosures to be structurally sound against weather and falling debris.

**28. BILINGUALISM**

- .1 Ensure that all signs, notices, etc. are posted in both official languages.



- .2 Ensure that all identification of services called for by under this contract are bilingual.

**29. LAYOUT OF WORK**

- .1 Location of equipment, fixtures, outlets and openings indicated on drawings or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with the manufacturer's recommendations for safety, access and maintenance.
- .3 Employ competent person to lay out work in accordance with the contract documents.

**30. DISCREPANCIES & INTERFERENCES**

- .1 Prior to the start of the work, examine drawings and specifications. Report at once to the Departmental Representative, any defects, discrepancies, omissions or interferences affecting the work.
- .2 Contractor to immediately inform the Departmental Representative in writing, of any discrepancies between the plans and the physical conditions so the Departmental Representative may promptly verify same.
- .3 Any work done after such a discovery, until authorized, is at the Contractor's risk.
- .4 Where minor interferences as determined by the Departmental Representative are encountered on the job and they have not been pointed out on the original tender or on the plans and specifications, provide offsets, bends or reroute the services to suit job conditions at no extra cost.
- .5 Arrange all work so as not to interfere in any way with other work being carried out.

**31. MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .2 Notify the Departmental Representative in writing of any conflict between these specifications and manufacturer's instruction. Departmental Representative will designate which document is to be followed.

**32. TEMPORARY HEATING AND VENTILATING**

- .1 Bear the costs of temporary heat and ventilation during construction including costs of installation, fuel, operation, maintenance, and removal of equipment.
- .2 Use of direct-fired heaters discharging waste products into the work areas will not be permitted unless prior approval is given by the Departmental Representative.
- .3 Furnish and install temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of work.
  - .2 Protect work and products against dampness and cold.
  - .3 Reduce moisture condensation on surfaces to an acceptable level.
  - .4 Provide ambient temperature and humidity levels for storage, installation and curing of materials.
  - .5 Provide adequate ventilation to meet health regulations for a safe working environment.
- .4 Maintain minimum temperature of 10°C (50°F) or higher where specified as soon as finishing work is commenced and maintain until acceptance by the Departmental Representative.
- .1 Maintain ambient temperature and humidity levels as required for comfort of NRC personnel.
- .5 Prevent hazardous or unhealthy accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction including also, storage areas and sanitary facilities.
- .1 Dispose of exhaust materials in a manner that will not result in a harmful or unhealthy exposure to persons.
- .6 Maintain strict supervision of operation of temporary heating and ventilating equipment.
- .1 Enforce conformance with applicable codes and standards.
  - .2 Comply with instructions of the Departmental Representative including provision of full-time watchman services when directed.
  - .3 Enforce safe practices.
  - .4 Vent direct-fired combustion units to outside.
- .7 Submit tenders assuming existing or new equipment and systems will not be used for temporary heating and ventilating.
- .8 After award of contract, Departmental Representative may permit use of the permanent system providing agreement can be reached on:
- .1 Conditions of use, special equipment, protection, maintenance, and replacement of filters.
  - .2 Methods of ensuring that heating medium will not be wasted and in the case of steam, agreement on what is to be done with the condensate.
  - .3 Saving on contract price.
  - .4 Provisions relating to guarantees on equipment.

### **33. CONNECTIONS TO AND INTERRUPTIONS TO EXISTING SERVICES**

- .1 Where work involves breaking into or connecting to existing services, carry out work at times and in the manner agreed to by the Departmental Representative and by authorities having jurisdiction, with minimum disruption to NRC Personnel and vehicular traffic and minimum service interruption. Do not operate any NRC equipment or plant.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.

- .3 Submit a schedule to and obtain approval from the Departmental Representative for any shut-down or closure of active service or facility; allow minimum 72 hours notice. Adhere to approved schedule and provide notice to the Departmental Representative.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Provide detours, bridges, alternate feeds, etc., as required to minimize disruptions.
- .6 Protect existing services as required and immediately make repairs if damage occurs.
- .7 Remove any abandoned service lines as indicated on the contract documents and as approved by the Departmental Representative; cap or otherwise seal lines at cut-off points. Record and provide a copy to the Departmental Representative of locations of maintained, re-routed and abandoned service lines.

**34. CUTTING AND PATCHING**

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove all items as shown or specified.
- .3 Patch and make good with identical materials, the surfaces that have been disturbed, cut or damaged, to the satisfaction of the Departmental Representative.
- .4 Where new pipes pass through existing construction, core drill an opening. Size openings to leave 12mm (1/2") clearance around the pipes or pipe insulation. Do not drill or cut any surface without the approval of the Departmental Representative.
- .5 Obtain written approval of the Departmental Representative before cutting openings through existing or new structural members.
- .6 Seal all openings where cables, conduits or pipes pass through walls with an acoustic sealant conforming to CAN/CGSB-19.21-M87.
- .7 Where cables, conduits and pipes pass through fire rated walls and floors, pack space between with compressed glass fibres and seal with fire stop caulking in accordance with CAN/CGSB-19.13-M87 AND NBC 3.1.7.

**35. FASTENING DEVICES**

- .1 Do not use explosive actuated tools, without first obtaining permission from the Departmental Representative.
- .2 Comply with the requirements of CSA A-166 (Safety Code for Explosive Actuated Tools).
- .3 Do not use any kind of impact or percussion tool without first obtaining permission from the Departmental Representative.

**36. OVERLOADING**

- .1 Ensure that no part of the building or work is subjected to a load which will endanger safety or cause permanent deformation or structural damage.

**37. DRAINAGE**

- .1 Provide temporary drainage and pumping as required to keep excavations and site free of water.

**38. ENCLOSURE OF STRUCTURES**

- .1 Construct and maintain all temporary enclosures as required to protect foundations, sub-soil, concrete, masonry, etc., from frost penetration or damage.
- .2 Maintain in place until all chances of damage are over and proper curing has taken place.
- .3 Provide temporary weather tight enclosures for exterior openings until permanent sash and glazing and exterior doors are installed.
- .4 Provide lockable enclosures as required to maintain the security of NRC facilities and be responsible for the same.
- .5 Provide keys to NRC security personnel when required.
- .6 Lay out the work carefully and accurately and verify all dimensions and be responsible for them. Locate and preserve general reference points.
- .7 Throughout the course of construction, keep continuously acquainted with field conditions, and the work being developed by all trades involved in the project. Maintain an awareness of responsibility to avoid space conflict with other trades.
- .8 Conceal all services, piping, wiring, ductwork, etc., in floors, walls or ceilings except where indicated otherwise.

**39. STORAGE**

- .1 Provide storage as required to protect all tools, materials, etc., from damage or theft and be responsible for the same.
- .2 Do not store flammable or explosive materials on site without the authorization of the Departmental Representative.

**40. GENERAL REVIEW**

- .1 Periodic review of the Contractor's work by the Departmental Representative does not relieve the Contractor of the responsibility of making the work in accordance with contract documents. Contractor shall carry out his own quality control to ensure that the construction work is in accordance with contract documents.

- .2 Inform the Departmental Representative of any impediments to the installation and obtain his / her approval for actual location.

**41. INSPECTION OF BURIED OR CONCEALED SERVICES**

- .1 Prior to concealing any services that are installed, ensure that all inspection bodies concerned, including NRC, have inspected the work and have witnessed all tests. Failure to do so may result in exposing the services again at the Contractor's expense.

**42. TESTING**

- .1 On completion, or as required by local authority inspectors and/or Departmental Representative during progress of work and before any services are covered up and flushing is complete, test all installations in the presence of the Departmental Representative.
- .2 Obtain and hand to the Departmental Representative all acceptance certificates or test reports from authority having jurisdiction. The project will be considered incomplete without the same.

**43. PARTIAL OCCUPANCY**

- .1 NRC may request partial occupancy of the facility if the contract extends beyond the expected completion date.
- .2 Do not restrict access to the building, routes, and services.
- .3 Do not encumber the site with materials or equipment.

**44. DISPOSAL OF WASTES**

- .1 Dispose of waste materials including volatiles, safely off NRC property. Refer to the section entitled "General and Fire Safety Requirements" included as part of this specification.

**45. CLEAN-UP DURING CONSTRUCTION**

- .1 On a daily basis, maintain project site and adjacent area of campus including roofs, free from debris and waste materials.
- .2 Provide on-site dump containers for collection of waste materials and rubbish.

**46. FINAL CLEAN-UP**

- .1 Upon completion do a final clean-up to the satisfaction of the Departmental Representative.
- .2 Clean all new surfaces, lights, existing surfaces affected by this work, replace filters, etc.
- .3 Clean all resilient flooring and prepare to receive protective finish. Protective finish applied by NRC.

**47. WARRANTY AND RECTIFICATION OF DEFECTS IN WORK**

- .1 Refer to General Conditions "C", section GC32.
- .2 Ensure that all manufacturers' guarantees and warranties are issued in the name of the **General Contractor** and the National Research Council.

**48. MAINTENANCE MANUALS**

- .1 Provide two (2) bilingual copies of maintenance manuals or two (2) English and two (2) French maintenance manuals and one (1) electronic copy of same immediately upon completion of the work and prior to release of holdbacks.
- .2 Manuals to be neatly bound in hard cover loose leaf binders.
- .3 Manuals to include operating and maintenance instructions, all guarantees and warranties, shop drawings, technical data, etc., for the material and apparatus supplied under this contract.

**END OF SECTION**

## 1. GENERAL CONSTRUCTION SAFETY REQUIREMENTS

- .1 The Contractor shall take all necessary steps to protect personnel (workers, visitors, general public, etc.) and property from any harm during the course of the contract.
- .2 The Contractor shall be solely responsible for the construction safety of both its employees and those of its sub-contractors at the work site, and for initiating, maintaining and supervising safety precautions, programs and procedures in connection with the performance of the work.
- .3 The Contractor shall comply with all Federal, Provincial and Municipal safety codes and regulations and the Occupational Health and Safety Act and the Workplace Safety and Insurance Board. In the event of any conflict between any provisions in legislation or codes, the most stringent provisions shall apply.
- .4 Periodic review of the Contractor's work by the Departmental Representative, using the criteria of the contract documents, does not relieve the Contractor of his safety responsibilities in carrying out the work in accordance with the contract documents. The Contractor shall consult with the Departmental Representative to ensure that this responsibility is carried out.
- .5 The Contractor shall ensure that only competent personnel are permitted to work on site. Throughout the term of the contract, any person will be removed from the site who is not observing or complying with the safety requirements.
- .6 All equipment shall be in safe operating condition and appropriate to the task.
- .7 Following a project and site hazard assessment, the Contractor shall develop a Site Specific Safety Plan based on the following minimum requirements. Site Specific Safety Plans must also be robust enough to address any abnormal occurrences, such as, but not limited to: pandemics (COVID-19 or a similar), fire, flooding, inclement weather or other environmental anomalies.
  - .1 Provide a safety board mounted in a visible location on the project site, with the following information included thereon:
    - .1 Notice of Project.
    - .2 Site specific Safety Policy.
    - .3 Copy of Ontario Health and Safety Act.
    - .4 Building Schematic showing emergency exits.
    - .5 Building emergency procedures.
    - .6 Contact list for NRC, Contractor and all involved sub-contractors.
    - .7 Any related MSDS sheets.
    - .8 NRC Emergency phone number.
- .8 The Contractor shall provide competent personnel to implement its safety program and those of any Health and Safety Act legislation applicable at this project location, and to ensure they are being complied with.

- .9 The Contractor shall provide safety orientation to all its employees as well as those of any sub-contractors under its jurisdiction.
- .10 The Departmental Representative will monitor to ensure that safety requirements are met and that safety records are properly kept and maintained. Continued disregard for safety standards can cause the contract to be cancelled and the Contractor or sub-contractors removed from the site.
- .11 The Contractor will report to the Departmental Representative and jurisdictional authorities, any accident or incident involving Contractor or NRC personnel or the public and/or property arising from the Contractor's execution of the work.
- .12 If entry to a laboratory is required as part of the work of the Contractor, a safety orientation shall be provided to all his employees as well as those of any sub-contractors regarding lab safety requirements and procedures, as provided by the Researcher or the Departmental Representative.

## **2. FIRE SAFETY REQUIREMENTS**

### **.1 Authorities**

1. The Fire Commissioner of Canada (FC) is the authority for fire safety at NRC.
2. For the purpose of this document, "Departmental Representative" will be deemed as the NRC person in charge of the project and who will enforce these Fire Safety Requirements.
3. Comply with the following standards as published by the Office of the Fire Commissioner of Canada:
  - a. Standard No. 301 - June 1982 "Standard for Construction Operations";
  - b. Standard No. 302 - June 1982 "Standard for Welding and Cutting".

### **.2 Smoking**

- .1 Smoking is prohibited inside all NRC buildings, as well as roof areas.
- .2 Obey all "NO SMOKING" signs on NRC premises.

### **.3 Hot Work**

- .1 Prior to commencement of any "Hot Work" involving welding, soldering, burning, heating, use of torches or salamanders or any open flame, obtain a Hot Work Permit from the Departmental Representative.
- .2 Prior to commencement of "Hot Work", review the area of hot work with the Departmental Representative to determine the level of fire safety precautions to be taken.

### **.4 Reporting Fires**

- .1 Know the exact location of the nearest Fire Alarm Pull Station and telephone, including the emergency phone number.



- .2 REPORT immediately, all fire incidents as follows:
  1. Activate nearest fire alarm pull station; and
  2. Telephone the following emergency phone number as appropriate:

<b>FROM AN NRC PHONE</b>	<b>333</b>
<b>FROM ANY OTHER PHONE</b>	<b>(613) 993-2411</b>

3. When reporting a fire by phone, give the location of fire, building number and be prepared to verify location.
4. The person activating fire alarm pull station must remain at a safe distance from the scene of the fire but readily available to provide information and direction to the Fire Department personnel.

## **.5 Interior and Exterior Fire protection & Alarm Systems**

- .1 DO NOT OBSTRUCT OR SHUT OFF FIRE PROTECTION EQUIPMENT OR SYSTEMS, INCLUDING BUT NOT LIMITED TO FIRE ALARM SYSTEMS, SMOKE/HEAT DETECTORS, SPRINKLER SYSTEM, PULL STATIONS, EMERGENCY CALL BUTTONS AND PA SYSTEMS, WITHOUT AUTHORIZATION FROM THE DEPARTMENTAL REPRESENTATIVE.
- .2 WHEN ANY FIRE PROTECTION EQUIPMENT IS TEMPORARILY SHUT DOWN, ALTERNATIVE MEASURES AS PRESCRIBED BY THE DEPARTMENTAL REPRESENTATIVE SHALL BE TAKEN TO ENSURE THAT FIRE PROTECTION IS MAINTAINED.
- .3 DO NOT LEAVE FIRE PROTECTION OR ALARM SYSTEMS INACTIVE AT THE END OF A WORKING DAY WITHOUT NOTIFICATION AND AUTHORISATION FROM THE DEPARTMENTAL REPRESENTATIVE. THE DEPARTMENTAL REPRESENTATIVE WILL ADVISE THE (FPO) OF THE DETAILS OF ANY SUCH EVENT.
- .4 DO NOT USE FIRE HYDRANTS, STANDPIPES AND HOSE SYSTEMS FOR OTHER THAN FIRE FIGHTING PURPOSES UNLESS AUTHORISED BY DEPARTMENTAL REPRESENTATIVE.

## **.6 Fire Extinguishers**

- .1 Provide a minimum of 1-20 lb. ABC Dry Chemical Fire Extinguisher at each hot work or open flame location.
- .2 Provide fire extinguishers for hot asphalt and roofing operations as follows:
  1. Kettle area - 1-20 lb. ABC Dry Chemical; and
  2. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.
- .3 Provide fire extinguishers equipped as below:
  1. Pinned and sealed;
  2. With a pressure gauge; and
  3. With an extinguisher tag signed by a fire extinguisher servicing company.

- .4 Carbon Dioxide (CO<sub>2</sub>) extinguishers will not be considered as substitutes for the above.

## **.7 Roofing Operations**

### **.1 Kettles:**

- .1 Arrange for the location of asphalt kettles and material storage with the Departmental Representative before moving on site. Do not locate kettles on any roof or structure and keep them at least 10m (30 feet) away from a building.
- .2 Equip kettles with two (2) thermometers or gauges in good working order; a hand held and a kettle-mounted model.
- .3 Do not operate kettles at temperatures in excess of 232°C (450°F).
- .4 Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire. Provide fire extinguishers as required in article 2.6.
- .5 Demonstrate container capacities to Departmental Representative prior to start of work.
- .6 Store materials a minimum of 6m (20 feet) from the kettle.

### **.2 Mops:**

- .1 Use only glass fibre roofing mops.
- .2 Remove used mops from the roof site at the end of each working day.

### **.3 Torch Applied Systems:**

- .1 DO NOT USE TORCHES NEXT TO WALLS.
- .2 DO NOT TORCH MEMBRANES TO EXPOSED WOOD OR CAVITY.
- .3 Provide a Fire Watch as required by article 2.9 of this section.

### **.4 Fire and Smoke Hazard Management:**

- .1 Contractor shall identify “Designated Roofing Marshall” for duration of construction activities. “Designated Roofing Marshall” shall be responsible for the following:
  - .1 Perform NRC Daily Fire and Smoke Risk Hazard Assessment each day prior to commencement of roofing activities.
  - .2 Provide completed NRC Daily Fire and Smoke Risk Hazard Assessment to Departmental Representative every morning by email prior to commencement of roofing activities.
  - .3 Follow behind any torch activities with a thermal scanner periodically to identify any hot spots and rectify immediately. Interval for periodic thermal scanning to be approved on site with Departmental Representative.
- .2 Any proposed changes to “Designated Roofing Marshall” must be reviewed and approved by Departmental Representative.

- .5 Store all combustible roofing materials at least 3m (10 feet) away from any structure.
- .6 Keep compressed gas cylinders a minimum of 6m (20 feet) away from the kettle, protected from mechanical damage and secured in an upright position.

### **.8 Welding / Grinding Operations**

- .1 Contractor to provide fire blankets, portable fume extraction devices, screens or similar equipment to prevent exposure to welding flash, or sparks from grinding.

### **.9 Fire Watch**

- .1 Provide a fire watch for a minimum of one hour after the termination of any hot work operation.
- .2 For temporary heating, refer to General Instructions Section 00 010 00.
- .3 Equip fire watch personnel with fire extinguishers as required by article 2.6.

### **.10 Obstruction of access/egress routes-roadways, halls, doors, or elevators**

- .1 Advise the Departmental Representative in advance of any work that would impede the response of Fire Department personnel and their apparatus. This includes violation of minimum overhead clearance, erection of barricades and the digging of trenches.
- .2 Building exit routes must not be obstructed in any way without special permission from the Departmental Representative, who will ensure that adequate alternative routes are maintained.
- .3 The Departmental Representative will advise the FPO of any obstruction that may warrant advanced planning and communication to ensure the safety of building occupants and the effectiveness of the Fire Department.

### **.11 Rubbish and Waste Materials**

- .1 Keep rubbish and waste materials to a minimum and a minimum distance of 6m (20 feet) from any kettle or torches.
- .2 Do not burn rubbish on site.
- .3 Rubbish Containers:
  - .1 Consult with the Departmental Representative to determine an acceptable safe location for any containers and the arrangement of chutes etc. prior to bringing the containers on site.
  - .2 Do not overfill the containers and keep area around the perimeter free and clear of any debris.

.4 Storage:

- .1 Exercise extreme care when storing combustible waste materials in work areas. Ensure maximum possible cleanliness, ventilation and that all safety standards are adhered to when storing any combustible materials.
- .2 Deposit greasy or oily rags or materials subject to spontaneous combustion in CSA or ULC approved receptacles and remove at the end of the work day or shift, or as directed.

**.12 Flammable Liquids**

- .1 The handling, storage and use of flammable liquids is governed by the current National Fire Code of Canada.
- .2 Flammable Liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 45 litres (10 imp gal), provided they are stored in approved safety cans bearing the ULC seal of approval and kept away from buildings, stockpiled combustible materials etc. Storage of quantities of flammable liquids exceeding 45 litres (10 imp gal) for work purposes, require the permission of the Departmental Representative.
- .3 Flammable liquids are not to be left on any roof areas after normal working hours.
- .4 Transfer of flammable liquids is prohibited within buildings.
- .5 Do not transfer flammable liquids in the vicinity of open flames or any type of heat producing device.
- .6 Do not use flammable liquids having a flash point below 38°C (100°F) such as naphtha or gasoline as solvents or cleaning agents.
- .7 Store flammable waste liquids for disposal in approved container located in a safe, ventilated area. Waste flammable liquids are to be removed from the site on a regular basis.
- .8 Where flammable liquids, such as lacquers or urethane are used, ensure proper ventilation and eliminate all sources of ignition. Inform the Departmental Representative prior to, and at the cessation of such work.

**3. QUESTIONS OR CLARIFICATIONS**

- .1 Direct any questions or clarification on Fire or General Safety, in addition to the above requirements, to the Departmental Representative.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Ontario Provincial Standard Specifications (OPSS).
- .2        Ontario Provincial Standard Drawings (OPSD).

**1.2                WORK COVERED BY CONTRACT DOCUMENTS**

- .1        Work of this Contract comprises the existing combined sewer to be replaced by a sanitary and storm sewer, located at 1200 Montreal Rd, Ottawa, ON. The site is located West of Blair Road and North of Montreal Road. Work includes the following:
  - .1        Asphalt removal
  - .2        Combine Sewer removal
  - .3        Sanitary and Storm sewer installation
  - .4        Maintenance Holes and Catch Basins
  - .5        Excavation, Grading and Paving
  - .6        Concrete curb and Sidewalks
  - .7        Site lighting
  - .8        Landscaping
  - .9        Construction Photographic Documentation Service
  - .11      Other related Work

**1.3                CONTRACT METHOD**

- .1        Construct Work under lump sum price contract.
- .2        Relations and responsibilities between Contractor and subcontractors assigned by Owner are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
  - 1        Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations thereunder when Contractor is required to furnish such bonds to Departmental Representative.
  - .2        Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Departmental Representative.

**1.4                WORK BY OTHERS**

- .1        Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
  - .2        Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to
-

- .3 Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

## **1.5 WORK SEQUENCE**

- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
  - .1 The Contractor will be required to submit a construction staging plan for approval to the Departmental Representative prior to the commencement of work for approval.
  - .2 Staging plan to accommodate and include the following provisions:
    - .1 Day time access to loading docks must remain active.
    - .2 Maintain Fire route access through site.
    - .3 Maintain a minimum parking spots during all phases of construction during regular business hours.
    - .4 Contractor to provide all necessary signage and barricades to identify closures and detours.
- .3 Coordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .4 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- .5 Task such as milling entire parking lot, grading, installation of underground services may be completed by closing off site after business hours and on weekends with approval of the Departmental Representative.

## **1.6 CONTRACTOR USE OF PREMISES**

- .1 Limit use of premises for access, for Work, for storage, to allow:
    - .1 Owner occupancy.
    - .2 Work by other contractors.
  - .2 Co-ordinate use of premises under direction of Departmental Representative.
  - .3 Contractor and his sub-contractors are limited to a total 6 parking spaces on site for the duration of the construction.
  - .4 Contractor will be responsible for snow removal of the entire construction area for the duration of the construction period.
  - .5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
  - .6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
-

- .7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.
- .8 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

**1.7 OWNER OCCUPANCY**

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

**1.8 EXISTING SERVICES**

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
  - .2 Where Work involves breaking into or connecting to existing services, give 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to tenant operations, pedestrian and vehicular traffic.
  - .3 Provide alternative routes for personnel, pedestrian and vehicular traffic.
  - .4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
  - .5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
  - .6 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.
  - .7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
  - .8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
  - .9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
  - .10 Record locations of maintained, re-routed and abandoned service lines.
-

**1.9 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy of each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Geotechnical Investigation Report, Houle Chevrier Engineering, March 11, 2016 (Ref. 62739.10).
  - .12 Supplemental Geotechnical Investigation, GEMTEC, February 6, 2018 (Ref. 62739.10).
  - .13 Other documents as specified.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

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**Part 1            General**

**1.1                ACCESS AND EGRESS**

- .1     Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.2                USE OF SITE AND FACILITIES**

- .1     Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2     Maintain existing services to building and provide for personnel and vehicle access.
- .3     Where security is reduced by work provide temporary means to maintain security.
- .4     Closures: protect work temporarily until permanent enclosures are completed.

**1.3                ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING**

- .1     Execute work with least possible interference or disturbance to occupants, public building operations and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

**1.4                EXISTING SERVICES**

- .1     Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2     Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3     Provide for personnel pedestrian and vehicular traffic.
- .4     Construct barriers in accordance with Section 01 56 00- Temporary Barriers and Enclosures.

**1.5                SPECIAL REQUIREMENTS**

- .1     Submit schedule in accordance with Section 01 32 16.06- Construction Progress Schedule
  - .2     Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
  - .3     Keep within limits of work and avenues of ingress and egress.
-

- .4 Ingress and egress of Contractor vehicles at site is limited to Blair Road and Montreal road.

**1.6 SECURITY**

- .1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

**1.7 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions. Smoking is not permitted.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            No measurement for payment will be made under this section. Include costs in items where required.

**1.2                APPOINTMENT AND PAYMENT**

- .1            Departmental Representative will appoint and pay for services of testing laboratory except follows:
  - .1            Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
  - .2            Inspection and testing performed exclusively for Contractor's convenience.
  - .3            Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
  - .4            Mill tests and certificates of compliance.
  - .5            Tests specified to be carried out by Contractor under supervision of Departmental Representative.
  - .6            Additional tests specified as follows:
    - .1            Granular Gradation.
    - .2            Granular Compaction – Road Base and Sub-Base.
    - .3            Granular Compaction – Utility Trench.
    - .4            Asphalt Compaction, Voids, Gradation and AC Content.
    - .5            Concrete Strength.
    - .6            Concrete Air and Slump.
    - .7            Topsoil.
- .2            Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

**1.3                CONTRACTOR'S RESPONSIBILITIES**

- .1            Provide labour, equipment and facilities to:
    - .1            Provide access to Work for inspection and testing.
    - .2            Facilitate inspections and tests.
    - .3            Make good Work disturbed by inspection and test.
    - .4            Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
-

- .2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                ADMINISTRATIVE**

- .1     Schedule and administer project meetings throughout the progress of the work at the call of the Departmental Representative.
- .2     Prepare agenda for meetings.
- .3     Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4     Provide physical space and make arrangements for meetings.
- .5     Preside at meetings.
- .6     Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7     Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants affected parties not in attendance and, Departmental Representative.
- .8     Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

**1.2                PRECONSTRUCTION MEETING**

- .1     Within 10 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
  - .2     Departmental Representative, Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
  - .3     Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
  - .4     Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
  - .5     Agenda to include:
    - .1     Appointment of official representative of participants in the Work.
    - .2     Schedule of Work: in accordance with Section 01 32 16.19- Construction Progress Schedule.
    - .3     Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00- Submittal Procedures.
    - .4     Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00- Construction Facilities.
    - .5     Site security in accordance with Section 01 56 00- Temporary Barriers and Enclosures.
    - .6     Health and safety in accordance with section 01 35 29
-

- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .8 Owner provided products.
- .9 Record drawings in accordance with Section 01 33 00- Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00- Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00- Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

**1.3 PROGRESS MEETINGS**

- .1 During course of Work and one (1) week prior to project completion, schedule progress meetings once a week, unless otherwise agreed upon with the Departmental Representative, Owner and Contractor.
- .2 Contractor, major Subcontractors involved in Work Departmental Representative and Owner are to be in attendance.
- .3 Notify parties minimum five (5) days prior to meeting
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.
- .5 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Problems which impede construction schedule.
  - .5 Review of off-site fabrication delivery schedules.
  - .6 Corrective measures and procedures to regain projected schedule.
  - .7 Revision to construction schedule.
  - .8 Progress schedule, during succeeding work period.
  - .9 Review submittal schedules: expedite as required.
  - .10 Maintenance of quality standards.
  - .11 Review proposed changes for affect on construction schedule and on completion date.
  - .12 Other business.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.
-

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

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**Part 1            General****1.1                DEFINITIONS**

- .1      Activity: element of Work performed during course of Project. Activity normally has expected duration and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2      Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, Bar Chart should be derived from commercially available computerized project management system.
- .3      Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4      Construction Work Week: Monday to Friday, inclusive, will provide five-day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5      Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or another project element. Usually expressed as workdays or workweeks.
- .6      Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7      Milestone: significant event in project, usually completion of major deliverable.
- .8      Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9      Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

**1.2                REQUIREMENTS**

- .1      Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
  - .2      Plan to complete Work in accordance with prescribed milestones and time frame.
  - .3      Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
  - .4      Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.
-



**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit to Departmental Representative within 30 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

**1.4 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

**1.5 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
  - .1 Award.
  - .2 Shop Drawings, Samples.
  - .3 Permits.
  - .4 Mobilization.
  - .5 Excavation.
  - .6 Backfill.
  - .7 Piping.
  - .8 Paving.
  - .9 Testing and Commissioning.
  - .10 Supplied equipment long delivery items.

**1.6 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.
  - .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
-

**1.7 PROJECT MEETINGS**

- .1 Discuss Project Schedule at regular site meetings specified in section 01 31 19 -Project meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

**1.1                ADMINISTRATIVE**

- .1        Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2        Do not proceed with Work affected by submittal until review is complete.
- .3        Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4        Where items or information is not produced in SI Metric units converted values are acceptable.
- .5        Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6        Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7        Verify field measurements and affected adjacent Work are co-ordinated.
- .8        Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9        Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10       Keep one reviewed copy of each submission on site.
- .11       Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSedit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with NRC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

**1.2                SHOP DRAWINGS AND PRODUCT DATA**

- .1        The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
  - .2        Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
  - .3        Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent
-

items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow five (5) days for Departmental Representative's review of each submission.
  - .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
  - .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
  - .7 Accompany submissions with transmittal letter, in duplicate, containing:
    - .1 Date.
    - .2 Project title and number.
    - .3 Contractor's name and address.
    - .4 Identification and quantity of each shop drawing, product data and sample.
    - .5 Other pertinent data.
  - .8 Submissions include:
    - .1 Date and revision dates.
    - .2 Project title and number.
    - .3 Name and address of:
      - .1 Subcontractor.
      - .2 Supplier.
      - .3 Manufacturer.
    - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
    - .5 Details of appropriate portions of Work as applicable:
      - .1 Fabrication.
      - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
      - .3 Setting or erection details.
      - .4 Capacities.
      - .5 Performance characteristics.
      - .6 Standards.
      - .7 Operating weight.
      - .8 Wiring diagrams.
      - .9 Single line and schematic diagrams.
      - .10 Relationship to adjacent work.
  - .9 After Departmental Representative's review, distribute copies.
-

- .10 Submit three (3) hard copies and one electronic copy prints of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
  - .11 Submit three (3) hard copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
  - .12 Submit three (3) hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
    - .2 Testing must have been within three (3) years of date of contract award for project.
  - .13 Submit three (3) hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
    - .2 Certificates must be dated after award of project contract complete with project name.
  - .14 Submit three (3) hard copies and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
  - .15 Submit three (3) hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
    - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
  - .16 Submit three (3) hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
  - .17 Delete information not applicable to project.
  - .18 Supplement standard information to provide details applicable to project.
  - .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
-

- .20 The review of shop drawings by NRC is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.
- .21 Notwithstanding the above, digital versions of all required submissions (i.e. .pdf format) shall be acceptable and is the preferred method of submittals for this project. Digital versions shall contain all the same information as the hard copies described above.

### **1.3 SAMPLES**

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

### **1.4 MOCK-UPS**

- .1 Erect mock-ups in accordance with 01 45 00- Quality Control.

### **1.5 PHOTOGRAPHIC DOCUMENTATION**

- .1 The Contractor must carry a photographic documentation service. The service must include a pre-construction site survey of the site as well as a record of construction progression at pre-determined intervals. Refer to specific requirements listed in Appendix C.
-

**1.6 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

**1.7 FEES, PERMITS AND CERTIFICATES**

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 – Submittal Procedures.

**1.2 REFERENCE STANDARDS**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 National Building Code 2010 (NBC):
  - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .4 National Fire Code 2010 (NFC):
  - .1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.
- .5 Province of Ontario
  - .1 Occupational Health and Safety Act, R.S.O. 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
  - .2 O. Reg. 490/09, Designated Substances.
  - .3 Workplace Safety and Insurance Act, 1997.
  - .4 Municipal statutes and authorities.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
  - .3 Measure and controls to be implemented to address identified safety hazards and risks.



- .3 Provide a Fire Safety, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS Safety Data Sheets (SDS) in accordance with Section 01 47 15- Sustainable Requirements: Construction and Section 02 81 01- Hazardous Materials.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five (5) days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response requirements and procedures provided by Departmental Representative.
- .11 Contractor's and Subcontractors' Safety Communication Plan.
- .12 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .13 Submit records of Contractor's health and Safety meetings when requested.
- .14 Submit names of personnel and alternates responsible for site safety and health.
- .15 Submit Workplace Safety and Insurance Board (WSIB) – Experience Rating Report.

#### **1.4 FILING OF NOTICE**

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.
  - .2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award. Contractor to submit written acknowledgement to CSST along with Ouverture de Chantier Notice.
  - .3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.
-

**1.5 WORK PERMIT**

- .1 Obtain work permits related to project prior to commencement of Work.

**1.6 SAFETY ASSESSMENT**

- .1 Perform site specific safety hazard assessment related to project.

**1.7 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

**1.8 REGULATORY REQUIREMENTS**

- .1 Do Work in accordance with Section 01 41 00- Regulatory Requirements.

**1.9 PROJECT/SITE CONDITIONS**

- .1 Confined spaces in maintenance holes.
- .2 Working on live sewers
- .3 Working near live watermain.
- .4 Working near live gas lines.
- .5 Working near live electrical lines (underground and aerial).
- .6 Working in deep trenches.
- .7 Excavation near existing buildings.
- .8 Pedestrian and Vehicular traffic near work area.

**1.10 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
  - .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.
-

- .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site specific health and Safety Plan shall be submitted to Departmental Representative in writing.

#### **1.11 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

#### **1.12 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with R.S.Q., c. S-2.1, an Act respecting Health and Safety, and c. S-2.1, r.4 Safety Code for the Construction Industry.
- .3 Comply with Occupational Health and Safety Regulations, 1996.
- .4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.
- .5 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

#### **1.13 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

#### **1.14 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
    - .1 Have working knowledge of occupational safety and health regulations.
    - .2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
    - .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
-

- .4 Be on site during execution of Work and report directly to and be under direction of site supervisor.

### **1.15 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.
  - .1 Contractor's Safety Policy.
  - .2 Constructor's Name.
  - .3 Notice of Project.
  - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
  - .5 Ministry of Labour Orders and reports.
  - .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
  - .7 Address and phone number of nearest Ministry of Labour office.
  - .8 Material Safety Data Sheets.
  - .9 Written Emergency Response Plan.
  - .10 Site Specific Safety Plan.
  - .11 Valid certificate of first aider on duty.
  - .12 WSIB "In Case of Injury At Work" poster.
  - .13 Location of toilet and cleanup facilities

### **1.16 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

### **1.17 BLASTING**

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative. It is expected that rock excavation will be performed using hoe ramming techniques.
-

**1.18 POWDER ACTUATED DEVICES**

- .1 Use powder actuated devices only after receipt of written permission from Departmental Representative.

**1.19 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1        Canadian Environmental Protection Act (CEPA).
- .2        Provincial Water Quality Objectives (PWQOs).
- .3        Canadian Water Quality Guidelines (CWQGs).
- .4        Ambient Air Quality Criteria (AAQC).
- .5        Canadian Fisheries Act.

**1.2                DEFINITIONS**

- .1        Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2        Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00- Submittal Procedures.
  - .2        Product Data:
    - .1        Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
    - .2        Submit 2 copies of WHMIS Safety Data Sheets (SDS) in accordance with Section 01 35 29.06- Health and Safety Requirements 01 35 43- Environmental Procedures.
  - .3        Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.
  - .4        Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
  - .5        Address topics at level of detail commensurate with environmental issue and required construction tasks.
-

- .6 Include in Environmental Protection Plan:
  - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
  - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
  - .3 Names and qualifications of persons responsible for training site personnel.
  - .4 Descriptions of environmental protection personnel training program.
  - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations and EPA 832/R-92-005, Chapter 3.
  - .6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
  - .7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
    - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
  - .8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
    - .1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.
  - .9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
  - .10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
  - .11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
  - .12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
  - .13 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
  - .14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
  - .15 Pesticide treatment plan to be included and updated, as required.

**1.4 FIRES**

- .1 Fires and burning of rubbish on site is not permitted

**1.5 DRAINAGE**

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

**1.6 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
  - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

**1.7 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
  - .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
  - .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
    - .1 Provide temporary enclosures where indicated directed by Departmental Representative.
  - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads and temporary granular parking lots.
-



## **1.8 REFUELING PROCEDURES / REQUIREMENTS**

- .1 The Contractor must ensure the following mitigation measures are implemented in order to reduce the risk of ground contamination from petroleum products:
  - .1 The list of persons and agencies to contact in the event of an emergency shall be posted in plain sight on the work site for the duration of the construction.
  - .2 Machinery will be clean and kept clean to limit any grease or oil deposits inside the work area.
  - .3 Frequent inspections will be performed to detect any oil, fuel, grease or other leaks. If a leak is detected, the necessary corrective action will be taken immediately.
  - .4 An emergency kit for the recovery of petroleum products will be kept on site at all times. The kit will include at least 30 meters of absorbent booms, a box of absorbent pads and solid absorbent material (powder or granules). The kit will be stored near the location of work and machinery and kept within easy reach at all times to ensure a rapid response.
  - .5 In the event of a spill, the contractor will immediately report to the Spills Action Centre of the Ministry of the Environment Ontario at 1-800-268-6060. Hydrocarbons and contaminated soils will be recovered by a specialized firm at the Contractor's expense.

## **1.9 HISTORICAL/ARCHAEOLOGICAL CONTROL**

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

## **1.10 NOTIFICATION**

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
  - .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
    - .1 Take action only after receipt of written approval by Departmental Representative.
  - .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
  - .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.
-

**Part 2            Products**

**2.1                NOT USED**

- .1            Not Used.

**Part 3            Execution**

**3.1                PREPARATION**

- .1            Temporary Erosion and Sedimentation Control:
  - .1            Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - .2            Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3            Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**3.2                CLEANING**

- .1            Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
  - .1            Leave Work area clean at end of each day.
- .2            Washwater to be tested and treated in accordance with authorities having jurisdiction prior to disposal.
- .3            Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4            Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .5            Waste Management: separate waste materials in accordance with Section 01 74 19- Waste Management and Disposal.
  - .1            Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

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**Part 1 General**

**1.1 SUMMARY**

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

**1.2 REFERENCES TO REGULATORY REQUIREMENTS**

- .1 Perform Work in accordance with the Ontario Provincial Standard Specifications (OPSS) and drawings (OPSD), National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.
- .2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
  - .1 Meet or exceed requirements of:
    - .1 Contract documents.
    - .2 Specified standards, codes and referenced documents.

**1.3 HAZARDOUS MATERIAL DISCOVERY**

- .1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's are discovered in course of work.
- .2 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. **stop work immediately** when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative
- .3 PCB: Polychlorinated Biphenyl: **stop work immediately** when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental Representative.
- .4 Mould: **stop work immediately** when material resembling mould is encountered during demolition work. Notify Departmental Representative.

**1.4 BUILDING SMOKING ENVIRONMENT**

- .1 Comply with smoking restrictions and municipal by-laws.

**1.5 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Except as otherwise specified, Constructor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
    - .1 Regulatory requirements and fees in force on date of Bid submission, and
-

- .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

**1.6 ACCESSIBLE DESIGN**

- .1 Comply with CSA B651-18, Accessible Design for the Built Environment, unless specified otherwise. In any case of conflict or discrepancy between the building codes and CSA B651, the requirements of CSA B651 shall apply.

**1.7 TAXES**

- .1 Pay applicable Federal, Provincial and Municipal taxes.

**1.8 EXAMINATION**

- .1 Examine existing conditions and determine conditions affecting work.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**2.2 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Inspection and testing, administrative and enforcement requirements.
- .2      Tests and mix designs.
- .3      Mock-ups.
- .4      Mill tests

**1.2                INSPECTION**

- .1      Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2      Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3      If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4      Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative will not pay cost of examination and replacement.

**1.3                INDEPENDENT INSPECTION AGENCIES**

- .1      Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Contractor.
  - .2      Provide equipment required for executing inspection and testing by appointed agencies.
  - .3      Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
  - .4      If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.
-

**1.4 ACCESS TO WORK**

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

**1.5 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

**1.6 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

**1.7 REPORTS**

- .1 Submit three (3) copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested.

**1.8 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
  - .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.
-

**1.9            MOCK-UPS**

- .1      Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2      Construct in locations acceptable to Departmental Representative.
- .3      Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4      Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5      If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6      Remove mock-ups at conclusion of work or when acceptable to Departmental Representative.
- .7      Mock-ups may remain as part of Work.

**1.10          MILL TESTS**

- .1      Submit mill test certificates as required of specification Sections.

**1.11          EQUIPMENT AND SYSTEMS**

- .1      Submit adjustment and balancing reports for mechanical, electrical systems.

**Part 2        Products**

**2.1           NOT USED**

- .1      Not Used.

**Part 3        Execution**

**3.1           NOT USED**

- .1      Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 01 52 00 - Construction Facilities
- .2        Section 01 56 00 - Temporary Barriers and Enclosures.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

**1.3                INSTALLATION AND REMOVAL**

- .1        Provide temporary utilities controls in order to execute work expeditiously.
- .2        Remove from site all such work after use.

**1.4                DEWATERING**

- .1        Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

**1.5                WATER SUPPLY**

- .1        Provide continuous supply of potable water for construction use.
- .2        Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3        Pay for utility charges at prevailing rates, based on General Conditions of Contract.

**1.6                TEMPORARY HEATING AND VENTILATION**

- .1        Provide temporary heating required during construction period, including attendance, maintenance and fuel.
  - .2        Construction heaters used inside building must be vented to outside or be flameless (vent free) type. Solid fuel salamanders are not permitted.
  - .3        Provide temporary heat and ventilation in enclosed areas as required to:
    - .1        Facilitate progress of Work.
    - .2        Protect Work and products against dampness and cold.
    - .3        Prevent moisture condensation on surfaces.
    - .4        Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
-



- .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10 degrees Celsius in areas where construction is in progress.
- .5 Ventilating:
  - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
  - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
  - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
  - .4 Ventilate storage spaces containing hazardous or volatile materials.
  - .5 Ventilate temporary sanitary facilities.
  - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
  - .1 Conform with applicable codes and standards.
  - .2 Enforce safe practices.
  - .3 Prevent abuse of services.
  - .4 Prevent damage to finishes.
- .7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

## **1.7 TEMPORARY POWER AND LIGHT**

- .1 The Departmental Representative will provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.
- .4 Provide and maintain temporary lighting throughout project.

## **1.8 TEMPORARY COMMUNICATION FACILITIES**

- .1 Provide and pay for temporary telephone, data, and fax, hook up, including line and equipment necessary for own use and use of Departmental Representative.
-

**1.9 FIRE PROTECTION**

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on Site.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1    Construction aids.
- .2    Office and sheds.
- .3    Parking.
- .4    Project identification.

**1.2                REFERENCE STANDARDS**

- .1    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
  - .2    CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2    CSA Group (CSA)
  - .1    CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2    CSA-0121-M1978(R2003), Douglas Fir Plywood.
  - .3    CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
  - .4    CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00- Submittal Procedures.

**1.4                INSTALLATION AND REMOVAL**

- .1    Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
  - .2    Identify areas which have to be gravelled to prevent tracking of mud.
  - .3    Indicate use of supplemental or other staging area.
  - .4    Provide construction facilities in order to execute work expeditiously.
  - .5    Remove from site all such work after use.
-

**1.5 SITE STORAGE/LOADING**

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

**1.6 CONSTRUCTION PARKING**

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.
- .4 Build and maintain temporary roads where indicated or directed by Departmental Representative and provide snow removal during period of Work.
- .5 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

**1.7 SECURITY**

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

**1.8 OFFICES**

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
- .4 Maintain in clean condition.

**1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

**1.10 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
-

- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

### **1.11 CONSTRUCTION SIGNAGE**

- .1 No other signs or advertisements, other than warning signs, are permitted on site.
- .2 Signs and notices for safety and instruction in both official language's Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

### **1.12 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
  - .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
  - .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
  - .4 Protect travelling public from damage to person and property.
  - .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
  - .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
  - .7 Construct access and haul roads necessary at the approval of the Departmental Representative.
  - .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
  - .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
  - .10 Dust control: adequate to ensure safe operation at all times.
  - .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
  - .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
  - .13 Provide snow removal during period of Work.
  - .14 Remove, upon completion of work, haul roads designated by Departmental Representative.
-

**1.13 CLEAN-UP**

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways on a regular basis as directed by Departmental Representative.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Barriers
- .2        Environmental Controls.
- .3        Traffic Controls.
- .4        Fire Routes.

**1.2                REFERENCE STANDARDS**

- .1        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2        CAN/CGSB 1.189-2000, Exterior Alkyd Primer for Wood.
- .2        CSA Group (CSA)
  - .1        CSA-O121-M1978(R2003) , Douglas Fir Plywood.

**1.3                INSTALLATION AND REMOVAL**

- .1        Provide temporary controls in order to execute Work expeditiously.
- .2        Remove from site all such work after use.

**1.4                HOARDING**

- .1        Erect temporary site enclosure using modular freestanding fencing: galvanized, minimum 1.8 m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys. Maintain fence in good repair.
- .2        Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.5                GUARD RAILS AND BARRICADES**

- .1        Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
  - .2        Provide as required by governing authorities.
-

**1.6 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

**1.7 PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

**1.8 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

**1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

**1.10 PROTECTION OF BUILDING FINISHES**

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1    Product quality, availability, storage, handling, protection, and transportation.
- .2    Manufacturer's instructions.
- .3    Quality of Work, coordination and fastenings.
- .4    Existing facilities.

**1.2                REFERENCE STANDARDS**

- .1    Within text of each specifications section, reference may be made to reference standards.
- .2    Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3    If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4    Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents in event of non-conformance.
- .5    Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.
- .6    OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at <http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>

**1.3                QUALITY**

- .1    Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
  - .2    Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
  - .3    Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
  - .4    Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
-

- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

#### **1.4 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

#### **1.5 METRIC SIZED MATERIALS**

- .1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.
- .2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.
- .3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.
- .4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.
- .5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

#### **1.6 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
  - .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
  - .3 Store products subject to damage from weather in weatherproof enclosures.
  - .4 Store cementitious products clear of earth or concrete floors, and away from walls.
-

- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

## **1.7 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

## **1.8 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

## **1.9 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
  - .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
  - .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.
-

**1.10 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

**1.11 REMEDIAL WORK**

- .1 Refer to Section 01 73 00 – Execution.
- .2 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.12 LOCATION OF FIXTURES**

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

**1.13 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.14 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
  - .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
-

- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

**1.15 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

**1.16 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Field engineering survey services to measure and stake site.
- .2      Survey services to establish and confirm inverts for Work.
- .3      Recording of subsurface conditions found via Daylighting.

**1.2                REFERENCE STANDARDS**

- .1      Owner's identification of existing survey control points and property limits.

**1.3                QUALIFICATIONS OF SURVEYOR**

- .1      Qualified registered land surveyor (or approved equivalent), licensed to practise in Place of Work, acceptable to Departmental Representative.

**1.4                SURVEY REFERENCE POINTS**

- .1      Existing base horizontal and vertical control points are designated on drawings.
- .2      Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3      Make no changes or relocations without prior written notice to Departmental Representative.
- .4      Report to Departmental Representative when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
- .5      Require surveyor to replace control points in accordance with original survey control.

**1.5                SURVEY REQUIREMENTS**

- .1      Establish (two) 2 permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
  - .2      Establish lines and levels, locate and lay out, by instrumentation.
  - .3      Stake for grading, fill and topsoil placement.
  - .4      Stake slopes.
  - .5      Establish pipe invert elevations.
  - .6      Establish lines and levels for mechanical and electrical work.
-

**1.6 EXISTING SERVICES**

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

**1.7 LOCATION OF EQUIPMENT AND FIXTURES**

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

**1.8 RECORDS**

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

**1.9 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying [and noting] those elevations and locations of completed Work that conform and do not conform with Contract Documents.

**1.10 SUBSURFACE CONDITIONS**

- .1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
  - .2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.
-

**Part 2            Products**

**2.1                NOT USED**

.1            Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**



**Part 1            General**

**1.1                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submittals: in accordance with Section 01 33 00- Submittal Procedures.
- .2        Submit written request in advance of cutting or alteration which affects:
  - .1        Structural integrity of elements of project.
  - .2        Integrity of weather-exposed or moisture-resistant elements.
  - .3        Efficiency, maintenance, or safety of operational elements.
  - .4        Visual qualities of sight-exposed elements.
  - .5        Work of Owner or separate contractor.
- .3        Include in request:
  - .1        Identification of project.
  - .2        Location and description of affected Work.
  - .3        Statement on necessity for cutting or alteration.
  - .4        Description of proposed Work, and products to be used.
  - .5        Alternatives to cutting and patching.
  - .6        Effect on Work of Owner or separate contractor.
  - .7        Written permission of affected separate contractor.
  - .8        Date and time work will be executed.

**1.2                MATERIALS**

- .1        Required for original installation.
- .2        Change in Materials: Submit request for substitution in accordance with Section 01 33 00- Submittal Procedures.

**1.3                PREPARATION**

- .1        Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
  - .2        After uncovering, inspect conditions affecting performance of Work.
  - .3        Beginning of cutting or patching means acceptance of existing conditions.
  - .4        Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
  - .5        Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.
-

**1.4 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Remove samples of installed Work for testing.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Submit proposed materials, finishes and installation method for patching to Departmental Representative for approval, prior to patching.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

---

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Progressive cleaning.
- .2      Final cleaning.

**1.2                PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2      Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3      Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5      Provide on-site containers for collection of waste materials and debris.
- .6      Provide and use marked separate bins for recycling. Refer to Section 01 74 19- Waste Management and Disposal.
- .7      Remove waste material and debris from site and deposit in waste container at end of each working day.
- .8      Dispose of waste materials and debris off site.
- .9      Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .10     Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11     Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

**1.3                FINAL CLEANING**

- .1      When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
  - .2      Remove waste products and debris with the exception of these generated by other Contractors and leave the premises clean and ready for occupancy.
  - .3      Prior to final review remove surplus products, tools, construction machinery and equipment.
  - .4      Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
-

- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .8 Remove dirt and other disfiguration from exterior surfaces.
- .9 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .10 Sweep and wash clean paved areas.
- .11 Clean roofs, downspouts, and drainage systems.
- .12 Remove snow and ice from access to building.
- .13 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .14 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .15 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures.
- .16 Clean lighting reflectors, lenses, and other lighting surfaces.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

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**Part 1 General**

**1.1 SUMMARY**

- .1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor 's commitment to reduce and divert waste materials from landfill and includes the following:
  - .1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.
  - .2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.
  - .3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.
  - .4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted, and diversion rates indicated as a percentage of the total waste produced.
- .2 Owner has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

**1.2 DEFINITIONS**

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, re modeling operations repair and demolition.
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .17 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings before starting any Work of the Contract attended by the Owner, Contractor, affected and Departmental Representative to discuss the Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

### **1.4 SUBMITTALS**

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
  - .1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies;

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.
- .2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:
  - .1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
  - .2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- .3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

- .1 Not Used.

**END OF SECTION**

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**Part 1            General**

**1.1                REFERENCE STANDARDS**

- .1 Canadian Environmental Protection Act (CEPA)
  - .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1 Acceptance of Work Procedures:
  - .1 Contractor's Inspection: The Contractor must conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - .2 Request Departmental Representative inspection.
  - .2 Departmental Representative Inspection:
    - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - .2 Contractor to correct Work as directed.
  - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
    - .1 Work: completed and inspected for compliance with Contract Documents.
    - .2 Defects: corrected and deficiencies completed.
    - .3 Equipment and systems: tested, and fully operational.
    - .4 Certificates required by Electrical Safety Authority submitted.
    - .5 Operation of systems: demonstrated to Owner's personnel.
    - .6 Work: complete and ready for final inspection.
  - .4 Final Inspection:
    - .1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
    - .2 When Work considered incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
  - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
  - .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.



- .7 Final Payment:
  - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
- .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

**1.3 FINAL CLEANING**

- .1 Clean in accordance with Section 01 74 11- Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1    As-built, samples, and specifications.
- .2    Product data, materials and finishes, and related information.
- .3    Operation and maintenance data.
- .4    Warranties and bonds.
- .5    Final site survey.

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1    Pre-warranty Meeting:
  - .1    Convene meeting one 1 week prior to contract completion with Contractor's representative and Departmental Representative, in accordance with Section 01 31 19- Project Meetings to:
    - .1    Verify Project requirements.
    - .2    Review warranty requirements and manufacturer's installation instructions.
  - .2    Departmental Representative to establish communication procedures for:
    - .1    Notifying construction warranty defects.
    - .2    Determine priorities for type of defects.
    - .3    Determine reasonable response time.
  - .3    Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
  - .4    Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
  - .2    Two (2) weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four (4) final copies of operating and maintenance manuals in English and French.
  - .3    Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
  - .4    Provide evidence, if requested, for type, source and quality of products supplied.
  - .5    Prepare evidence, if requested, for type, source and quality of products supplied.
  - .6    Pay costs of transportation.
-

#### **1.4           FORMAT**

- .1     Organize data as instructional manual.
- .2     Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3     When multiple binders are used correlate data into related consistent groupings.
  - .1       Identify contents of each binder on spine.
- .4     Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5     Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6     Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7     Text: manufacturer's printed data, or typewritten data.
- .8     Drawings: provide with reinforced punched binder tab.
  - .1       Bind in with text; fold larger drawings to size of text pages.
- .9     Provide 1:1 scaled CAD files in dwg format. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with NRC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

#### **1.5           CONTENTS - PROJECT RECORD DOCUMENTS**

- .1     Table of Contents for Each Volume: provide title of project;
    - .1       Date of submission.
    - .2       Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
    - .3       Schedule of products and systems indexed to content of volume.
  - .2     For each product or system:
    - .1       List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
  - .3     Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
  - .4     Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
  - .5     Typewritten Text: as required to supplement product data.
    - .1       Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00- Quality Control.
-

## **1.6 AS -BUILT DOCUMENTS AND SAMPLES**

- .1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one (1) record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.
- .6 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with NRC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.
- .7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

## **1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of red lined drawings, provided by Departmental Representative.
  - .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
  - .3 Record information concurrently with construction progress.
    - .1 Do not conceal Work until required information is recorded.
  - .4 Contract Drawings and shop drawings: mark each item to record actual construction, including:
-

- .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 Referenced Standards to related shop drawings and modifications.
- .5 Specifications: mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

## **1.8 FINAL SURVEY**

- .1 Submit final site survey certificate in accordance with Section 01 71 00- Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

## **1.9 EQUIPMENT AND SYSTEMS**

- .1 For each item of equipment and each system include description of unit or system, and component parts.
    - .1 Give function, normal operation characteristics and limiting conditions.
    - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
  - .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
  - .3 Include installed colour coded wiring diagrams.
  - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
    - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
    - .2 Include summer, winter, and any special operating instructions.
  - .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
-

- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports.

#### **1.10 MATERIALS AND FINISHES**

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
  - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: as specified in individual specifications sections.

#### **1.11 MAINTENANCE MATERIALS**

- .1 Spare Parts:
    - .1 Provide spare parts, in quantities specified in individual specification sections.
    - .2 Provide items of same manufacture and quality as items in Work.
    - .3 Deliver to location as directed; place and store.
    - .4 Receive and catalogue items.
      - .1 Submit inventory listing to Departmental Representative.
      - .2 Include approved listings in Maintenance Manual.
    - .5 Obtain receipt for delivered products and submit prior to final payment.
  - .2 Extra Stock Materials:
    - .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
    - .2 Provide items of same manufacture and quality as items in Work.
-

- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue items.
  - .1 Submit inventory listing to Departmental Representative.
  - .2 Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.
- .3 Special Tools:
  - .1 Provide special tools, in quantities specified in individual specification section.
  - .2 Provide items with tags identifying their associated function and equipment.
  - .3 Deliver to location as directed; place and store.
  - .4 Receive and catalogue items.
    - .1 Submit inventory listing to Departmental Representative.
    - .2 Include approved listings in Maintenance Manual.

**1.12 DELIVERY, STORAGE AND HANDLING**

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

**1.13 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
  - .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.
  - .3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.
  - .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
  - .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
  - .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
    - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
    - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
-

- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
  - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include transformers and commissioned systems.
  - .3 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
    - .7 Cross-reference to warranty certificates as applicable.
    - .8 Starting point and duration of warranty period.
    - .9 Summary of maintenance procedures required to continue warranty in force.
    - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
    - .11 Organization, names and phone numbers of persons to call for warranty service.
    - .12 Typical response time and repair time expected for various warranted equipment.
  - .4 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.
  - .5 Procedure and status of tagging of equipment covered by extended warranties.
  - .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.



- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

**1.14 WARRANTY TAGS**

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

---

APPENDIX A: Geotechnical Report, Houle Chevrier Engineering, March 11, 2016



**Houle  
Chevrier**  
Engineering

**Geotechnical Investigation  
Proposed Sanitary and Storm Sewer  
National Research Council Canada  
Montreal Road Campus, Ottawa, Ontario**



**Houle  
Chevrier**  
Engineering

Submitted to:

National Research Council Canada  
1200 Montreal Road  
Ottawa, Ontario  
K1A 0R6

**Geotechnical Investigation  
Proposed Sanitary and Storm Sewer  
National Research Council Canada  
Montreal Road Campus, Ottawa, Ontario**

March 11, 2016  
Project: 62739.10

## EXECUTIVE SUMMARY

This report provides the results of a geotechnical and limited environmental investigation associated with the proposed construction of new sanitary and storm sewers along a proposed 3 kilometre alignment within north portion of the Montreal Road Campus of the National Research Council Canada. Stormwater management areas are also being considered as part of the project.

At the time of our report preparation, detailed design information, including the exact service alignments, invert depths of the services and details of the stormwater management area(s) were not available.

In general, the subsurface conditions across the site consist of overburden deposits ranging from about 0.6 to over 5.2 metres thick, underlain by limestone bedrock. The overburden is generally composed of sandy fill material, silty clay, silty sand and glacial till. Where confirmed by coring, the elevation of the bedrock surface ranges from about 90.9 to 102.4 metres, geodetic datum. The groundwater levels measured in the installed piezometers ranged from 0.4 to 4.2 metres below ground surface (elevation 79.2 to 99.2 metres geodetic datum). Possible hydrocarbon contamination was noted in several boreholes. As a result a limited number of environmental boreholes were advanced at selected locations.

Based on the results of our investigation, it is our opinion that the most significant constraints for the proposed infrastructure project will be shallow bedrock, high groundwater levels, boulders within the overburden deposits and potentially petroleum hydrocarbon (PHC) impacted soils. PHC contaminated soil was identified around one (1) borehole location, borehole 16-105E. The contaminated soil can be excavated and remediated (i.e. biopile, land farming, etc.,) at a suitable location of on the property or transported offsite for disposal as waste in accordance with Ontario Regulation 347.

A City of Ottawa Sewer Use permit is required in order to discharge the construction water to the sanitary sewer. Preliminary testing has been performed for benzene, toluene, ethylbenzene, xylenes, and petroleum hydrocarbons. The discharge guidelines were exceeded at one (1) location, borehole 16-105E. Groundwater pumped from the Site during the infrastructure work will need to be evaluated in accordance with City of Ottawa By-Law 2003-514 (Schedule A: Table 1 - Limits for Sanitary and Combined Sewers Discharge; and, Table 2 - Limits for Storm Sewer Discharge).

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## 1.0 INTRODUCTION

This report presents the results of a subsurface investigation carried out at the Montreal Road Campus of the National Research Council Canada (NRC) in Ottawa, Ontario (refer to Key Plan, Figure 1). The purpose of the investigation was to assess the subsurface soil, bedrock and groundwater conditions with a limited borehole investigation and to provide design and construction recommendations for the proposed storm and sewer service alignments, proposed storm water management areas, and roadway structure reconstruction.

The investigation undertaken by Houle Chevrier Engineering Ltd. (HCEL) was carried out in general accordance with our proposal to NRC dated October 5, 2015. Subsequent to the initial scope of work, HCEL advanced additional geotechnical boreholes to delineate the inferred bedrock surface. Also, a limited number of environmental boreholes were advanced in an attempt to delineate suspected hydrocarbon contamination encountered during the initial investigation.

A separate, targeted environmental subsurface investigation was carried out concurrently by HCEL at the request of the NRC due to a fuel oil spill at Building M7. The results of that investigation will be provided in a separate report.

This report presents the findings of our investigation and provides preliminary geotechnical design recommendations.

## 2.0 SITE AND PROJECT DESCRIPTION

### 2.1 Project Description

It is understood that plans are being prepared to construct sanitary and storm sewers throughout the north side of the Montreal Road Campus of the NRC to replace the existing, combined storm and sanitary sewers. The alignment for the proposed services is about 3 kilometers in length. Based on preliminary plans provided to us, we understand that two (2) storm water management areas may be included in the scope of the project.

The existing roadways along the alignment will be either by fully reconstructed or partially reconstructed within the trenches only.

The invert depths for the proposed sanitary and storm sewers were not available during report preparation. Therefore, we have assumed that invert depths will range between about 3 and 4 meters below ground surface.

### 2.2 Review of Geology Maps

Surficial geology maps of the Ottawa area indicate that the site is underlain by shallow bedrock. Drift thickness maps indicate that the thickness of the overburden deposits ranges from about 0 to 1 meters in the vicinity of the site. Bedrock geology maps of the Ottawa area indicate that the

overburden deposits are underlain by limestone and dolostone bedrock of the Gull River formation and shale of the Rockcliffe formation.

### **3.0 SUBSURFACE INVESTIGATION**

#### **3.1 Geotechnical Investigation**

The field investigation for our original scope of work consisted of fifty-one (51) boreholes. This work was undertaken between November 23, 2015 and December 10, 2015. Six (6) additional boreholes were added to delineate the bedrock (boreholes 15-12A, B, and C, 15-16A and B, and 15-20A). These additional boreholes were advanced between January 5 and 8, 2016. Three (3) boreholes from the initial investigation (boreholes 15-02, 15-41 and 15-55) encountered suspected hydrocarbon impacted soils, therefore, eight (8) environmental boreholes were advanced to further delineate potential hydrocarbon contamination (boreholes 16-102E, 16-104E, 15-105E, 16-106E, and 16-108E to 16-111E). The field work for the environmental boreholes was undertaken between December 23, 2015 and January 15, 2016.

In total, sixty-five (65) boreholes were advanced across the site.

The boreholes were advanced using either a CME 55 truck mounted drill rig and a CME 45 track mounted drill rig, supplied and operated by George Downing Estate Drilling Limited of Grenville-sur-la-Rouge, Quebec, and Marathon Drilling of Ottawa, Ontario.

The soil conditions in the boreholes were identified by examining the materials retrieved from the 50 mm diameter drive open sampler at regular depth intervals and manually sampling the upper portion of the holes. In situ shear vane testing was carried out, where possible, within the silty clay deposits to determine the undrained shear strength. Remolded shear vane testing was also carried out to assess the sensitivity of the cohesive soil deposits. The groundwater conditions in the boreholes were observed within the hollow stem augers, and open boreholes where possible. In addition, standpipe piezometers were installed within fifteen (15) of the boreholes from which static groundwater measurements were obtained.

The Record of Borehole sheets are provided in Appendix A. The borehole locations are shown on the attached Borehole Location Plan, Figure 2.

Following the field work, the soil and bedrock samples were returned to our laboratory at 32 Steacie Drive in Ottawa, Ontario for examination by a geotechnical engineer. Selected soil samples were tested for moisture, grain size distribution, and Atterberg limits. Selected bedrock core samples were tested for unconfined compressive strength.

The borehole locations were selected by HCEL and NRC and positioned in the field using our Trimble R10 GPS survey instrument. The elevations in this report and on the Record of Borehole sheets are referenced to geodetic datum.

## 4.0 SUBSURFACE CONDITIONS

### 4.1 General

As previously indicated, the soil and groundwater conditions identified in the boreholes are given on the Record of Borehole sheets (Appendix A). The logs indicate the subsurface conditions at the specific test locations only. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of exploration, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at other than the borehole locations may vary from the conditions encountered in the boreholes. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties.

The groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These conditions may vary seasonally or as a consequence of construction activities in the area.

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and Houle Chevrier Engineering Ltd. does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice.

The following presents an overview of the subsurface conditions encountered in the boreholes advanced as part of this investigation.

### 4.2 Summary of Subsurface Conditions

An overview of the soil, bedrock and groundwater conditions encountered at the borehole locations are summarized in Table 4.1 and described in detail in the following sections. Detailed Record of Borehole sheets are provided in Appendix A.

**Table 4.1: Summary of Overburden, Bedrock and Groundwater Conditions**

BH	Ground Elevation	Fill* Thickness	Clay Depth	Glacial Till Depth	Bedrock Depth	Groundwater Depth
(metres)						
15-01	100.3	1.4	--	--	1.4 C	3.0 P
15-02	98.7	2.0	--	4.6	4.7 AR	2.5 P
15-03	104.2	1.7	--	--	1.7 AR	--
15-04	104.4	2.6	--	--	2.6 AR	--

BH	Ground Elevation	Fill* Thickness	Clay Depth	Glacial Till Depth	Bedrock Depth	Groundwater Depth
(metres)						
15-05	104.1	0.7	--	--	0.7 AR	--
15-06	100.3	1.9	--	1.9	3.0 AR	--
15-07	99.8	NL	NL	NL	4.3 AR	NL
15-08	99.2	1.2	1.2	--	--	--
15-09	98.5	0.8	1.3	3.4	3.8 AR	--
15-10	99.9	1.7	--	1.7	2.9 AR	--
15-11	99.7	1.8	1.8	1.9	3.0 AR	--
15-12	99.8	NL	NL	NL	1.0 AR	NL
15-12A	98.6	1.2	2.3	3.7	--	--
15-12B	98.9	2.3	--	2.3	4.7 AR	--
15-12C	98.8	2.3	--	2.3	--	--
15-13	98.8	1.8	--	2.3	4.2 AR	--
15-14	98.7	0.8	--	0.8	2.2 AR	--
15-15	98.7	0.7	0.9	1.6	--	--
15-16	98.8	0.7	--	--	1.0 AR	--
15-16A	98.8	2.4	--	2.4	--	--
15-16B	98.8	0.5	0.5	1.5	--	3.7
15-17	98.9	0.2	0.2	1.9	4.9 AR	--
15-18	98.8	1.7	1.7	4.6	--	3.2 P
15-19	98.9	1.3	1.3	--	--	--
15-20	99.1	0.3	--	--	0.6 AR	--
15-20A	99.0	0.6	--	--	0.6 C	--
15-21	99.0	1.2	--	1.2	4.4 C	2.1 P

BH	Ground Elevation	Fill* Thickness	Clay Depth	Glacial Till Depth	Bedrock Depth	Groundwater Depth
	(metres)					
15-22	96.9	0.1	0.3	2.1	2.2 AR	--
15-23	98.4	1.7	1.7	2.5	--	--
15-24	96.5	0.9	0.9	4.9	--	--
15-25	96.6	0.5	0.5	--	--	--
15-26	97.1	1.0	1.0	--	--	--
15-27	97.3	0.5	0.5	--	--	--
15-28	94.2	1.3	1.6	--	--	--
15-29	93.7	--	0.6	--	--	0.4 P
15-30	92.8	0.8	0.8	--	--	--
15-31	92.8	1.5	1.5	--	--	--
15-32	92.3	0.9	0.9	--	--	2.6 P
15-33	93.7	NL	NL	NL	--	--
15-34	93.5	1.3	1.3	--	--	--
15-35	93.8	0.6	0.6	1.6	3.9 AR	--
15-36	97.7	2.6	--	2.6	4.8 AR	--
15-37	94.4	0.8	--	--	0.8 AR	--
15-38	96.5	1.5	--	1.5	1.8 AR	--
15-39	95.9	NL	NL	NL	0.8 AR	--
15-40	95.6	0.5	--	--	0.9 AR	--
15-41	93.7	0.9	--	0.9	2.2 AR	--
15-42	84.1	0.7	0.7	4.1	--	--
15-43	84.8	1.8	2.0	4.6	--	--
15-44	85.7	0.6	--	--	1.0 AR	--

BH	Ground Elevation	Fill* Thickness	Clay Depth	Glacial Till Depth	Bedrock Depth	Groundwater Depth
(metres)						
15-45	99.4	NL	NL	NL	2.4 AR	--
15-46	99.3	1.2	--	--	1.2 AR	--
15-47	99.4	1.9	--	--	1.9 C	3.3 P
15-54	78.8	0.3	0.3	3.3	--	--
15-55	78.9	1.2	1.2	3.9	--	--
15-56A	78.8	4.7	--	4.7	--	3.2 P
15-56B	79.9	4.8	--	4.8	--	-
16-102E	103.4	1.4	--	--	--	--
16-104E	103.0	0.7	--	--	0.7 C	3.8 P
15-105E	98.8	2.3	3.6	-	4.9 AR	2.7 P
16-106E	98.0	2.3	--	2.3	2.8 AR	1.9 P
16-108E	93.5	--	--	0.8	2.4 C	2.6 P
16-109E	93.1	1.1	--	--	1.1 C	3.6 P
16-110E	83.4	--	0.1	3.5	4.6 AR	4.2 P
16-111E	83.1	--	0.2	3.3	--	3.3 P

\* = Combined thickness of pavement structure, fill and possible fill soils

AR = Auger refusal, probable bedrock depth but not proven by rock coring

C = Bedrock proven by rock coring

NL = Soil conditions not logged (Auger Probe only)

P = Stabilized groundwater level measured in standpipe piezometer

E = Borehole put down for environmental screening purposes

#### 4.2.1 Pavement Structure

Asphaltic concrete was encountered at all borehole locations with the exception of boreholes 15-22, 15-29, 15-37, 15-39, 16-108E, 16-110E and 16-111E. The thickness of the asphaltic concrete ranges from about 5 to 280 millimeters, averaging 110 millimeters.

It should be noted that a 530 millimeter thick concrete layer was encountered directly below the asphaltic concrete surface at borehole 15-16A.

The asphaltic concrete surface is underlain by a granular base/subbase layer ranging in thickness from about 100 to 1,700 millimeters, averaging 600 millimeters. The granular base/subbase is generally composed of sand and gravel with trace to some silt.

Three (3) grain size distribution tests were undertaken on selected samples of the granular base/subbase. The results are provided on Figure B1 (Appendix B) along with the Ontario Provincial Standard Specification (OPSS) Granular B Type I envelope and summarized in the following table.

**Table 4.2: Summary of Grain Size Distribution Tests (Granular Base/Subbase)**

Location	Sample Number	Sample Depth(metres)	Gravel (%)	Sand (%)	Silt & Clay (%)
BH 15-2	1	0.2 – 0.9	52	32	16
BH 15-8	1	0.1 - 0.2	45	44	11
BH 15-38	1	0.1 – 0.3	33	52	14

The results show that the samples generally meet the grain size distribution requirements for OPSS Granular B Type I, with the exception of the fines content (percent passing the 0.075 millimetre sieve). The fines content measured ranges from 11 to 16 percent compared to the fines limit for OPSS Granular B Type I of 8 percent.

#### 4.2.2 Fill

Fill or possible fill was encountered at most of the borehole locations. The fill is generally composed of sand with varying amounts of silt and gravel. Foreign debris such as steel, ash, wood and insulation was encountered within the fill at a few of the borehole locations. It should be noted that it is difficult to differentiate between native sand and sand fill within the relatively small split spoon sample sizes when no foreign debris is encountered. Therefore, soil identified as fill could potentially be native soil. In our opinion, this should not affect the design considerations for this project.

The thickness of the fill/ possible fill ranges from about 0.1 to 4.8 meters, averaging 1.2 meters.

The standard penetration test (SPT) N values recorded within the fill range from 3 to over 50 blows per 0.3 meters of penetration, which reflects a highly variable very loose to very dense relative density.

#### **4.2.3 Sand**

Native deposits of sand were encountered in six (6) of the sixty-five (65) boreholes (15-02, 15-09, 15-12A, 15-13, 15-22, and 15-105E). The sand can generally be described as brown, fine to coarse grained with trace to some silt. Hydrocarbon odour was noted within the sand layer at borehole 15-02.

The thickness of the sand ranges from about 0.2 to 2.6 meters.

The SPT N values recorded within the native sand range from 4 to 47 blows per 0.3 meters of penetration, which reflects a highly variable very loose to dense relative density.

#### **4.2.4 Topsoil, Former Topsoil**

Topsoil was encountered from ground surface at borehole locations 15-29, 15-37, 16-108E, 16-110E and 16-111E. A layer of probable former topsoil was encountered below the fill material in borehole 15-28. The topsoil is generally composed of a dark brown silty clay or sandy silt with trace organic material. The topsoil/ former topsoil thickness typically ranges from about 130 to 760 millimetres.

#### **4.2.5 Silty Clay**

Native deposits of silty clay were encountered at twenty-eight (28) of the sixty-five (65) boreholes. The thickness of the silty clay typically ranges from about 0.2 to greater than 5.5 metres. It should be noted that boreholes were terminated within the silty clay layer at ten (10) locations (15-19, 15-25 to 32 inclusive, and 15-34).

At the majority of the borehole locations, the upper portion of the silty clay has been desiccated to form a weathered crust. The SPT N values recorded within the weathered crust generally range between 2 and 24 blows per 0.3 metres of penetration. Based on our local experience and our review of the soil samples, N values within the silty clay deposit which are greater than about 2 blows per 0.3 metres would be indicative of a stiff to very stiff consistency.

The silty clay below the weathered crust is grey to grey brown. The undrained shear strength was measured in boreholes 15-26, 15-27, 15-29, 15-31, 15-32, and 15-34. At these borehole locations the undrained shear strength ranges from 42 to 61 kilopascals, which corresponds to a firm to stiff consistency. The corresponding remolded values range from 6 to 13 kilopascals. The ratio of the undrained shear strength to the remolded shear strength indicates that the sensitivity of the grey silty clay deposit is medium to extra-sensitive.

Representative samples of the silty clay were tested for:



- Moisture content;
- Grain size distribution; and,
- Atterberg limits.

Three (3) grain size distribution tests were undertaken on selected samples of silty clay. The results are provided on Figure B3 (Appendix B) and summarized in Table 4.3.

**Table 4.3: Summary of Grain Size Distribution Tests (Silty Clay)**

Location	Sample Number	Sample Depth(metres)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 15-25	3	1.5 – 2.1	0	1	32	67
BH 15-29	4	2.3 – 2.9	0	1	39	61

Four (4) Atterberg limits tests were undertaken on selected samples of the silty clay obtained. The results are provided on Figure B4 (Appendix B) and the Record of Borehole sheets and summarized in Table 4.4.

**Table 4.4: Summary of Atterberg Limits and Moisture Content Tests**

Location	Sample Number	Sample Depth (metres)	Moisture (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index(%)
BH 15-08	4	1.5 - 2.1	34.5	54.5	22.9	31.6
BH 15-15	3	0.8 - 1.4	25.9	50.1	24.3	25.9
BH 15-26	8	3.8 - 4.4	76.2	57.7	24.1	33.6
BH 15-29	6	4.6 – 5.2	76.7	56.2	26.6	29.7

The moisture contents of the silty clay within the weathered crust zone are below the liquid limit value (boreholes 15-08 sample 4 and 15-15 sample 3). In contrast, the moisture of contents of the grey silty clay are above the liquid limit value (borehole 15-26 Sample 8 and borehole 15-29 Sample 6).

The results of the Atterberg limit tests indicate that the cohesive soils at the site have a high plasticity.

#### 4.2.6 Glacial Till

Native deposits glacial till were encountered at thirty-three (33) of the sixty-five (65) borehole locations. The thickness of the glacial till deposits range from about 0.1 to greater than 3.6

meters. The thicknesses of the glacial till deposits were estimated from the auger refusal depths. It should be noted that auger refusal could occur on boulders within the glacial till. Therefore, the thicknesses should be taken as approximate.

Glacial till is a heterogeneous mixture of all grain sizes. For this site, the glacial till composition is generally described as grey to grey brown silty sand with some clay and gravel, and likely containing varying amounts of cobbles and boulders.

The SPT N values recorded within the glacial till generally ranged between 2 and over 50 blows per 0.3 metres, averaging 32 blows. The highly variable test results likely represent the presence of cobbles and boulders within the glacial till.

Rotary diamond drilling was used to core through boulders at three (3) of the borehole locations (BH 15-12C, 15-16B and 15-21).

Four (4) grain size distribution tests were undertaken on samples of the glacial till obtained from boreholes 15-13, 15-16A, 15-54 and 15-105E. The results are provided on Figures B2 and B3 (Appendix B) and summarized in Table 4.5.

**Table 4.5: Summary of Grain Size Distribution and Moisture Content Tests (Glacial Till)**

Location	Sample Number	Sample Depth(metres)	Moisture (%)	Gravel (%)	Sand(%)	Silt & Clay (%)
BH 15-13	5	2.1 – 2.8	14.6	3	53	44*
BH 15-16A	4	2.9 – 3.5	10.7	9	54	37*
BH 15-54	7	4.6 – 5.2	8.2	14	54	31*
BH 15-105E	5	3.8 – 4.4	-	10	52	38

\* Combined percentage of material passing the 0.075 mm sieve (silt and clay).

#### 4.2.7 Soil Chemistry Relating to Corrosion

Soil corrosivity testing (pH, sulfate, resistivity, and conductivity) was completed on three (3) soil samples. The test results are provided in Appendix E and summarized in Table 4.6.

**Table 4.6: Summary of Chemical Test Results**

Location	pH	Sulphate Content (µg/g)	Resistivity (Ohm.m)	Conductivity (µS/cm)
BH 15-08	7.25	160	7.85	1270
BH 15-22	7.27	195	27.1	369
BH 15-35	7.90	19	70.5	142

#### 4.2.8 Bedrock

Bedrock was cored and proven at seven (7) borehole locations across the site using HQ sized diamond coring equipment. The confirmed bedrock depths range from about 0.6 to 4.4 metres below surface grade (elevation 90.9 to 102.4 meters, geodetic datum). Auger refusal was encountered at depths ranging from 0.6 to 4.9 metres (elevation 78.8 to 103.3 meters, geodetic datum). It should be noted that auger refusal can also occur on cobbles and boulders found in glacial till.

The bedrock type encountered is generally grey limestone with shale seams.

The rock quality designation (RQD) ranges from 0 to 100 percent, averaging 57 percent. Therefore, the average bedrock quality may be described as fair.

Unconfined compressive strength tests were carried out on five (5) bedrock core samples. The compressive strength ranges from 39 to 194 MPa; therefore the bedrock strength classification is very strong on average.

The results are provided in Appendix C and summarized in Table 4.7.

**Table 4.7: Summary of Compressive Strength Analysis (Bedrock)**

Location	Sample Depth (metres)	Unconfined Compressive Strength(MPa)
BH 15-01	3.0 – 3.1	193.7
BH 15-20A	0.6 – 0.7	134.3
BH 15-47	3.1 – 3.4	145.4

Location	Sample Depth (metres)	Unconfined Compressive Strength(MPa)
BH 16-104E	1.2 – 1.3	38.7
BH 16-109E	1.5 – 1.7	111.4

Photos of the bedrock cores collected are presented in appended Figures D1 to D7 (Appendix D).

#### 4.2.9 Groundwater Conditions

The groundwater conditions in the open boreholes were observed prior to backfilling. In addition, standpipe piezometers were installed in fifteen (15) of the boreholes from which stabilized groundwater measurements were taken.

A summary of the stabilized groundwater levels measured in the piezometers are presented in Table 4.8. Refer to the Record of Borehole sheets for estimated groundwater levels observed in the open boreholes shortly after drilling.

**Table 4.8: Summary of Groundwater Levels in Piezometers**

Location	Waterlevel Date	Well Screen Formation	Groundwater Depth Below Ground Surface (metres)	Geodetic Elevation (metres)
BH 15-01	Jan. 27, 2016	Bedrock	3.01	97.29
BH 15-02	Jan. 27, 2016	Fill/Sand	2.50	96.16
BH 15-18	Jan. 27, 2016	Silty Clay	3.24	95.56
BH 15-21	Jan. 27, 2016	Bedrock	2.08	96.95
BH 15-29	Jan. 27, 2016	Silty Clay	0.43	93.30
BH 15-32	Feb 05, 2016	Silty Clay	2.56	89.75
BH 15-47	Jan. 27, 2016	Bedrock	3.34	96.08
BH 15-56A	Jan 27, 2016	Fill/Glacial Till	3.21	75.58
BH 16-104E	Jan. 25, 2016	Bedrock	3.82	99.20
BH 15-105E	Jan. 25, 2016	Sand/Silty Clay	2.66	97.16

Location	Waterlevel Date	Well Screen Formation	Groundwater Depth Below Ground Surface (metres)	Geodetic Elevation (metres)
BH 16-106E	Jan. 25, 2016	Fill/Glacial Till	1.86	96.18
BH 16-108E	Jan. 25, 2016	Bedrock	2.63	90.72
BH 16-109E	Jan. 25, 2016	Bedrock	3.58	89.53
BH 16-110E	Jan. 25, 2016	Silty Clay /Glacial Till	4.15	79.20
BH 16-111E	Jan. 25, 2016	Glacial Till	3.33	79.72

It should be noted that the groundwater levels may be higher during wet periods of the year such as the early spring or following periods of precipitation.

## 5.0 ENVIRONMENTAL SCREENING

Seven (7) environmental boreholes / monitoring wells were drilled at three (3) locations where possible petroleum hydrocarbon (PHC) odours were noted during the geotechnical drilling. The three (3) locations are described below and are shown in the attached Figure 3 and 4.

**Table 5.1: Summary of Environmental Borehole Locations**

Location	Area of Potential Environmental Concern (APEC) <sup>1</sup>	Geotechnical Borehole	Environmental Borehole / Monitoring Well
Near intersection of Douglas St. and Kuhring Ave. (Figure 3)	APEC #2	BH15-2	BH16-104(B)E / BH16-105E / BH16-106E
Roadway north of building M-40 (Figure 4)	APEC #1	BH15-55	BH16-110E / BH16-111E
North end of building M-35, near entrance (Figure 4)	APEC #1	BH15-41	BH16-108E / BH16-109E

Notes: APEC as defined in Limited Supplemental Phase II ESA by Stantec, 2012

Originally only five (5) monitoring wells were planned; however, all seven (7) boreholes were equipped with 50 mm diameter PVC wells in order to supplement the lack of soil samples, which was due to thin soil cover at some locations.

## **5.1 Combustible Gas Measurements**

Combustible vapour measurements were undertaken on the all soil samples collected at the seven (7) environmental borehole locations using an RKI Eagle Portable Multi-Gas Detector - Type 101. Generally the headspace vapours measured were less than 15 ppm, with the exception of samples from BH16-105E. The soil gas readings at this location were 90 ppm in sample SA-3B and 70 ppm in sample SA-4. Sample SA-3B was sent to an analytical laboratory for testing, as described below in Section 5.2.

## **5.2 Analytical Testing**

Based on soil gas readings, select soil samples from each borehole were submitted to an analytical laboratory for testing. A groundwater sample was collected from each monitoring well and submitted for testing. The analytical testing results are presented in the following two (2) sections.

### **5.2.1 Soil**

Seven (7) soil samples were sent to Agat Laboratories for analysis of benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbons (F1 to F4 Canada Wide Standards Method). The laboratory Certificate of Analyses are included in Appendix F. Only one (1) of the analyzed parameters was detected at concentrations above the laboratory reporting limits.

The analytical results are presented in appended Table G1 (Appendix G). The PHC F2 fraction in soil sample SA-3B from BH16-105 was 2600 mg/kg, which exceeds the CCME Canada Wide Standard (CWS) of 260 mg/kg - Tier 1 levels (commercial land use, non-potable groundwater, coarse-textured soil).

### **5.2.2 Groundwater**

All monitoring wells were purged a minimum of three (3) times or until the well was dry prior to sampling. The wells were first checked for light non-aqueous phase liquid (LNAPL) using an oil/water interface probe. LNAPL was not detected at any of the well locations although a petroleum sheen was noted in the purge water from monitoring well BH16-105E

Seven (7) groundwater samples and two QA/QC samples (one field blank and one trip blank) were sent to Agat Laboratories for analysis of benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbons (F1 to F4 Canada Wide Standards Method). The laboratory Certificate of Analyses are included in Appendix F. The groundwater PHC analytical results are presented in the appended Table G2 (Appendix G).

Low levels of toluene were detected in two (2) of the groundwater samples collected from BH16-108E and BH16-111E; however, the concentrations did not exceed applicable guidelines. Benzene, toluene, ethylbenzene and xylene were not detected above the laboratory reporting limits in any of the other groundwater samples.

PHCs were detected in the groundwater samples collected from BH16-104E (110 ug/L - F3 fraction) and BH16-105E (9500 ug/L – F2 fraction). Only the sample from BH16-105E exceeded the applicable standard.

The possible extent of the PHC contaminated soil and groundwater in the area around BH16-105E is shown in the attached Figure 3.

## **6.0 RECOMMENDATIONS**

### **6.1 General**

The information in the following sections is provided for the guidance of the design engineers and is intended for the design of this project only. Contractors bidding on or undertaking the works should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of the factual data as it affects their construction techniques, schedule, safety and equipment capabilities.

### **6.2 Background**

Although specific project details were not known to HCEL during report preparation, it is our understanding that the project will consist of the following:

- About three (3) kilometres of new storm and sanitary sewers;
- Full roadway reconstruction in some areas;
- Roadway reinstatement within service trenches only in some areas; and,
- Two (2) stormwater management pond areas.

### **6.3 Excavation**

#### **6.3.1 Overburden Excavation**

Assuming maximum service trench depths of about 3 to 4 metres, the overburden excavations will generally be carried out through the existing pavement structure, fill, native sand, silty clay and glacial till. It should be noted that boulders are to be expected within the glacial till layer.

The sides of the overburden excavations should be sloped in accordance with the requirements in Ontario Regulation 213/91 under the Occupational Health and Safety Act. According to the Act, the fill soils and native overburden soils can be classified as Type 3 soil and, accordingly, allowance should be made excavation slopes of 1 horizontal to 1 vertical extending upwards from the base of the excavation. As an alternative or where space constraints dictate, the

underground service installations could be carried out within a tightly fitting braced steel trench box, which is specifically designed for this purpose.

No unusual constraints are expected in excavating the overburden materials above the groundwater level. In contrast, excavation below the groundwater level could present some constraints, especially in the sandy soil zones (fill and native), which are prone to sloughing/flowing below the groundwater table. Therefore, flatter side slopes of 2 horizontal to 1 vertical or flatter may be required for excavation of the sandy soils below the groundwater table.

### **6.3.2 Bedrock Excavation**

Possible bedrock, determined from auger refusal, was noted at thirty (30) of the sixty five (65) borehole locations. Bedrock was cored and proven at seven (7) of the boreholes locations. Possible bedrock and proven bedrock were observed at depths ranging from 0.6 to 4.9 metres below existing surface grade, averaging 2.5 metres. Therefore, bedrock excavation is anticipated along the proposed service trenches.

Bedrock was not encountered within the borehole depths (upper 5.2 metres) advanced within the proposed stormwater management pond areas at the north and southwest ends of the site (boreholes 15-29, 15-30, 15-31, 15-32, 15-56A and 15-56B). Provided that the base of the ponds do not extend more than 5.2 metres below existing surface grade, bedrock excavation would not be expected.

Localized bedrock removal within the service trenches could be carried out using hoe ramming techniques in conjunction with line drilling on close centres. Provided that good bedrock excavation techniques are used, the bedrock could be excavated using near vertical side walls. Any loose rock should be scaled from the sides of the excavation.

The vibration effects of hoe ramming are usually minor and localized compared with blasting. Monitoring of the hoe ramming could be carried out to measure the vibrations to ensure that they are below acceptable threshold values.

The bedrock could also be removed using blasting techniques. Any blasting should be carried out under the supervision of a blasting specialist engineer. As a guideline for blasting, the suggested peak vibration limits at the nearest structure or service are provided in Table 6.1.



**Table 6.1 – Peak Vibration Limits**

Frequency of Vibration (Hz)	Vibration Limits (millimetres/second)
<10	5
10 to 40	5 to 50 (interpolated)
>40	50

It is pointed out that these criteria, although conservative, were established to prevent damage to existing buildings and services in good condition; more stringent criteria may be required to prevent damage to freshly placed (uncured) concrete or vibration sensitive equipment or utilities. Monitoring of the blasting should be carried out to ensure that the blasting meets the limiting vibration criteria. Pre-construction condition surveys of nearby structures and existing buried services are considered essential. The effects due to vibration from blasting can be controlled by limiting the size and amount of charge, using delayed detonation techniques, and the like. To reduce the effects of vibration on nearby services, we suggest that the separation distance between any blasting and existing underground services be at least 3 metres. Any bedrock removal within these limits could be carried out using hoe ramming techniques in conjunction with line drilling on close centres.

Monitoring of the blasting and hoe ramming should be carried out to measure the vibrations to check that they are below the threshold values outlined in Table 6.1. It is noted that the vibration intensities required to cause damage to structures and services are much greater than the vibration intensities that can be felt by building occupants. Therefore, it is important that preconstruction surveys be carried out on nearby structures as a precautionary measure in the event of possible claims for damages due to the construction. Also, staff should be consulted regarding any vibration sensitive tests or equipment on site to ensure that the threshold values noted in Table 5.1 are appropriate.

#### **6.4 Groundwater Pumping**

Stabilized groundwater levels were measured at the fifteen (15) standpipe piezometer locations installed across the site. The stabilized groundwater levels ranged from 0.4 to 4.2 metres below surface grade (elevation 79.2 to 99.2 metres, geodetic datum).

Stabilized groundwater levels measured at each standpipe piezometer are summarized in Table 4.8.

Assuming that the service trench excavations will extend 3 to 4 metres below grade, some level of dewatering will be required for excavations extending below the groundwater table. The

anticipated rate of groundwater inflow into the excavations is expected to be relatively low within the silty clay and glacial till overburden since these soils have a low hydraulic conductivity. Conversely, the rate of groundwater inflow will be more substantial for excavations extending into the sandy fill, native sand and fractured bedrock below the groundwater table.

It should be noted that heavy localized groundwater seepage could be expected within the existing services trenches. This heavy groundwater flow would be temporary and could be handled by pumping from filtered sumps within the excavation.

A City of Ottawa Sewer Use permit is required in order to discharge the construction water to the sanitary sewer. Preliminary testing has been performed for benzene, toluene, ethylbenzene, xylenes, and petroleum hydrocarbons only. Groundwater pumped from the Site during the infrastructure work will need to be evaluated in accordance with City of Ottawa By-Law 2003-514 (Schedule A: Table 1 - Limits for Sanitary and Combined Sewers Discharge; and, Table 2 - Limits for Storm Sewer Discharge). Although the City of Ottawa does not have a discharge limit for petroleum hydrocarbons, we understand that a combined PHC value (sum of F1 to F4) of 500 ug/L has been used for other infrastructure projects. The applicability of the limit for this project should be confirmed. The PHC concentration at borehole location BH16-105E exceeds the 500 ug/L discharge limit.

Suitable detention and filtration will be required before discharging the water to any sewers. The contractor should be required to prepare and submit an excavation and groundwater management plan for review and approval as part of the contract.

As noted above service excavations are expected to extend into the groundwater table at some locations across the site. Depending on the final excavation depths and the quantity of open excavations expected during construction, the rate of groundwater inflow into the excavations could exceed 50,000 litres per day. Therefore, we suggest that a Permit to Take Water (PTTW) be obtained from the Ministry of the Environment and Climate Change (MOECC) in advance of the construction. Issuance of the permit by the MOECC usually takes 3 to 4 months.

## **6.5 Underground Utilities**

### **6.5.1 Pipe Bedding**

The bedding for the proposed service pipes should be in accordance with OPSD 802.010 and 802.031 for flexible and rigid pipes in Type 3 overburden excavations, respectively. The bedding for the proposed service pipes should be in accordance with OPSD 802.013 and OPSD 802.033 for flexible and rigid pipes in bedrock excavations, respectively. The pipe bedding material should consist of at least 150 millimetres of well graded crushed stone meeting OPSS for Granular A.

In areas where unsuitable material exists below the pipe subgrade level, or where the subgrade becomes disturbed, the unsuitable/disturbed material should be removed and replaced with a

subbedding layer of compacted granular material, such as that meeting OPSS Granular B Type II (50 or 100 millimetre minus crushed stone). To provide adequate support for the pipe in the long term in areas where subexcavation of material is required below design subgrade level, the excavations should be sized to allow a 1 horizontal to 2 vertical spread of granular material down and out from the bottom of the pipe.

Cover material, from pipe spring line to at least 300 millimetres above the top of the pipe, should consist of granular material, such as OPSS Granular A.

The use of clear crushed stone as bedding or subbedding material should not be permitted.

The subbedding, bedding and cover materials should be compacted in maximum 200 millimetre thick lifts to at least 95 percent of the standard Proctor dry density value.

### **6.5.2 Trench Backfill**

To reduce the potential for differential frost heaving between the area over the trench and the adjacent roadway, frost compatible borrow fill (i.e. on site borrow) should be used as backfill between the roadway subgrade level and the depth of seasonal frost penetration (i.e., 1.8 metres below finished grade). The backfill materials within the zone of frost penetration should match the materials exposed on the trench walls. Backfill below the zone of seasonal frost penetration could consist of either acceptable native material, on-site fill or imported granular material conforming to OPSS Granular B Type I.

To minimize future settlement of the backfill and achieve an acceptable subgrade for the roadways, curbs, etc., the trench backfill should be compacted in maximum 300 millimetre thick lifts to at least 95 percent of the standard Proctor dry density value.

The native silty clay, silty sand and glacial till materials are sensitive to changes in moisture content and precipitation. Depending on the weather conditions encountered during the construction, the specified densities may not be possible to achieve, and, as a consequence, some settlement of these backfill materials could occur. Consideration could be given to implementing one or a combination of the following measures to reduce post construction settlement above the trench, depending on the weather conditions encountered during the construction:

- Allow the overburden materials to dry prior to compaction;
- Reuse any wet materials in the lower part of the trench and make provision to defer final paving of surface course (i.e., the Superpave 12.5 asphaltic concrete) for 3 months, or longer, to allow the trench backfill settlement to occur and thereby improve the final roadway appearance.

- Avoid reusing any wet materials within the trench. If additional material is required for trench backfill, consideration could be given to using relatively dry on-site material or imported fill, such as OPSS Select Subgrade Material or Granular B Type I, below the zone of frost penetration.

### **6.5.3 Seepage Barriers**

The granular bedding in the service trench could act as a “French Drain”, which could promote groundwater lowering. As such, we suggest that seepage barriers be installed along the service trenches at strategic locations at a horizontal spacing of about 100 metres. The seepage barriers should begin at subgrade level and extend vertically through the granular pipe bedding and granular surround to within the native backfill materials, and horizontally across the full width of the service trench excavation. The seepage barriers could consist of 1.5 metre wide dykes of compacted weathered silty clay. The weathered silty clay should be compacted in maximum 300 millimetre thick lifts to at least 95 percent of the standard Proctor dry density value. The locations of the seepage barriers could be provided as the design progresses.

## **6.6 Stormwater Management Ponds**

### **6.6.1 Excavation**

The two (2) proposed stormwater management pond locations have been identified as the area to the north of the campus (boreholes 15-56A and 15-56B) and the area to the southwest of the campus (boreholes 15-29, 15-30 15-31 and 15-32). At the time of report preparation, the exact locations, sizes and elevations of the proposed stormwater management ponds had not been finalized.

The general overburden excavation recommendations outlined in Section 5.3.1 would be applicable for the stormwater management pond excavations. The main constraint for the excavation of the stormwater ponds (southwest) will be equipment mobility on the native silty clay deposits. These soils are susceptible to softening in the presence of heavy construction traffic. As such, excavation and removal of soil, including trimming to final grade, should be carried out from existing ground surface, if possible. It is suggested that temporary haul roadways constructed at or above the existing ground surface consist of a relatively thick layer of granular material (say 600 millimetres, or more) of Granular B Type II or well shattered and graded blast rock. A woven geotextile separator meeting OPSS 1860 Class II requirement is suggested.

Provided that excavation depths do not extend more than 5.2 metres below existing surface grade, bedrock excavation is not expected.

### **6.6.2 Long Term Side Slopes**

We recommend that the stormwater management ponds be designed using permanent side slopes not steeper than 3 horizontal to 1 vertical. Although steeper side slopes could be used, it

has been our experience that 3 horizontal to 1 vertical slopes minimize the risks of localized sloughing due freeze thaw action and groundwater seepage. If steeper side slopes are required, we recommend that they be no steeper than 2 horizontal to 1 vertical and blanketed with a 300 millimetre thick layer (minimum) of rip-rap or Granular B Type II fill.

In our opinion, long term global slope instability for the proposed stormwater management ponds should not be an issue. Once the location, size and depth of the ponds are finalized, HCEL should verify the long term stability.

All exposed slopes should be protected from erosion using either a vegetated cover or a 300 millimetre thick granular blanket.

### **6.6.3 Berm Construction**

Earth berms may be required around the perimeter of the proposed ponds. Permanent berm construction may be carried out on or in the vicinity of the crest of the slopes. Berms may be constructed using on-site borrow fill such as the native silty clay and glacial till overburden. The material shall be placed within 2 percent of its optimum moisture content and compacted to at least 95 percent of the maximum standard Proctor dry density.

Permanent berms should have final slopes of not steeper than 2 horizontal to 1 vertical. The slopes should be protected from erosion using a vegetated cover or a 300 millimetre thick granular blanket.

### **6.6.4 Short and Long Term Groundwater Inflow to the Proposed Pond**

Excavation for the proposed stormwater management pond(s) will be carried out through deposits of silty clay, fill and glacial till. If the excavations extend below the groundwater table, groundwater flow should be expected into the ponds, both under short and long term conditions. It is our opinion that both short and long term groundwater inflow into the pond(s) will be relatively small due to the relatively low hydraulic conductivity of the native overburden soils (i.e. likely in the order of  $1 \times 10^{-6}$  to  $1 \times 10^{-8}$  cm/sec).

### **6.6.5 Permeability and Percolation Rate of Overburden Soils**

For preliminary design purposes, the permeability and percolation time (T-Time) estimates outlined in Table 6.2 may be used for the stormwater management pond design. These values are estimates only based on our local experience and the results of the grain size distribution tests.

**Table 6.2: Estimate of Permeability and Percolation Time**

Soil Type	Coefficient of Permeability (cm/sec)	Percolation Time (min/cm)
Sandy Fill	$10^{-3}$ - $10^{-5}$	8 - 20
Silty Clay	$10^{-8}$ and less	Greater than 50
Glacial Till	$10^{-6}$ and less	Greater than 50

#### 6.6.6 Buoyant Uplift of the Structures

To reduce the potential for surface and groundwater inflow into the related structures (i.e. manholes, inlet and outlet control structures, etc), the walls and bottom of the structures should be made water tight and buoyant uplift of the structures should be checked.

To account for possible stormwater runoff into the backfill material around the excavation, it is suggested that the maximum water level be used to assess uplift. Additional resistance to buoyant uplift could be achieved by extending the footings beyond the concrete structure and filling the void above the footing extension with compacted granular material. Assuming that OPSS Granular B Type II is used as backfill and that the backfill is compacted to at least 95 percent of the standard Proctor dry density value, the buoyant unit weight of the backfill could be taken as 11.5 kilonewtons per cubic metre. Additional details on buoyant uplift resistance could be provided if necessary.

#### 6.7 Corrosion of Buried Concrete and Steel

The measured sulphate concentration in three (3) soil samples collected range from 19 to 195 micrograms per gram. According to Canadian Standards Association (CSA) "Concrete Materials and Methods of Concrete Construction", the concentration of sulphate in the soil can be classified as low. For low exposure conditions, any concrete that will be in contact with the native soil or groundwater could be batched with General Use (GU) type cement.

The soil samples collected have resistivity values ranging from 785 to 7050 Ohm-centimetres and pH ranging from 7.3 to 7.9. Therefore, the soil can generally be classified as slightly aggressive to non-aggressive towards unprotected steel.

#### 6.8 Roadways

It is understood that full width roadway reconstruction will be undertaken across much of the site following the installation of the storm and sanitary sewer services. In some areas, the pavement

structure will only be reinstated within the trench. We provide the following recommendations for full roadway reconstruction and trench reinstatement.

### **6.8.1 Subgrade Preparation**

In preparation for the construction of the roadways, any loose/soft, wet, organic or deleterious materials should be removed from the proposed subgrade surface. Prior to placing granular fill the exposed subgrade should be proof rolled with a large (minimum 10 tonne) vibratory steel drum roller under dry conditions and inspected and approved by geotechnical personnel. Any soft areas that are evident from the proof rolling should be sub-excavated and replaced with suitable earth borrow.

In areas where abrupt changes in the frost susceptibility of the subgrade materials are encountered, frost tapers and/or some subexcavation of materials may be required to prevent future localized differential frost heaving of the pavement structure. The frost taper and subexcavation requirements should be assessed at the time of construction by geotechnical personnel.

The roadway subgrade surfaces should be made smooth and crowned or sloped prior to placing the granular materials to promote drainage of the roadway base and subbase materials.

### **6.8.2 Pavement Structure**

The pavement structure was designed using the Ontario Ministry of Transportation (MTO) Pavement Design and Rehabilitation Manual (SDO-90-01). In the absence of traffic data, we provide the following preliminary pavement structure design section for an AADT of 1000 to 2000 with 10 percent trucks:

- 40 millimetre of Superpave 12.5
- 60 millimetres of Superpave 19.0
- 150 millimetre of OPSS Granular A
- 450 millimetres of OPSS Granular B Type II

The above pavement design conservatively assumes that the subgrade soils are silty clay containing more than 55 percent fines (i.e. percent passing the 0.075 millimetre sieve). If traffic data is available the above pavement structure design can be reviewed and adjusted accordingly.

The above pavement structure can be used for areas where full roadway reconstruction will be undertaken as well as the trench reinstatement areas.

### **6.8.3 Asphaltic Concrete**

The asphaltic concrete should consist of a 40 millimetre surface layer of Superpave 12.5 (Traffic Level B) over one (1) 60 millimetre thick layer of Superpave 19.0 (Traffic Level B).



Performance grade PG 58-34 asphaltic concrete should be specified unless slow moving heavy traffic is anticipated.

#### **6.8.4 Compaction Requirements**

All imported granular materials should be placed in maximum 200 millimetre thick lifts and should be compacted to at least 98 percent of the standard Proctor dry density value using suitable vibratory compaction equipment.

#### **6.8.5 Pavement Drainage**

If possible, it is suggested that filter wrapped, perforated subdrains be installed at the catch basins in the roadways. The catch basins should be provided with 3 metre (minimum) long perforated stub drains which extend in at least two (2) directions from the catch basin at the pavement subgrade level.

#### **6.8.6 Pavement Transitions**

New pavements will abut the existing pavements along the service trench reinstatement areas and in areas where the full roadway reconstruction will terminate at an existing roadway. The following is suggested to improve the performance of the joint between the new and the existing pavements:

- Neatly saw cut the existing asphaltic concrete;
- Remove the asphaltic concrete and slope the bottom of the excavation within the existing granular base and subbase at 1 horizontal to 1 vertical, or flatter, to avoid undermining the existing asphaltic concrete.
- To avoid cracking of the asphaltic concrete due to an abrupt change in the thickness of the roadway granular materials where new pavement areas join with the existing pavements, the granular depths should taper up or down at 5 horizontal to 1 vertical, or flatter, to match the existing pavement structure.
- Remove (mill off) 50 millimetres of the existing asphaltic concrete to a distance of at least 300 millimetres at the joint and tack coat the asphaltic concrete at the joint in accordance with the requirements in OPSS 310.

#### **6.8.7 Pavement Resurfacing**

In the event that a new layer of asphaltic concrete is placed across the entire roadway width for the trench reinstatement areas we provide the following recommendations:

- The overlay should consist of at least 40 millimetres of Superpave 12.5 (Traffic Level B) asphaltic concrete; and



- Milling should be carried out, where required, and a tack coat should be applied before placing the overlay.

The design life of the overlay alternative is expected to be 5 to 10 years. Reflective cracking of the asphaltic concrete should be expected within 1 to 2 years after construction. Crack sealing will be required periodically following resurfacing to reduce deterioration of the pavement due to the ingress of water.

#### **6.8.8 Reuse of Existing Granular Material**

Consideration could be given to stockpiling the existing granular base/subbase material for possible re-use following the sewer construction. The material should be stockpiled and assessed by geotechnical personnel to determine a suitable use (e.g. trench backfill, earth borrow, or possibly base/subbase material as part of the new pavement structure).

#### **6.8.9 Effects of Existing Service Trenches**

Differential frost heaving could occur in areas where abrupt changes in the frost susceptibility of the subgrade materials exist. The locations of any service trenches that cause differential frost heaving issues during the winter period should be identified at the design stage. To mitigate future differential frost heaving at these locations, granular frost tapers (sloped at 5 horizontal to 1 vertical, or flatter) and/or some subexcavation of materials could be carried out as part of the rehabilitation. The frost heave treatment could be assessed at the time of the construction by geotechnical personnel.

#### **6.8.10 Effects of Soil Disturbance and Construction Traffic**

The pavement structure guidelines above assume that the trench backfill is adequately compacted, and prepared as described in this report. If the subgrade surface becomes disturbed or wetted due to construction operations or precipitation, the Granular B Type II thickness given above may not be adequate and it may be necessary to increase the thickness of the Granular B Type II subbase. The adequacy of the design pavement thickness should be assessed by geotechnical personnel at the time of construction.

If the granular pavement materials above the trenches are to be used by construction traffic, it may be necessary to increase the thickness of the Granular B Type II, install a woven geotextile separator between the subgrade surface and the granular material, or a combination, to prevent pumping and disturbance to the subbase material. The contractor should be made responsible for their construction access.

## **7.0 ADDITIONAL DESIGN CONSIDERATIONS**

### **7.1 Excess Soil Management Plan**

The petroleum hydrocarbon contaminated soil around borehole BH16-105E can be excavated and remediated (biopile, land farming, etc.) at a suitable location of on the property or transported offsite for disposal as waste in accordance with Ontario Regulation 347.

This report does not constitute an excess soil management plan. The disposal requirements for excess soil from the site have not been assessed.

### **7.2 Monitoring Well Abandonment**

All fifteen (15) monitoring wells (standpipe piezometers) installed as part of this investigation should be decommissioned by a licensed well technician. The well abandonment could be carried out in advance of, or during the construction.

### **7.3 Winter Construction**

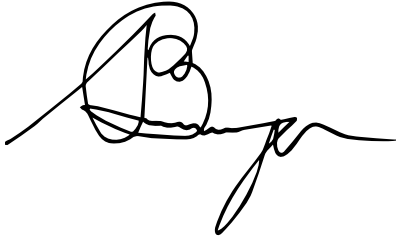
In order to carry out the work during freezing temperatures and maintain adequate performance of the trench backfill as a roadway subgrade, the service trenches should be opened for as short a time as practicable and the excavations should be carried out only in lengths which allow all of the construction operations, including backfilling, to be fully completed in one working day. The materials on the sides of the trenches should not be allowed to freeze. In addition, the backfill should be excavated, stored and replaced without being disturbed by frost or contaminated by snow or ice.

### **7.4 Design Review and Construction Observations**

The details for the proposed service upgrades and stormwater management ponds were not available to us at the time of report preparation. It is recommended that the design drawings be reviewed by the geotechnical engineer as the design progresses to ensure that the guidelines provided in this report have been interpreted as intended.

The subgrade surfaces for the proposed services and roadways should be inspected by experienced geotechnical personnel to ensure that suitable materials have been reached and properly prepared. The placing and compaction of earth fill and imported granular materials should be inspected to ensure that the materials used conform to the grading and compaction specifications.

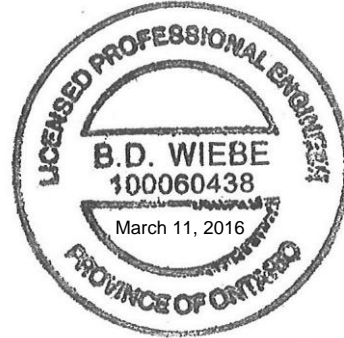
We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, contact the undersigned.

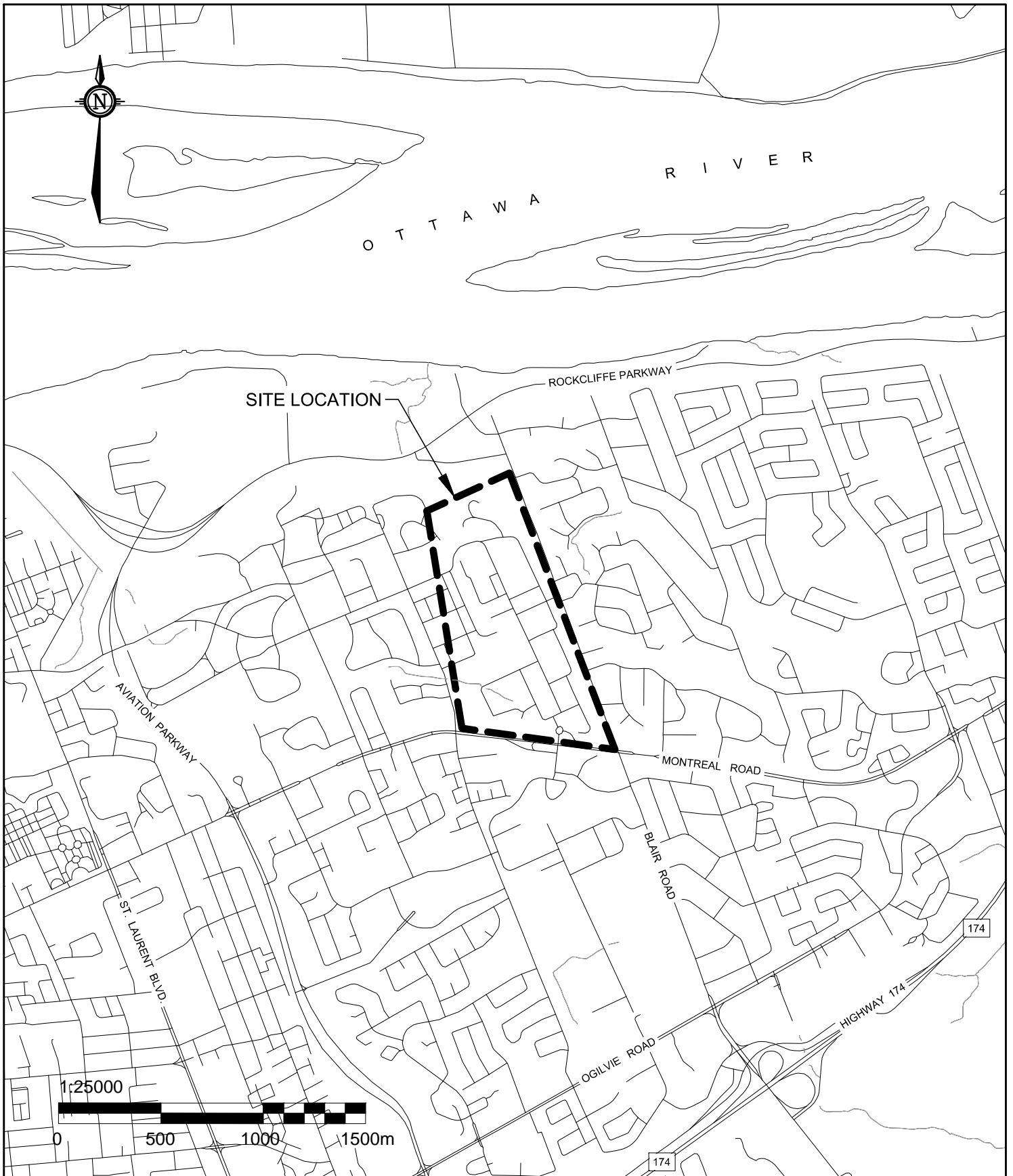



Serge Bourque, M.Eng., P.Eng.,  
Principal, Operations Manager



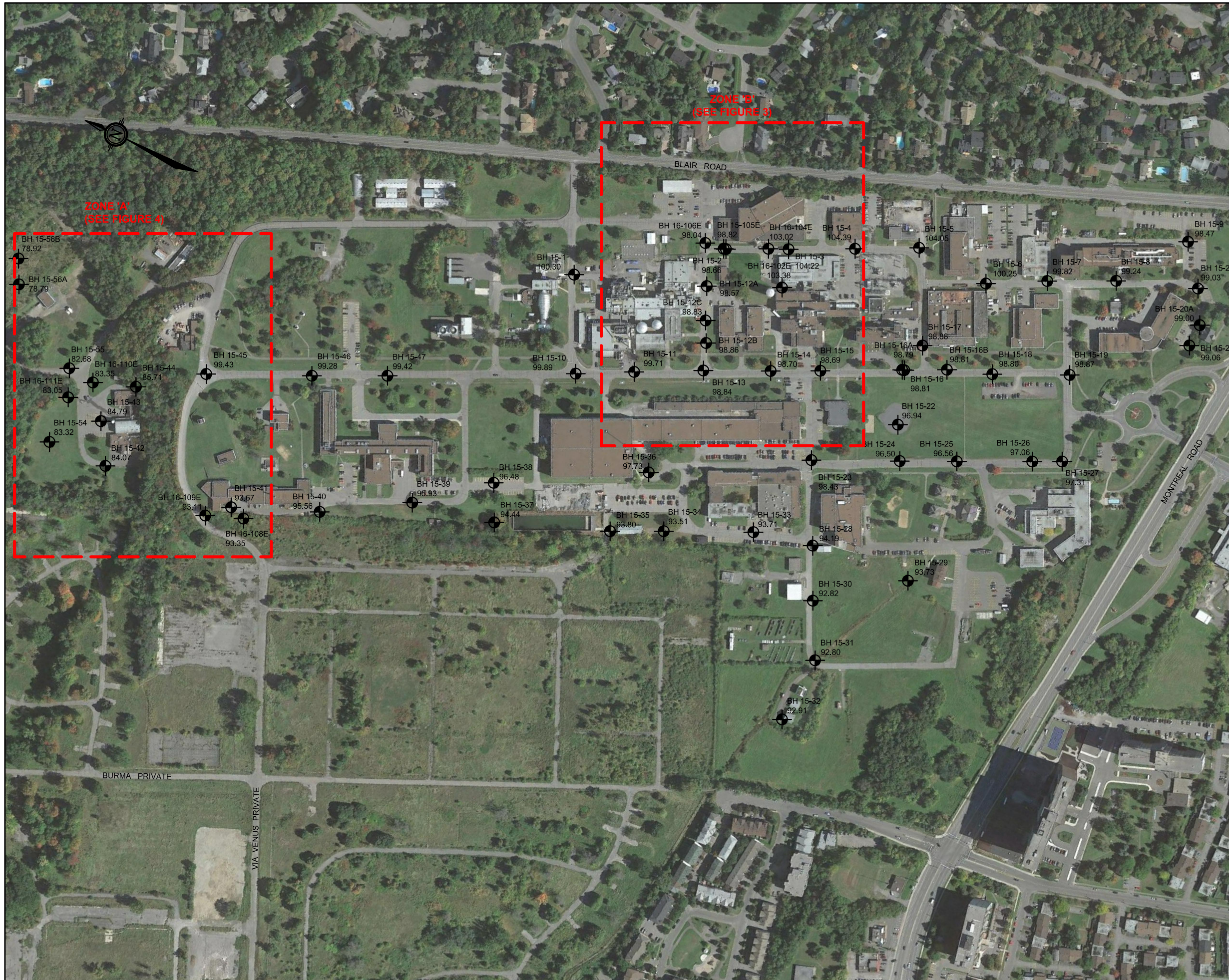
Brent Wiebe, P.Eng.,  
Senior Geotechnical Engineer





 <p>32 Steacie Drive, Ottawa, ON T: (613) 836-1422   www.hceng.ca   ottawa@hceng.ca</p>	Project <b>GEOTECHNICAL INVESTIGATION          PROPOSED SANITARY &amp; STORM SEWER          MONTREAL ROAD CAMPUS          OTTAWA, ONTARIO</b>			Drawing  <b>KEY PLAN</b>		
	Drwn By <b>P.C.</b>	Chkd By <b>S.B.</b>	Date <b>MARCH 2016</b>	Project No. <b>62739.10</b>	Revision No. <b>0</b>	<b>FIGURE 1</b>



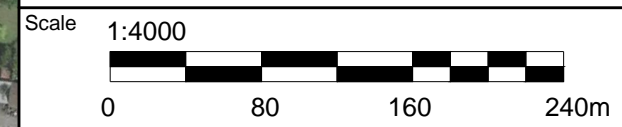


**LEGEND**

BH 15-1  
99.99

BOREHOLE LOCATION IN PLAN  
(current investigation by Houle Chevrier Engineering Ltd.)

GROUND SURFACE ELEVATION IN METRES  
GEODETIC DATUM



Houle Chevrier Engineering Ltd.  
32 Steacie Drive  
Ottawa, ON  
Tel: (613) 836-1422  
www.hceng.ca  
ottawa@hceng.ca

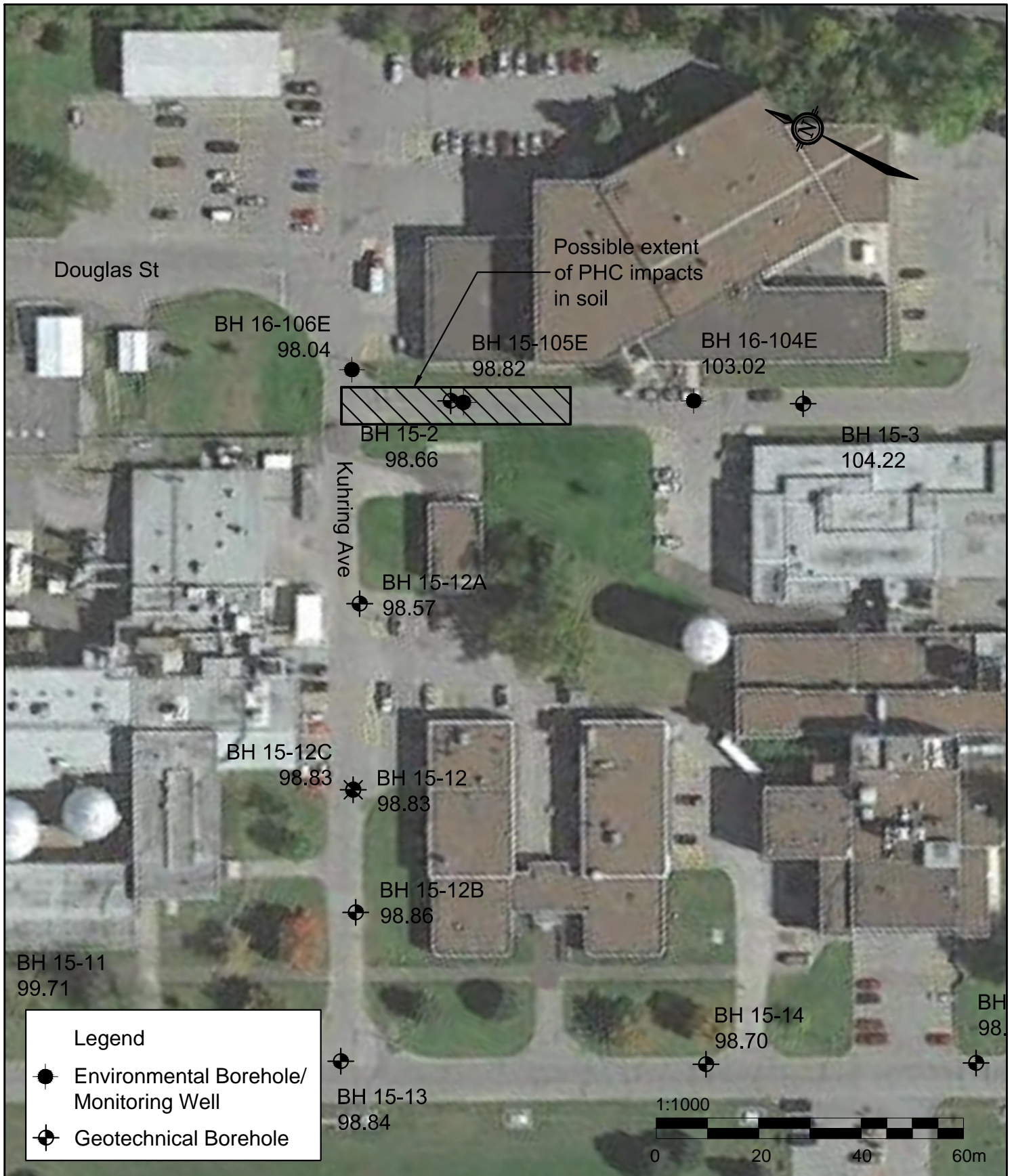
Client	NATIONAL RESEARCH COUNCIL CANADA	Project	62739.10
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Location MONTREAL ROAD CAMPUS OTTAWA, ON

Drwn by	Chkd by	BOREHOLE LOCATION PLAN
P.C.	S.B.	

Date	MARCH 2016	Rev.	0	<b>FIGURE 2</b>
------	------------	------	---	-----------------





 <p>32 Steacie Drive, Ottawa, ON T: (613) 836-1422   www.hceng.ca   ottawa@hceng.ca</p>	Project <b>GEOTECHNICAL INVESTIGATION          MONTREAL ROAD CAMPUS          OTTAWA, ONTARIO</b>		Drawing <b>DETAILED SITE PLAN          ZONE 'B'</b>		
	Drwn By <b>P.C.</b>	Chkd By <b>S.B.</b>	Date <b>MARCH 2016</b>	Project No. <b>62739.10</b>	Revision No. <b>0</b>





**Legend**

- Environmental Borehole/  
Monitoring Well
- Geotechnical Borehole

<p>32 Steacie Drive, Ottawa, ON T: (613) 836-1422   www.hceng.ca   ottawa@hceng.ca</p>	Project <b>GEOTECHNICAL INVESTIGATION          MONTREAL ROAD CAMPUS          OTTAWA, ONTARIO</b>			Drawing <b>DETAILED SITE PLAN          ZONE 'A'</b>		
	Drwn By <b>P.C.</b>	Chkd By <b>S.B.</b>	Date <b>MARCH 2016</b>	Project No. <b>62739.10</b>	Revision No. <b>0</b>	<b>FIGURE 4</b>



## **APPENDIX A**

### Record of Borehole Sheets



## LIST OF ABBREVIATIONS AND TERMINOLOGY

### SAMPLE TYPES

AS	auger sample
CS	chunk sample
DO	drive open
MS	manual sample
RC	rock core
ST	slotted tube
TO	thin-walled open Shelby tube
TP	thin-walled piston Shelby tube
WS	wash sample

### PENETRATION RESISTANCE

#### Standard Penetration Resistance, N

The number of blows by a 63.5 kg hammer dropped 760 millimetres required to drive a 50 mm drive open sampler for a distance of 300 mm. For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

#### Dynamic Penetration Resistance

The number of blows by a 63.5 kg hammer dropped 760 mm to drive a 50 mm diameter, 60° cone attached to 'A' size drill rods for a distance of 300 mm.

#### WH

Sampler advanced by static weight of hammer and drill rods.

#### WR

Sampler advanced by static weight of drill rods.

#### PH

Sampler advanced by hydraulic pressure from drill rig.

#### PM

Sampler advanced by manual pressure.

### SOIL TESTS

C	consolidation test
H	hydrometer analysis
M	sieve analysis
MH	sieve and hydrometer analysis
U	unconfined compression test
Q	undrained triaxial test
V	field vane, undisturbed and remoulded shear strength

### SOIL DESCRIPTIONS

<u>Relative Density</u>	<u>'N' Value</u>
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

<u>Consistency</u>	<u>Undrained Shear Strength (kPa)</u>
--------------------	---------------------------------------

Very soft	0 to 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	over 100

### LIST OF COMMON SYMBOLS

$c_u$	undrained shear strength
$e$	void ratio
$C_c$	compression index
$c_v$	coefficient of consolidation
$k$	coefficient of permeability
$I_p$	plasticity index
$n$	porosity
$u$	pore pressure
$w$	moisture content
$w_L$	liquid limit
$w_P$	plastic limit
$\phi^1$	effective angle of friction
$\gamma$	unit weight of soil
$\gamma^1$	unit weight of submerged soil
$\sigma$	normal stress

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-01

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

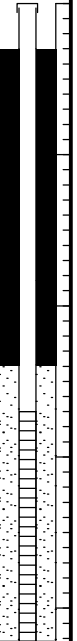
BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		100.30												
		Asphaltic Concrete		100.13												
		Brown sand and grave,l trace silt (BASE/SUBBASE)		0.17 0.28	1	C.S.										
1	Power Auger 200mm Diameter Hollow Stem	Loose, brown fine to medium sand, trace to some gravel, trace silt (Possible FILL)			2	C.S.										
					3	50 D.O.	8									
		Possible WEATHERED BEDROCK		98.93 1.37												
2	HQ Rotary Drilling			98.17 2.13												
		Grey LIMESTONE BEDROCK with shale seams			4	R.C. TCR = 99% SCR = 34% RQD = 0%										
					5	R.C. TCR = 100% SCR = 81% RQD = 71%										
4	HQ Rotary Drilling			96.08 4.22												
		End of borehole														
5																
6																
7																
8																
9																
10																

U.C.S. 193.7 MPa

51 mm Diameter, 1.52 metres long well screen.



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	3.01	97.29

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT - 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-02

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

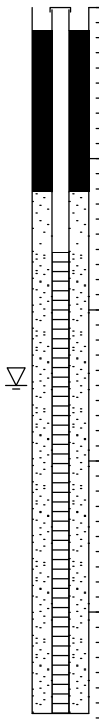
DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.66								
		Asphaltic Concrete		98.46								
		Grey brown crushed sandy gravel, trace silt (BASE/SUBBASE)		0.20	1	C.S.						
1		Compact, brown fine to medium sand, trace silt, steel pieces (FILL)		97.75	2	50 D.O.	23					
				0.91								
2		Loose, brown fine to medium SAND, trace silt		96.70	3	50 D.O.	15					
				1.96								
3	Dense, grey fine to medium SAND, trace silt, strong hydrocarbon odour noted		95.94	4	50 D.O.	4						
			2.72									
4	Loose, grey fine to coarse SAND, some gravel		94.85	5	50 D.O.	47						
			3.81									
5	Grey silty clay trace sand, some gravel (GLACIAL TILL) Auger refusal, end of borehole		94.09	6	50 D.O.	5						
			4.57									
			4.67	7	50 D.O.	50 for 75mm						

51 mm Diameter, 3.05 metres long well screen.



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	2.50	96.16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

## RECORD OF BOREHOLE 15-03

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

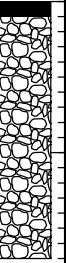
BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa		nat. V - + rem. V - ⊕ Q - ● U - ○		Wp		W			WI
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		104.22													
		Asphaltic Concrete		104.09													
		Crushed sand and gravel (BASE/SUBBASE)	[Pattern]	103.84	1	C.S.											
		Compact, brown fine to medium sand, trace to some gravel, trace silt (Possible FILL)		103.38	2	C.S.											
1						3	50 D.O.	19									
				102.52	4	50 D.O.	50 for 75mm										
2		Auger refusal, end of borehole		1.70													
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Cold Patch

Backfilled with soil cuttings



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-04

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		nat. V - + Q - ● rem. V - ⊕ U - ○		WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		104.39													
		Asphaltic concrete		104.25													Cold Patch  Backfilled with soil cuttings
		Crushed sand and gravel (BASE/SUBBASE)		103.98	1	C.S.											
				103.98	2	C.S.											
1			Dense, dark brown sand and gravel (FILL)														
				3	50 D.O.	33											
2				4	50 D.O.	45											
				5	50 D.O.	50 for 75mm											
3		Auger refusal, end of borehole		101.75													
				2.64													
4																	
5																	
6																	
7																	
8																	
9																	
10																	

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT - 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-05




SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

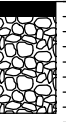
DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT						
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		104.05														
		Asphaltic concrete		103.92														
		Black, crushed sand and gravel (BASE/SUBBASE)		103.69	1	C.S.												
		Dark brown silty clay, some gravel and cobbles (FILL)		103.31	2	C.S.												
		Auger refusal, end of borehole		0.74														
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Cold patch



Backfilled with soil cuttings

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-06

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		100.25													
		Asphaltic concrete		0.08	1	C.S.											Cold patch
		Crushed sand and gravel (BASE/SUBBASE)		0.76	2	C.S.											
1		Compact, grey sand and gravel (FILL)		0.76	3	50 D.O.	10										
				1.88	4	50 D.O.	34										
2		Very dense, grey brown silty sand, some gravel, possible cobbles (GLACIAL TILL)		1.88	5	50 D.O.	60										Backfilled with soil cuttings
3		Auger refusal, end of borehole		3.00													
4																	
5																	
6																	
7																	
8																	
9																	
10																	

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-07

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

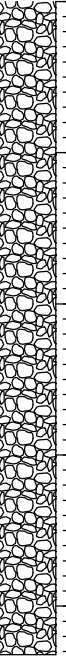
DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80	10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>	WATER CONTENT, PERCENT					
							SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○				Wp   W   Wl			
							20 40 60 80					20 40 60 80			
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.82											
		Overburden conditions not logged													
1															
2															
3															
4															
4.32			Auger refusal, end of probehole		95.50 4.32										
5															
6															
7															
8															
9															
10															

Backfilled with soil cuttings



BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-08

SHEET 1 OF 1

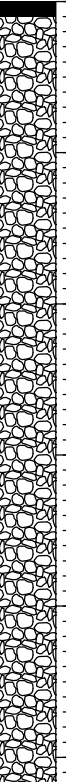
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa 20   40   60   80 nat. V - + Q ● rem. V - ⊕ U - ○				WATER CONTENT, PERCENT 10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup> Wp  ——  W  ——  WI 20   40   60   80							
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface	99.24															
		Asphaltic concrete	0.08	1	C.S.						○					Cold patch		
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)	0.28	2	C.S.													
		Former asphaltic concrete	0.79															
		Grey crushed sand and gravel (FORMER BASE/SUBBASE)	98.45															
1		Compact, brown, fine to medium sand, some silt, trace gravel (FILL)	0.79	3	50 D.O.	11										Backfilled with soil cuttings		
		Very stiff, grey brown SILTY CLAY (Weathered Crust)	98.07															
			1.17	4	50 D.O.	24					○							
2					5	50 D.O.	13					○						
					6	50 D.O.	10											
3					7	50 D.O.	4											
4	Stiff, grey SILTY CLAY with silty sand seams, trace gravel	95.13																
	Grey SILTY CLAY, trace gravel	4.11	8	50 D.O.	3													
		4.57																
5	End of Borehole	94.06																
		5.18																
6																		
7																		
8																		
9																		
10																		



See Fig B4

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-09

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		nat. V - + Q - ● rem. V - ⊕ U - ○		WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.47												Cold patch  Backfilled with soil cuttings
		Asphaltic concrete		0.08	1	C.S.										
		Possible old asphaltic concrete		0.18	2	C.S.										
		Brown crushed sand and gravel (BASE/SUBBASE)		0.79	3	C.S.										
1		Compact, brown fine to medium SAND, trace silt		1.30	4	50 D.O.	23									
2		Very stiff, grey SILTY CLAY		1.30	5	50 D.O.	16									
3					6	50 D.O.	15									
4					7	50 D.O.	23									
		Grey brown silty sand, some gravel, cobbles, possible boulders (GLACIAL TILL)		3.38												
		Possible WEATHERED BEDROCK		3.81												
	Auger refusal, end of borehole		4.14													

BOREHOLE LOG 62739.10 GNT. V01 2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT. 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-10

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊕ U - ○	Wp
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.89												
		Asphaltic concrete		99.70												
		Crushed sand and gravel, trace silt, black coated (BASE/SUBBASE)		0.19 99.48 0.41	1											Cold patch
1		Loose, brown sandy silt trace clay some gravel, cobbles and boulders (FILL)			2	59 D.O.	9									Backfilled with soil cuttings
2		Very dense, grey brown silty sand/sandy silt, some gravel (GLACIAL TILL)		98.21 1.68	3	59 D.O.	20									
					4	59 D.O.	50 for 100mm									
3		Auger refusal, end of borehole		96.99 2.90												
4																
5																
6																
7																
8																
9																
10																

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT - 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-11

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.71														
		Asphaltic concrete		0.10	1	C.S.											Cold patch  Backfilled with soil cuttings	
		Grey to black crushed sand and gravel (BASE/SUBBASE)		99.00	2	C.S.												
1		Loose, brown, fine to medium SAND, trace to some silt (Possible FILL)		0.71	3	50 D.O.	5											
		Very stiff, grey brown SILTY CLAY, trace sand		1.78	4	50 D.O.	8											
2	Very dense, grey brown sandy silt, some gravel, trace clay (GLACIAL TILL)		1.93	5	50 D.O.	50 for 0mm												
3		Auger refusal, end of borehole		96.76														
				2.95														
4																		
5																		
6																		
7																		
8																		
9																		
10																		

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-12


SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - +	rem. V - ⊖	Q - ●			U - ○
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.81													
1		Overburden conditions not logged															Backfilled with soil cuttings 
1		Auger refusal, end of probehole		97.79 1.02													
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-12 A

SHEET 1 OF 1

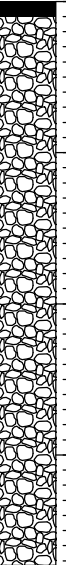
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 5, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface										
		Asphaltic concrete										Cold patch
		Crushed sand and gravel (BASE/SUBBASE)		0.13	1	G.S.						
1												
		Compact, brown fine to medium SILTY SAND		1.22	2	50 D.O.	13					
2					3	50 D.O.	15					
		Very stiff, grey SILTY CLAY, some seashells		2.29	4	50 D.O.	11					
3												
		Very stiff, grey SILTY CLAY		3.05	5	50 D.O.	6					
4			Grey silty sand and gravel, probable cobbles and boulders (GLACIAL TILL)	3.66								
		Borehole terminated due to broken components on drill.	3.73									



Cold patch

Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: M.L.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-12 B

SHEET 1 OF 1

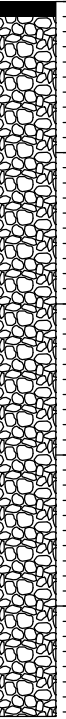
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 7, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.86												
		Asphaltic concrete		98.73												
		Crushed sand and gravel (BASE/SUBBASE)		0.13	1	G.S.										
				98.10												
1			Compact to dense, dark grey sand and gravel, with some cobbles (FILL MATERIAL)		0.76	2	50 D.O.	39								
2						3	50 D.O.	10								
3			Loose to compact, brown silty fine to medium sand, trace clay and gravel, with probable cobbles and boulders (GLACIAL TILL)		96.57	4	50 D.O.	7								
				2.29												
4		Wet			5	50 D.O.	14									
					6	50 D.O.	>50 for 100 mm									
					7	50 D.O.	>50 for 25 mm									
5		Auger refusal, end of borehole		94.13												
				4.73												
6																
7																
8																
9																
10																



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-12 C

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

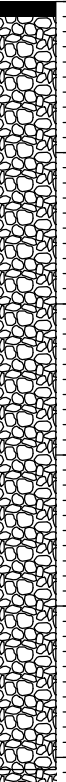
BORING DATE: January 7-8, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT								
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>				
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.83														
		Asphaltic concrete		0.05														
		Crushed sand and gravel (BASE/SUBBASE)																
1	Power Auger 200 mm Diameter Hollow Stem	Very loose, dark brown silty sand (Probable FILL)		97.43														
				1.40	1	50	4											
2	HQ Rotary Drilling	Dense, brown silty sand, some gravel, trace clay, probable cobbles and boulders (GLACIAL TILL)		96.54														
				2.29	2	50	44											
3	HQ Rotary Drilling	Boulders		95.30														
				3.53	4	R.C.												
4	HQ Rotary Drilling	Boulders																
					5	50	51											
5	HQ Rotary Drilling	Boulders																
					6	50	>50 for 100 mm											
					7	50	17											
5	HQ Rotary Drilling	End of borehole		93.66														
					5.17													

Cold patch

Backfilled with soil cuttings



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT - 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-13

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT					
							20 40 60 80		10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>	Wp  -----  W  -----  WI 20 40 60 80					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.84											
		Asphaltic concrete		98.71											
		Grey to black crushed sand and gravel, trace silt, (BASE/SUBBASE)		0.13	1	C.S.									Cold patch
					2	C.S.									
1			Pieces of brown silty clay and brown fine to medium sand, some crushed stone (FILL)		3	50 D.O.	14								Backfilled with soil cuttings
					4	50 D.O.	6								
2			Brown fine to medium SAND, trace to some silt		5	50 D.O.	14								
		Very dense, grey brown silty sand/sandy silt, trace to some gravel, possible cobbles and boulders (GLACIAL TILL)		6	50 D.O.	65									
3				7	50 D.O.	50 for 125mm									
4		Auger refusal, end of borehole		94.60											
				4.24											
5															
6															
7															
8															
9															
10															

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-14

SHEET 1 OF 1

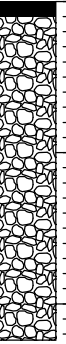
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.70													
		Asphaltic Concrete		98.56	1	C.S.											Cold patch
		Crushed sand and gravel, trace silt and cobbles (BASE/SUBBASE)		0.14	2	A.S.											Backfilled with soil cuttings
1		Very dense, grey brown silty sand/sandy silt, some gravel, cobbles (GLACIAL TILL)		97.94	3	50 D.O.											
2				0.76	4	50 D.O.											
		Auger refusal, end of borehole		96.46													
				2.24													
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-15

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80	10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>	WATER CONTENT, PERCENT					
							SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○			Wp	W	WI		
							20 40 60 80				20 40 60 80				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.69											
		Asphaltic Concrete		0.10	1	C.S.									Cold patch
		Black to grey crushed sand and gravel, trace silt (BASE/SUBBASE)		0.74	2	C.S.									
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.74	3	50 D.O.	15								
		Loose to compact, grey brown silty sand, some gravel, (GLACIAL TILL)		0.74	4	50 D.O.	20								
2				0.74	5	50 D.O.	22								
3				0.74	6	50 D.O.	26								
4				0.74	7	50 D.O.	7								
5			0.74	8	50 D.O.	5									
		End of Borehole		93.51											
				5.18											

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-16




SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

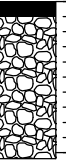
DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - +	rem. V - ⊕	Q - ●			U - ○
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.81													
		Asphaltic Concrete		98.66													
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		0.15	1	C.S.											
		Possible WEATHERED BEDROCK		98.10	2	C.S.											
1		Auger refusal, end of borehole		97.77	3	50 D.O.	50 for 75 mm										
1		Auger refusal, end of borehole		1.04													
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Cold patch



Backfilled with soil cuttings

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-16 A

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 7, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.79													
		Asphaltic concrete		98.66													
		Concrete		0.13													
		Grey sand and gravel (BASE/SUBBASE)		98.13													
				0.66													
1			Compact, brown sand, some gravel, trace silt (possible FILL)		97.93	1	50 D.O.	13									
					0.86												
2						2	50 D.O.	17									
3			Compact, brown to grey silty sand, some gravel, trace clay, probable cobbles and boulders (GLACIAL TILL)		96.35	3	50 D.O.	16									
				2.44													
4					4	50 D.O.	11										
5					5	50 D.O.	25										
6					6	50 D.O.	22										
7																	
8																	
9																	
10		End of borehole		93.61													
				5.18													

DEPTH SCALE

1 to 50

LOGGED: M.L.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-16 B

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 6, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊖ U - ○	Wp
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.81											Cold patch	
		Asphaltic concrete		98.68												
		Dark grey sand and gravel (BASE/SUBBASE)		0.13												
				98.30												
1			Very stiff, brown SILTY CLAY		0.51	1	50 D.O.	19								Backfilled with soil cuttings
					97.29	2	50 D.O.	19								
2		Compact, brown to grey silty sand, trace clay and gravel, probable cobbles and boulders (GLACIAL TILL)		1.52	3	50 D.O.	19									
3					4	50 D.O.	20									
4		Wet		3.74	5	50 D.O.	>50 for 50 mm							Groundwater observed at depth of 3.74 metres in open borehole		
5	HQ Rotary Drilling	Boulder		94.51	6	R.C.										
					4.30											
		End of borehole		93.63												
				5.18												

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: M.L.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-17

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.88											
		Asphaltic concrete		0.08	1	C.S.									Cold patch  Backfilled with soil cuttings
		Grey crushed sand and gravel trace silt (BASE/SUBBASE)		0.23											
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)				2	50 D.O.	12							
2		Very loose to compact, grey brown silty sand, trace clay, some gravel, probable cobbles and boulders (GLACIAL TILL)			97.03	3	50 D.O.	16							
					1.85										
							4	50 D.O.	14						
3						5	50 D.O.	9							
4						6	50 D.O.	2							
5		Auger refusal, end of borehole		93.95	7	50 D.O.	50 for 150 mm								
				4.93											
6															
7															
8															
9															
10															

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT - 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-18

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

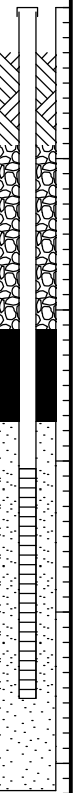
DATUM: Geodetic

BORING DATE: November 24, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.80								
		Asphaltic concrete		98.52								
		Brown sand and gravel, trace silt (BASE/SUBBASE)		0.28	1	C.S.						
				0.46								
1			Compact, brown silty sand, some gravel, cobbles and boulders (FILL)									
					2	50 D.O.	23					
					3	50 D.O.	19					
2		Very stiff, grey brown SILTY CLAY (Weathered Crust)		97.15								
				1.65								
				4	50 D.O.	16						
				5	50 D.O.	16						
				6	50 D.O.	5						
				7	50 D.O.	9						
5		Loose, grey silty sand, trace gravel (GLACIAL TILL)		94.23								
				4.57								
				93.62								
		End of borehole		5.18								

51 mm Diameter,  
1.52 metres long well screen.



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	3.24	95.56

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT\_11/2/16



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-19

SHEET 1 OF 1

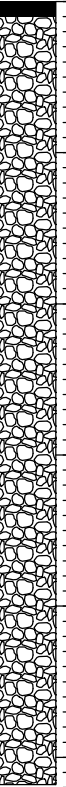
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊖ U - ○	Wp
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.87												
		Asphaltic concrete		0.10												
		Crushed sand and gravel, trace silt (BASE/SUBBASE)			98.11	1	C.S.									
1		Boulder (FILL)		0.76	2	50 D.O.	50 for 75 mm									
		Very stiff, grey brown SILTY CLAY (Weathered Crust)			97.55	3	50 D.O.	13								
2				1.32	4	50 D.O.	16									
					93.99	5	50 D.O.	13								
3			4.88	6	50 D.O.	9										
4				93.69	7	50 D.O.	4									
5		Stiff, grey SILTY CLAY		4.88												
5		End of borehole		5.18												
6																
7																
8																
9																
10																



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT\_11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-20




SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT							
								20	40	60	80	nat. V - +	rem. V - ⊕	Q - ●			U - ○	Wp	W
0	Power Auger follow Stem 200mm Diameter	Ground Surface		99.06															
		Asphaltic concrete		0.05	1	C.S.													
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		98.76															
		Grey LIMESTONE BEDROCK		0.30															
		Auger refusal, end of borehole		98.48															
	Auger refusal, end of borehole		0.58																
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Cold patch



Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-20 A

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 6, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa		nat. V - +	rem. V - ⊕	Q - ●	U - ○	Wp			W
0	Power Auger follow Stem	Ground Surface															
		Asphaltic concrete		0.05												Cold patch	
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		0.58	1	50 D.O.	>50	for	125	mm							
1	HQ Rotary Drilling 200 mm Diameter	Grey LIMESTONE BEDROCK with shale seams			2		R.C. TCR = 94%, SCR = 33%, RQD = 27%									Backfilled with soil cuttings	
2																	
3					3		R.C. TCR = 100%, SCR = 40%, RQD = 60%										
3.18		End of borehole															
4																	
5																	
6																	
7																	
8																	
9																	
10																	

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-21

SHEET 1 OF 1

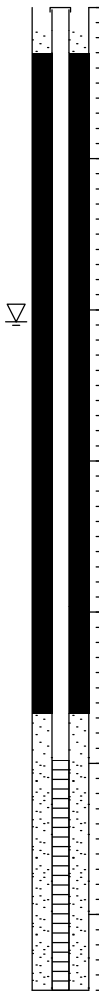
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
							20	40	60	80	$10^{-5}$ $10^{-4}$ $10^{-3}$ $10^{-2}$					
							nat. V - +   Q - ● rem. V - ⊕   U - ○				Wp   W   WI 20   40   60   80					
0	Power Auger 51mm Diameter Hollow Stem	Ground Surface		99.03												
		Ashpaltic concrete		0.10	1	C.S.										
	200mm Diameter Hollow Stem	Dark brown crushed sand and gravel, trace silt (BASE/SUBBASE)		98.24												
				0.79	2	50 D.O.	50 for 0 mm									
1	200mm Diameter Hollow Stem	Grey brown silty clay, some gravel, trace sand (FILL)		97.81												
				1.22	3	R.C. TCR = 46% SCR = 18% RQD = NA										
	200mm Diameter Hollow Stem	Boulder (GLACIAL TILL)														
					4	R.C. TCR = 11% SCR = 0% RQD = NA										
2	HQ Rotary Drilling															
					5	R.C. TCR = 25% SCR = 13% RQD = NA										
3	HQ Rotary Drilling															
					6	R.C. TCR = 100% SCR = 56% RQD = 44%										
4	HQ Rotary Drilling															
					7	R.C. TCR = 95% SCR = 81% RQD = 35%										
5	HQ Rotary Drilling	Grey LIMESTONE BEDROCK with shale seams		94.64												
				4.39												
6	HQ Rotary Drilling															
					Auger refusal, end of borehole											
7	HQ Rotary Drilling			92.53												
				6.50												
8	HQ Rotary Drilling															
9	HQ Rotary Drilling															
10	HQ Rotary Drilling															



51 mm Diameter, 1.52 metres long well screen.

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	2.08	96.95

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-22

SHEET 1 OF 1

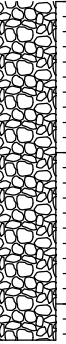
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊖ U - ○	WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		96.94											
		Crushed sand and gravel (BASE/SUBBASE)		0.10											
		Brown fine to medium SAND, trace to some silt		96.64	1	50 D.O.	15								
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.30											
2					2	50 D.O.	15								
3					3	50 D.O.	10								
2		Grey brown silty clay, some sand, trace gravel (GLACIAL TILL)		94.81											
		Auger refusal, end of borehole		2.13											
				2.24											
3															
4															
5															
6															
7															
8															
9															
10															



Backfilled with soil cuttings

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-23

SHEET 1 OF 1

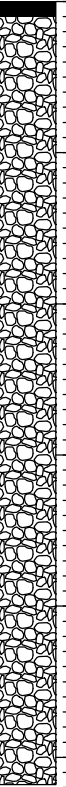
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT		WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		98.43													
		Asphaltic concrete		0.03													
		Possible former asphaltic concrete		98.18 0.25	1	C.S.											Cold patch
		Crushed sand and gravel (BASE/SUBBASE)			2	C.S.											
1		Grey brown silty clay (Possible FILL)		97.39 1.04	3	50 D.O.	8										
2		Very stiff, grey brown silt and clay (WEATHERED CRUST)		96.70 1.73	4	50 D.O.	33										
3		Compact, grey brown silty sand, trace clay, some gravel (GLACIAL TILL)		95.97 2.46	5	50 D.O.	17										
4				6	50 D.O.	25											
5				7	50 D.O.	19											
5.18		End of borehole		93.25 5.18													



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-24

SHEET 1 OF 1

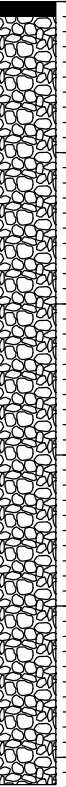
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		96.50													
		Asphaltic concrete		0.08	1	C.S.											Cold patch
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)			2	A.S.											
1		Dark grey silty clay, some gravel and organic material (FILL)		95.69	3	50 D.O.	11										Backfilled with soil cuttings
				0.81													
		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.91	4	50 D.O.	12										
2					5	50 D.O.	6										
3					6	50 D.O.	4										
4	Very loose, grey sandy SILT, some shells		92.69	7	50 D.O.	2											
			3.81														
5	Grey sandy silty clay, some gravel (GLACIAL TILL)		91.62	8	50 D.O.	7											
			4.88														
	End of borehole		91.32														
			5.18														



BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-25

SHEET 1 OF 1

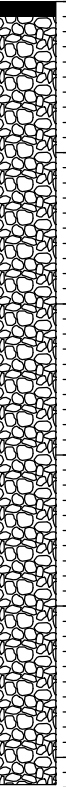
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		96.56													
		Asphaltic concrete		0.10													
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		96.10	1	C.S.											Cold patch
		Very stiff, grey brown SILTY CLAY (Weathered Crust)		96.04													
1					2	50 D.O.	13										
2					3	50 D.O.	10										
3					4	50 D.O.	7										
4		Stiff to firm, grey SILTY CLAY		92.75	6	50 D.O.	2										
5				91.38	7	50 D.O.	1										
6		End of borehole		5.18													



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-26

SHEET 1 OF 1

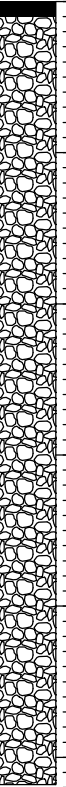
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 2, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		nat. V - + rem. V - ⊕ U - ○		WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		97.06													
		Asphaltic concrete		0.10	1	C.S.											Cold patch
		Grey brown sand and gravel (BASE/SUBBASE)		96.68	2	C.S.											
				0.38	3	C.S.											
		Dark grey silty clay, trace gravel (FILL)															Backfilled with soil cuttings
1				96.09	4	50 D.O.	13										
		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.97													
2					5	50 D.O.	9										
				6	50 D.O.	7											
3				7	50 D.O.	4											
4		Grey brown to grey SILTY CLAY		93.25	8	50 D.O.	2									See Fig B4	
				3.81													
5				91.88													
		End of Borehole		5.18													



DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-27

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		97.31												Cold patch  Backfilled with soil cuttings
		Asphaltic concrete		0.10												
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		96.83	1	C.S.										
				0.48												
1			Very stiff, grey brown SILTY CLAY (Weathered Crust)													
					2	50 D.O.	13									
					3	50 D.O.	12									
2				4	50 D.O.	9										
3				5	50 D.O.	4										
		Very stiff to stiff, grey brown SILTY CLAY		94.26												
				3.05												
4				6	50 D.O.	3										
5				7	50 D.O.	1										
6							⊕									
							⊕	+								
		End of borehole		91.37												
				5.94												
7																
8																
9																
10																

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT\_11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-28

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 27, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - +	rem. V - ⊕	Q - ●			U - ○
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		94.19												Cold patch  Backfilled with soil cuttings	
		Asphaltic concrete		0.10	1	C.S.											
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)			2	C.S.											
				93.43													
		Compact, black coated sand and gravel (FILL)		0.76													
1			Grey black silty sand, some gravel with black staining (FILL)		0.91	3	50 D.O.										
			Possible former TOPSOIL		1.30												
			Very stiff, dark grey SILTY CLAY		1.57	4	50 D.O.										
2																	
						5	50 D.O.										
3																	
					6	50 D.O.											
4																	
					7	50 D.O.											
5																	
		Stiff to firm, grey SILTY CLAY		89.62													
				4.57	8	50 D.O.											
5																	
		End of borehole		89.01													
				5.18													
6																	
7																	
8																	
9																	
10																	

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-29

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - $\oplus$			rem. V - $\ominus$
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		93.73											
		Dark brown silty clay, trace organic material (TOPSOIL)		93.12	1	50 D.O.									
			Very stiff, grey brown SILT and CLAY (Weathered Crust)		0.61										
1					2	50 D.O.									
2					3	50 D.O.									
3					4	50 D.O.									
4		Stiff, grey SILTY CLAY		90.05	5	50 D.O.									
				3.68			$\oplus$								
5				6	50 D.O.	1	$\oplus$								
		End of Borehole		88.55											
				5.18											
6															
7															
8															
9															
10															

51 mm Diameter, 1.52 metres long well screen.

See Fig B4

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	0.43	93.30

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-30

SHEET 1 OF 1

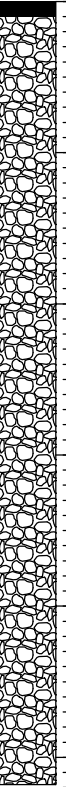
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊕ U - ○	Wp
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		92.82												
		Asphaltic concrete		0.05												
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)			92.06											
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.76	1	50 D.O.	15									
2						2	50 D.O.	13								
3						3	50 D.O.	10								
4		Stiff, grey SILTY CLAY		89.01												
				3.81	5	50 D.O.	2									
5					6	50 D.O.	2									
		End of borehole		87.64												
				5.18												



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-31

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 27, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		nat. V - + rem. V - ⊕ U - ○		WATER CONTENT, PERCENT				Wp   W   WI
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		92.80												
		Asphaltic concrete		0.10												Cold patch
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)		92.44	1	C.S.										
				0.36	2	C.S.										
1			Loose, brown fine to medium sand, trace to some silt, some gravel (Possible FILL)													Backfilled with soil cuttings
					3	50 D.O.	6									
2			Very stiff, grey brown SILTY CLAY (Weathered Crust)		91.28	4	50 D.O.	13								
			1.52	5	50 D.O.	7										
				6	50 D.O.	3										
4		Stiff to firm, grey SILTY CLAY		88.99	7	50 D.O.	1									
			3.81													
5		End of Borehole		87.62				⊕	+							
				5.18				⊕	+							

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-32

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 2, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + rem. V - ⊕ U - ○	WATER CONTENT, PERCENT		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		92.31								<p>51 mm Diameter, 1.52 metres long well screen.</p>
		Grey to black crushed sand and gravel (BASE/SUBBASE)		91.78	1	C.S.						
		Brown silty clay, some gravel, trace organics or ash (FILL)		0.53	2	C.S.						
1		Very stiff to stiff, grey brown SILTY CLAY (Weathered Crust)		91.42	3	50 D.O.	12					
				0.89	4	50 D.O.	10					
2					5	50 D.O.	7					
					6	50 D.O.	3					
4		Stiff grey SILTY CLAY		87.74	7	50 D.O.	2					
			4.57									
5		End of Borehole		87.13								
				5.18								
6												
7												
8												
9												
10												

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/02/05	2.56	▽ 89.75

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-33

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

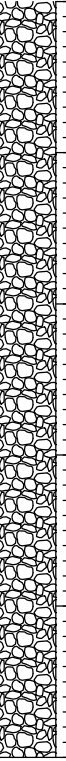
DATUM: Geodetic

BORING DATE: December 2, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	WATER CONTENT, PERCENT		
								20 40 60 80	Wp 20 40 60 80		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		93.71							
1		Overburden conditions not logged									
2											
3											
4											
5		End of probehole		88.71 5.00							
6											
7											
8											
9											
10											

Backfilled with soil cuttings



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-34

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

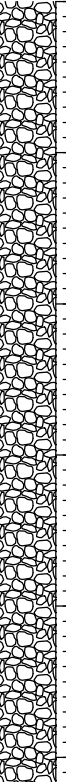
DATUM: Geodetic

BORING DATE: November 27, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V -	+	Q - ●			U - ○
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		93.51													
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)		93.10	1	50	14										
		Compact, brown silty sand, trace clay, some gravel cobbles and boulders (Possible FILL)		92.21	2	50	24										
		Very stiff, grey brown SILTY CLAY (Weathered Crust)		92.21	3	50	11										
				89.85	4	50	4										
				88.33	5	50	3										
4		Stiff to firm, grey SILTY CLAY		89.85	6	50	1										
5		End of Borehole		88.33													

Backfilled with soil cuttings



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-35

SHEET 1 OF 1

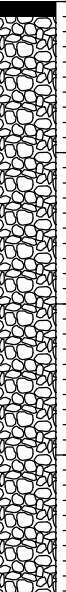
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 27, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		93.80											
		Asphaltic concrete		0.08	1	C.S.									Cold patch
		Grey black crushed sand and gravel or former asphaltic concrete (BASE/SUBBASE)		93.16											
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.64	2	50 D.O.	13								Backfilled with soil cuttings
2		Very dense, grey brown silt sand, some gravel, probable cobbles and boulders (GLACIAL TILL)		92.20											
	Boulders		1.60	3	50 D.O.	50 for 25 mm									
3					4	50 D.O.	50 for 90 mm								
4					5	50 D.O.	28								
4		Auger refusal, end of borehole		89.89											
				3.91											
5															
6															
7															
8															
9															
10															



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT - 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-36

SHEET 1 OF 1

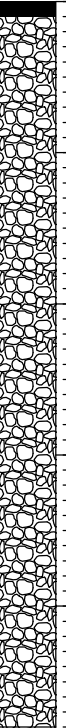
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT						
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		97.73												
		Asphaltic concrete		0.08												
		Grey black crushed sand and gravel, trace silt (BASE/SUBBASE)		97.22	1	C.S.										Cold patch
		Grey brown silty clay, trace sand, some gravel (FILL)		96.84	2	C.S.										
1			Loose to compact, brown fine to medium sand, some silt, trace clay (Possible FILL)		96.89	3	50 D.O.	13								
2					95.14	4	50 D.O.	9								
3			Compact, grey brown silty clay, trace sand, some gravel, (GLACIAL TILL)		2.59	5	50 D.O.	33								
4				93.82	6	50 D.O.	21									
5		Dense, grey brown silty sand, some gravel, cobbles and possible boulders (GLACIAL TILL)		3.91	7	50 D.O.	44									
5		Auger refusal, end of borehole		92.93												
				4.80												



DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-37

SHEET 1 OF 1

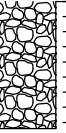
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		94.44												
		Dark brown silty sand/sandy silt, trace organic material (TOPSOIL)		94.19 0.25	1	50 D.O.	12									
		Brown sand and gravel (FILL)														
1		Auger refusal, end of borehole		93.60 0.84	2	50 D.O.	50 for 100 mm									Backfilled with soil cuttings
2																
3																
4																
5																
6																
7																
8																
9																
10																



Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-38

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT							
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		96.48													
		Asphaltic concrete		0.05	1	C.S.											Cold patch  Backfilled with soil cuttings
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)			2	C.S.											
					3	C.S.											
1			Loose, brown silty sand, some gravel, possible cobbles (FILL)		95.72 0.76	4	50 D.O.	8									
		Grey brown silty sand, some gravel (GLACIAL TILL)		94.96 1.52	5	50 D.O.	50 for 50 mm										
2		Auger refusal, end of borehole		94.65 1.83													
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-39

SHEET 1 OF 1

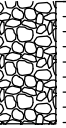
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>					
								20	40	60	80	WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		95.93													
		Overburden conditions not logged															
1		Auger refusal, end of probehole		95.12 0.81													
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	



Backfilled with soil cuttings

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-40

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

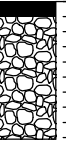
DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION							
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80			10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>			
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		95.56	1	C.S.														
		Asphaltic concrete		0.08																
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)		95.10																
		Possible WEATHERED BEDROCK		94.65																
1		Auger refusal, end of borehole		0.91																
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Cold patch



Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-41

SHEET 1 OF 1

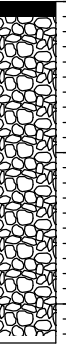
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT						
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		93.67												
		Asphaltic concrete		0.05												
		Grey crushed sand and gravel trace silt (BASE/SUBBASE)		93.24 0.43	1	C.S.										Cold patch
		Brown fine to medium sand, trace silt (Possible FILL)		92.78 0.89	2	C.S.										
1		Compact, grey silty sand, some gravel, possible cobbles and boulders (GLACIAL TILL)			3	50 D.O.	25									
		Strong hydrocarbon odour			4	50 D.O.	50 for 130 mm									Backfilled with soil cuttings
2		Auger refusal, end of borehole		91.46 2.21												
3																
4																
5																
6																
7																
8																
9																
10																



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-42

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT					
							20 40 60 80		10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>						
							20 40 60 80		Wp  -----  W  -----  Wl	20	40	60	80		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		84.07											
		Grey crushed sand and gravel, trace silt (BASE/SUBBASE)			83.33	1	C.S.								
1		Very stiff, grey brown SILTY CLAY (Weathered Crust)			0.74	2	50 D.O.	13							Backfilled with soil cuttings
2						3	50 D.O.	16							
3						4	50 D.O.	10							
4						5	50 D.O.	4							
5						6	50 D.O.	40							
	Dense, grey silty sand, some gravel (GLACIAL TILL)			79.93	7	50 D.O.	24								
				4.14											
5		End of borehole		78.96											
				5.11											
6															
7															
8															
9															
10															

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-43

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT					
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		84.79											
		Asphaltic concrete		0.10	1	C.S.									Cold patch
		Crushed sand and gravel, trace silt (BASE/SUBBASE)			2	C.S.									Backfilled with soil cuttings
1															
		Dark brown clayey silt (possible former TOPSOIL)		82.96 1.83 1.98	3	50 D.O.	18								
2			Grey brown SILTY CLAY (Weathered Crust)		4	50 D.O.	16								
3					5	50 D.O.	15								
4				6	50 D.O.	9									
5		Grey brown silty sand, some gravel and cobbles (GLACIAL TILL)		80.22 4.57	7	50 D.O.	50 for 75 mm								
5		End of Borehole		79.51 5.28											
6															
7															
8															
9															
10															

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-44

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		85.71										
		Asphaltic concrete		0.10	1	A.S.								Cold patch
		Crushed sand and gravel, trace silt (BASE/SUBBASE)		85.10	2	A.S.								Backfilled with soil cuttings
		Possible WEATHERED BEDROCK		84.69										
1		Auger refusal, end of borehole		1.02										
2														
3														
4														
5														
6														
7														
8														
9														
10														

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-45

SHEET 1 OF 1

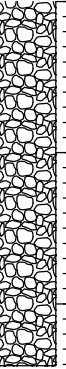
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH						WATER CONTENT, PERCENT			
								Cu, kPa		nat. V - + rem. V - ⊕				Q - ● U - ○		Wp	
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.43													
1		Overburden conditions not logged															
2		Auger refusal, end of probehole			97.02 2.41												
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	



Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-46


SHEET 1 OF 1

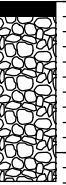
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 25, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.28												
		Asphaltic concrete		99.13												
		Grey crushed sand and gravel, trace silt, possible cobbles (BASE/SUBBASE)		0.15	1	C.S.										Cold patch
1					2	50 D.O.	50	50	50	50						Backfilled with soil cuttings
		Auger refusal, end of borehole		98.09												
				1.19												
2																
3																
4																
5																
6																
7																
8																
9																
10																



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-47

SHEET 1 OF 1

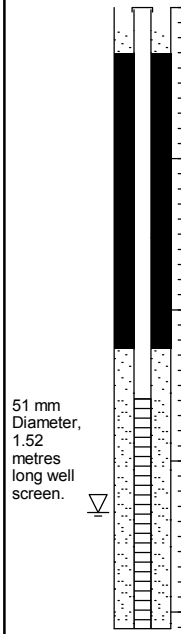
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 1, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		99.42												
		Asphaltic concrete		0.10												
		Brown sand and gravel, trace silt (BASE/SUBBASE)		98.96 0.46	1	C.S.										
		Dark grey sand and gravel, some silt (FILL)		98.38 1.04	2	C.S.										
1	Power Auger 200mm Diameter Hollow Stem	Black grey silty sand, some clay, trace gravel, probable boulders (Possible FILL)		97.51 1.91	3	50 D.O.	15									
					4	50 D.O.	50 for 80 mm									
2	HQ Rotary Drilling	LIMESTONE BEDROCK with shale seams - 3 25mm thick mud seams within upper 0.3m of rock core - subvertical fractures noted		95.31 4.11	5	R.C.	TCR = 95% SCR = 16% RQD = 0%									
3					6	R.C.	TCR = 98% SCR = 88% RQD = 76%									
4		End of borehole														
5																
6																
7																
8																
9																
10																



U.C.S. 145.4 MPa

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	3.34	96.08

DEPTH SCALE  
1 to 50

Houle Chevrier Engineering

LOGGED: A.N.  
CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-54

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

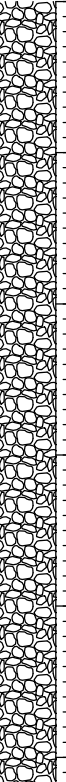
DATUM: Geodetic

BORING DATE: November 26, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊖ U - ○	Wp
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		78.79												
		Dark brown sandy silt, trace organic and clay, red brick (FILL)		78.51	1	50	7									
		Very stiff, grey brown SILTY CLAY (Weathered Crust)		0.28												
1					2	50	12									
2					3	50	19									
3					4	50	14									
4			Dense to very dense, grey brown silty sand, some gravel, cobbles and boulders (GLACIAL TILL)		75.49	5	50	45								
				3.30												
					6	50	50 for 25 mm									
5					7	50	43									
		End of borehole		73.61												
				5.18												
6																
7																
8																
9																
10																

Backfilled with soil cuttings



BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT\_11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-55

SHEET 1 OF 1

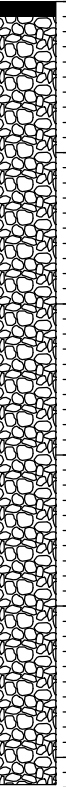
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: November 30, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊖ U - ○	Wp
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		78.92												
		Asphaltic concrete		78.77												
		Grey brown sand and gravel, trace silt (BASE/SUBBASE)		0.15	1	C.S.										Cold patch
				78.54												
			Dark brown silty clay, trace gravel, wood (FILL)		0.38											
1					77.75	2	50 D.O.	12								
			Very stiff, grey brown SILTY CLAY (Weathered Crust)		1.17											
2		NOTE: Hydrocarbon odor @ 3.78 metre depth below ground surface			3	50 D.O.	18									
					4	50 D.O.	21									
3					5	50 D.O.	18									
4				75.01	6	50 D.O.	50 for 130 mm									
		Grey brown silty sand, some gravel, cobbles and possible boulders (GLACIAL TILL)		3.91												
5					7	50 D.O.	14									
		End of borehole		73.74												
				5.18												



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

LOGGED: A.N.

CHECKED:



PROJECT: 62739.10

# RECORD OF BOREHOLE 15-56A

SHEET 1 OF 1

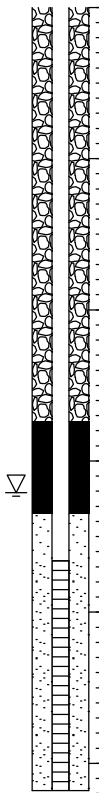
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 10, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT						
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
							20	40	60	80	Wp	W	WI			
											20	40	60	80		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		78.79												
		Loose, grey brown silty clay, some gravel and shell pieces, trace organic material (FILL)			78.18	1	50 D.O.									
					0.61											
1		Loose to compact, dark grey brown silty sand, some gravel, cobbles, shell and wood fragments (FILL)				2	50 D.O.									
2						3	50 D.O.									
3					4	50 D.O.										
4					5	50 D.O.										
5		Asphaltic concrete		74.62	6	50 D.O.										
				4.17												
		Grey crushed sand and gravel (BASE/SUBBASE)		4.29												
				74.09												
				4.70												
5		Grey sandy silt, some gravel, possible cobbles (GLACIAL TILL)		74.09	7	50 D.O.										
				4.70												
				73.61												
		End of borehole		5.18												
6																
7																
8																
9																
10																



51 mm Diameter, 1.52 metres long well screen.

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/27	3.21	▽ 75.58

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-56B

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

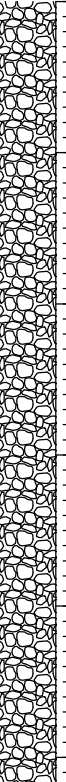
DATUM: Geodetic

BORING DATE: December 10, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT							
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>			
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		78.92													
		Dark brown silt, some sand and organic material (FILL)		78.74	1	50	6										
		Compact, dark grey silty sand, trace to some gravel with shell fragments (FILL)		0.18													
1					2	50	17										
2					3	50	15										
3			Loose, dark grey brown silty sand, some gravel, shell pieces, blue rigid insulation, trace wood (FILL)		76.25	4	50	3									
					2.67												
4			Grey brown silty clay, trace sand, some gravel (FILL)		75.47	5	50	8									
					3.45												
5			Asphaltic concrete		74.60	6	50	17									
		Probable sand and gravel (BASE/SUBBASE)		4.32													
		Grey silty sand, some gravel, cobbles and boulders (TILL)		74.14	7	50	47										
				4.42													
				74.14													
				4.78													
		End of borehole		73.74													
				5.18													
6																	
7																	
8																	
9																	
10																	

Backfilled with soil cuttings



BOREHOLE LOG 62739.10 GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 15-105 E

SHEET 1 OF 1

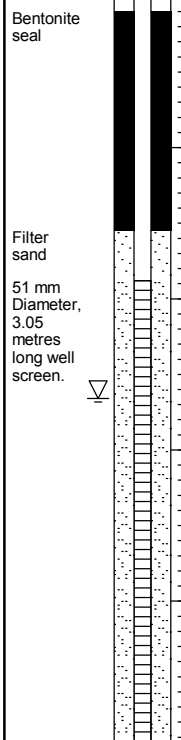
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		99.82													
		Asphaltic concrete		99.64													
		Crushed sand and gravel (BASE/SUBBASE)		0.18													
1		Loose to compact, brown sand and gravel (FILL)		99.06	1	50 D.O.	16										
2				0.76	2	50 D.O.	4										
3		Saturated, loose to compact SAND, trace silt, trace shells		97.53	3	50 D.O.	4										
4			2.29	4	50 D.O.	18											
5			96.24	5	50 D.O.	18											
			3.58	6	50 D.O.	15 mm											
5	Auger refusal, end of borehole		94.89			4.93											
6																	
7																	
8																	
9																	
10																	



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	2.66	97.16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED:

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-102 E

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

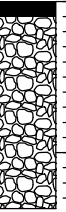
DATUM: Geodetic

BORING DATE: January 15, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 <sup>-5</sup>			10 <sup>-4</sup>	10 <sup>-3</sup>
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		103.38												
		Asphaltic concrete		0.05												
		Crushed sand and gravel (BASE/SUBBASE)		103.08	1	50 D.O.	69									
1		Light brown fine to medium sand, trace silt (FILL)		102.31												
		Blud rigid insulation at 1.07 metres +/-		1.07	2	50 D.O.	3									
		Borehole terminated due to possible services		102.01												
				1.37												
2																
3																
4																
5																
6																
7																
8																
9																
10																

Cold patch



Backfilled with soil cuttings

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-104 E

SHEET 1 OF 1

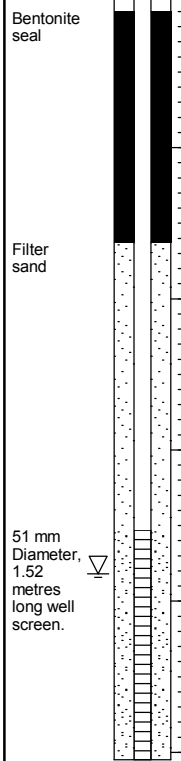
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 6, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION					
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT									
							20	40	60	80	20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>			
							nat. V - + Q - ● rem. V - ⊕ U - ○				Wp   W   WI										
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		103.02																	
		Asphaltic concrete		0.10																	
		Crushed sand and gravel (BASE/SUBBASE)		102.36																	
				0.66																	
1			Grey LIMESTONE BEDROCK with shale seams			1	R.C.	TCR = 93%	SCR = 96%	RQD = 78%											
2					2	R.C.	TCR = 90%	SCR = 66%	RQD = 77%												
3					3	R.C.	TCR = 100%	SCR = 89%	RQD = 95%												
5		End of borehole		97.97																	
				5.05																	
6																					
7																					
8																					
9																					
10																					



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	3.82	99.20

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED:

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-106 E

SHEET 1 OF 1

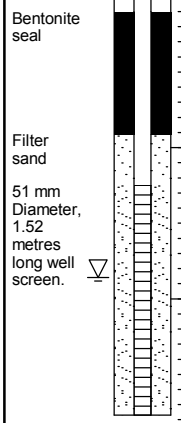
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: December 23, 2015

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - + Q - ●	rem. V - ⊕ U - ○	Wp			W
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.04													
		Asphaltic concrete		0.10													
1		Crushed sand and gravel (BASE/SUBBASE)		96.77	1	50 D.O.	12										
		Compact, medium to fine brown sand, trace gravel, trace silt (possible FILL)		95.75 1.27	2	50 D.O.	15										
2		Silty sand, some gravel, trace clay, trace shells (GLACIAL TILL)		95.75 2.29	3	50 D.O.	73										
3		Auger refusal, end of borehole		95.27 2.77													
4																	
5																	
6																	
7																	
8																	
9																	
10																	



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	1.86	96.18

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE  
1 to 50

Houle Chevrier Engineering

LOGGED:  
CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-108 E

SHEET 1 OF 1

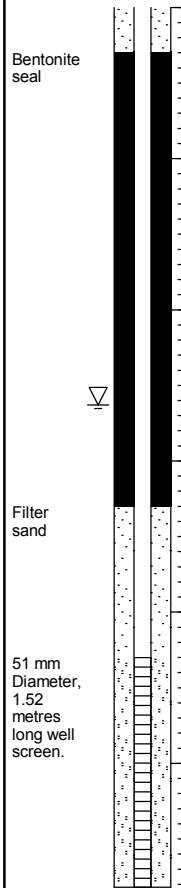
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 12, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION							
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT											
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>							
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface TOPSOIL		93.35	1	50 D.O.															
1		Compact to dense, grey brown silty sand, some gravel, trace clay, with probable cobbles and boulder (GLACIAL TILL)		92.59 0.76	2	50 D.O.															
2				3	50 D.O.																
3				4	50 D.O.	>50 for 75 mm															
3	HQ Rotary Drilling	Grey LIMESTONE BEDROCK with shale seams		90.94 2.41	5	R.C. TCR = 100%, SCR = 93%, RQD = 90%															
4				6	R.C. TCR = 100%, SCR = 100%, RQD = 100%																
5				7	R.C. TCR = 100%, SCR = 90%, RQD = 85%																
6		End of borehole		87.53 5.82																	



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	2.63 ∇	90.72

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT 11/2/16

DEPTH SCALE  
1 to 50

Houle Chevrier Engineering

LOGGED: M.L.  
CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-109 E

SHEET 1 OF 1

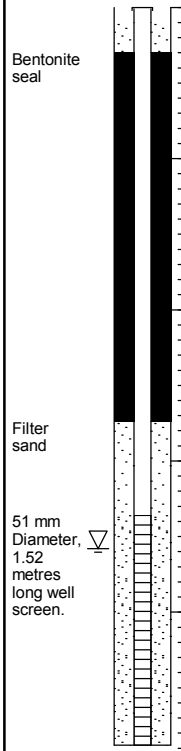
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 13-14, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT, PERCENT				
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		93.11												
		Asphaltic concrete		0.05												
1	200 mm Diameter Hollow Stem	Dark brown to grey silty sand and gravel (BASE/SUBBASE)		91.97	1	50 D.O.	24									
					1.14	2	50 D.O.	> 50 for 75 mm								
2	HQ Rotary Drilling	Grey LIMESTONE BEDROCK with shale seams			3	R.C.										
						4	R.C.	TCR = 100%, SCR = 97%, RQD = 52%							U.C.S. 111.4 MPa	
3	HQ Rotary Drilling															
						5	R.C.	TCR = 94%, SCR = 91%, RQD = 82%								
4	HQ Rotary Drilling															
						6	R.C.	TCR = 100%, SCR = 100%, RQD = 0%								
5	HQ Rotary Drilling	End of borehole		88.23												
					4.88											
6	HQ Rotary Drilling															
7	HQ Rotary Drilling															
8	HQ Rotary Drilling															
9	HQ Rotary Drilling															
10	HQ Rotary Drilling															



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	3.58	89.53

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16



PROJECT: 62739.10

# RECORD OF BOREHOLE 16-110 E

SHEET 1 OF 1

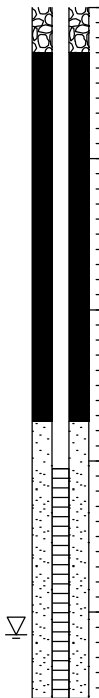
LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: January 11, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT						
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger 200mm Diameter Hollow Stem	Ground Surface		83.35												
		TOPSOIL		83.22												
			Very stiff, grey to brown SILTY CLAY		0.13	1	50 D.O.									
1						2	50 D.O.									
2						3	50 D.O.									
3						4	50 D.O.									
4						5	50 D.O.									
		Boulders, probable GLACIAL TILL		79.82 3.53	6	50 D.O.										
					7	50 D.O.										
		Auger refusal, end of borehole		78.78 4.57												
5																
6																
7																
8																
9																
10																



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	4.15	▽ 79.20

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER 2015.GDT 11/2/16

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-111 E



SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

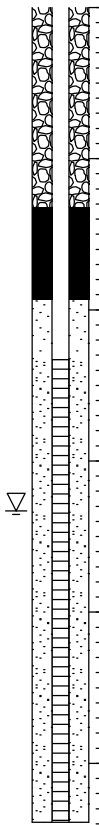
DATUM: Geodetic

BORING DATE: January 11, 2016

SPT HAMMER:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT					
							20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	
0		Ground Surface		83.05											
		TOPSOIL		82.90											
		Very stiff, brown SILTY CLAY		0.15	1	50 D.O.									
1	Power Auger 200 mm Diameter Hollow Stem				2	50 D.O.									
2					3	50 D.O.									
3					4	50 D.O.									
4					5	50 D.O.									
5					6	50 D.O.									
6					7	50 D.O.									
7	HQ Rotary Drilling	Compact, grey brown silty sand, some gravel, trace clay, with cobbles and boulders (GLACIAL TILL)		79.75 3.30											
8					6	50 D.O.									
9					7	50 D.O.									
10		End of borehole		77.66 5.39											

Bentonite seal  
Filter sand  
51 mm Diameter, 3.05 metres long well screen.



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16/01/25	3.33	▽ 79.72

BOREHOLE LOG: 62739.10\_GNT\_V01\_2015-12-08.GPJ HOUILLE CHEVRIER 2015.GDT\_11/2/16

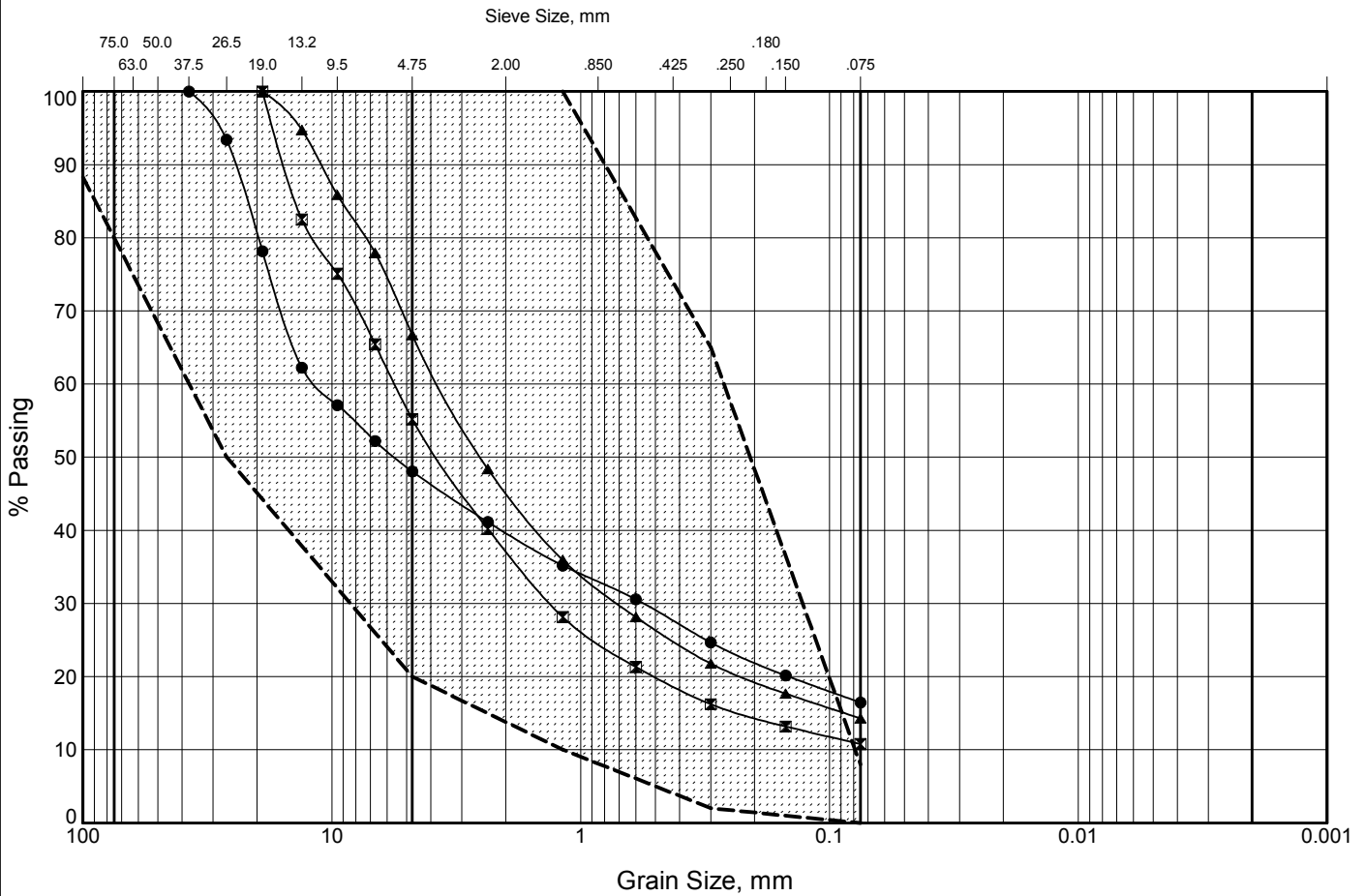


## **APPENDIX B**

Laboratory Index Test Results (Figure B1 to B4)

# GRAIN SIZE DISTRIBUTION BASE/SUBBASE

**FIGURE B1**



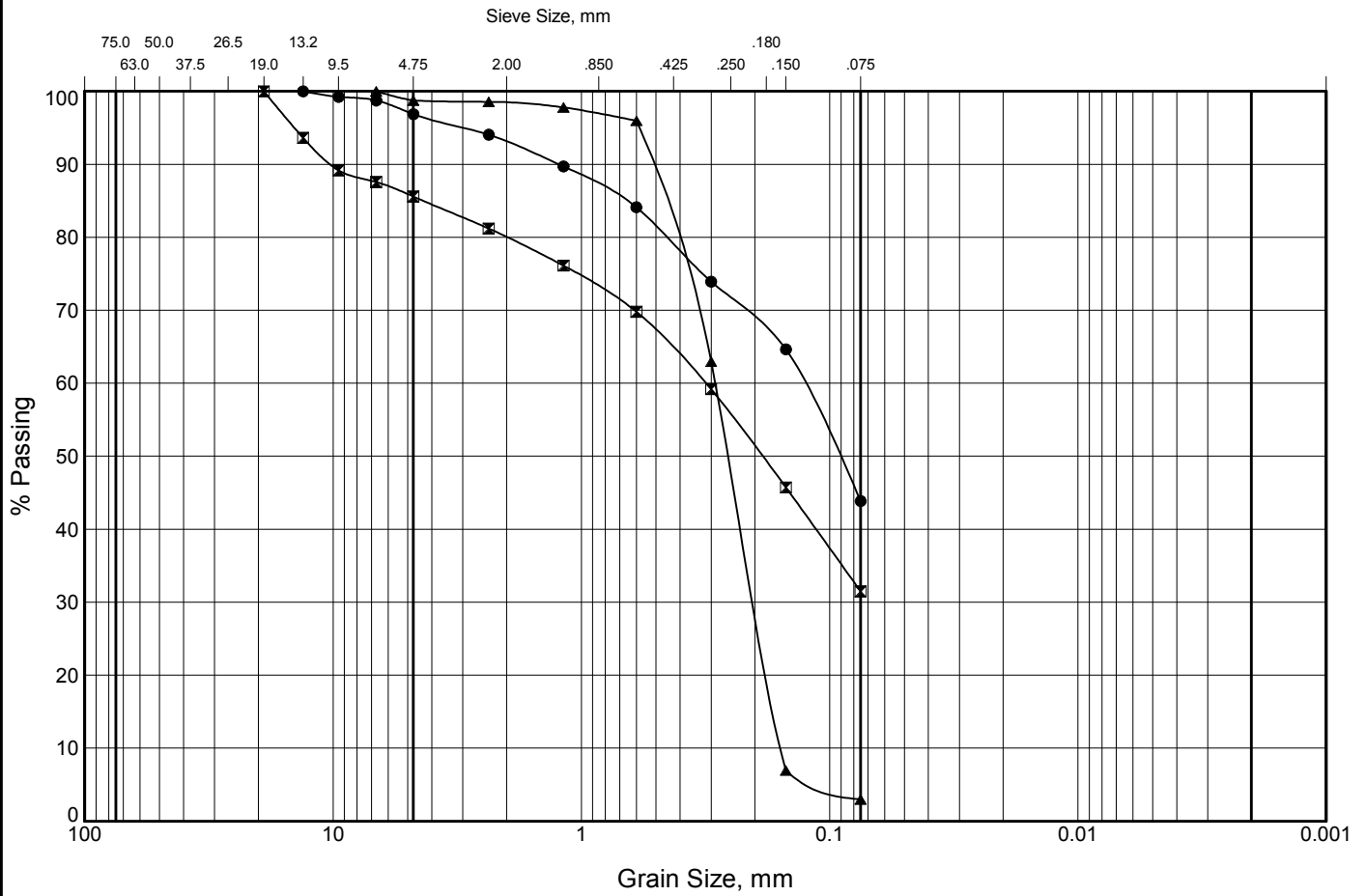
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	
	GRAVEL		SAND			SILT AND CLAY

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-02	1	0.2 - 0.9	52	32	16
☒	15-08	1	0.1 - 0.2	45	44	11
▲	15-38	1	0.1 - 0.3	33	52	14

----- Gradation Envelope: OPSS 1010 - GRANULAR B TYPE I

# GRAIN SIZE DISTRIBUTION

## FIGURE B2



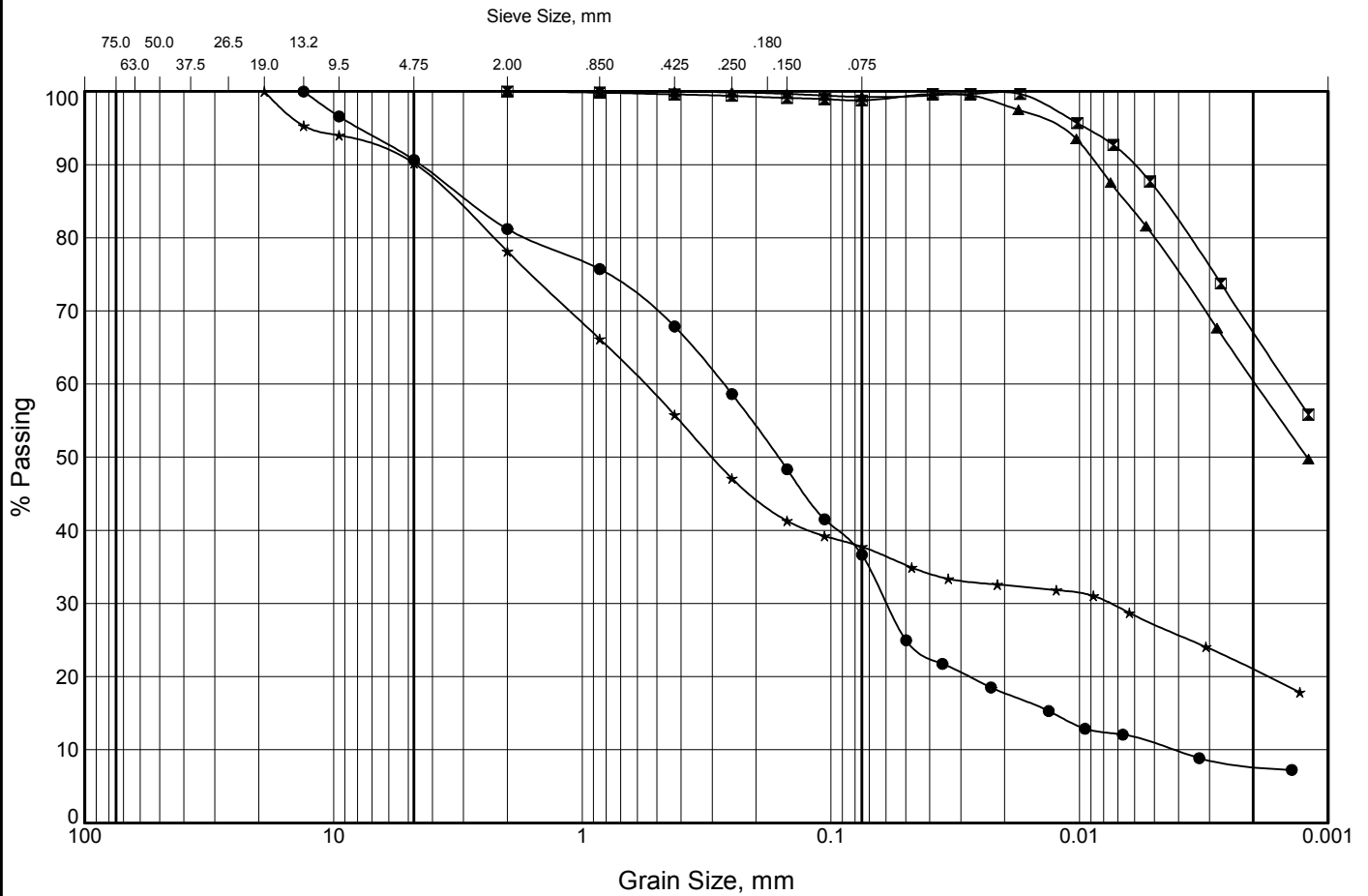
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-13	5	2.1 - 2.8	3	53	44
☒	15-54	7	4.6 - 5.2	14	54	31
▲	16-106 E	2	1.5 - 2.1	1	96	3

SOILS GRAIN SIZE GRAPH UNIFIED % (SIEVE) 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER FEB 9 2011.GDT 2-8-16

# GRAIN SIZE DISTRIBUTION

## FIGURE B3



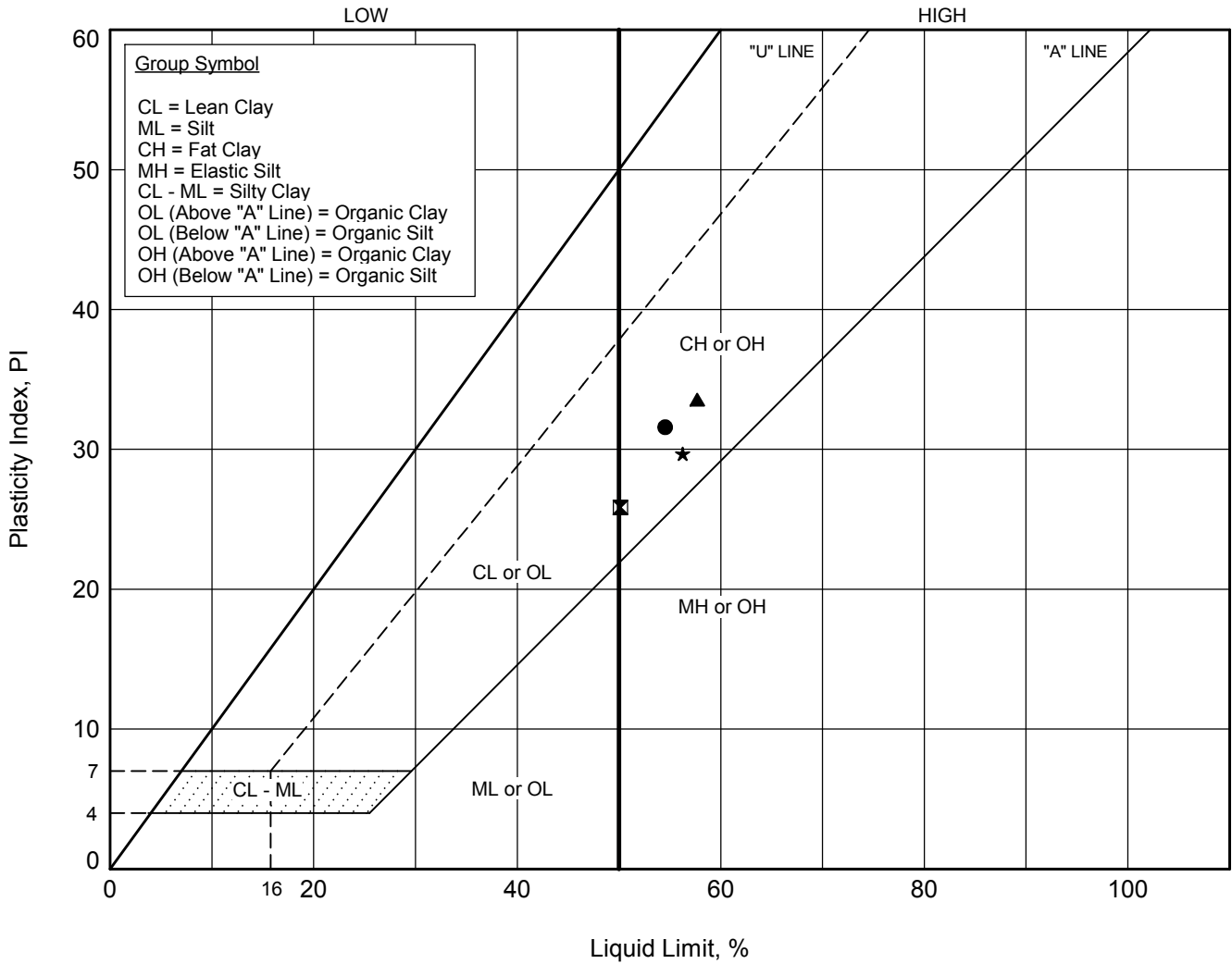
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
	GRAVEL		SAND				

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt	% Clay
●	15-16 A	4	2.9 - 3.5	9	54	29	8
☒	15-25	3	1.5 - 2.1	0	1	32	67
▲	15-29	4	2.3 - 2.9	0	1	39	61
★	15-105 E	5	3.8 - 4.4	10	52	17	21

SOILS GRAIN SIZE GRAPH UNIFIED % (HYDRO) 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER FEB 9 2011.GDT 2-8-16

# PLASTICITY CHART

FIGURE B4



Legend	Borehole	Sample	Depth (m)	Water Content %	LL %	PL %	PI %
●	15-08	4	1.5 - 2.1	34.5	54.5	22.9	31.6
⊠	15-15	3	0.8 - 1.4	25.9	50.1	24.3	25.9
▲	15-26	8	3.8 - 4.4	76.2	57.7	24.1	33.6
★	15-29	6	4.6 - 5.2	76.7	56.2	26.6	29.7

HCE ATTERBERG LIMITS 62739.10\_GNT\_V01\_2015-12-08.GPJ HOULE CHEVRIER FEB 9 2011.GDT 9/2/16



## **APPENDIX C**

### Compressive Strength of Bedrock Core Samples






**COMPRESSIVE STRENGTH  
of ROCK CORE**


Houle Chevrier Engineering Ltd.  
32 Steacie Drive  
Ottawa, ON  
K2K 2A9  
Tel.: 613-836-1422  
Fax.:613-836-9731

**CLIENT:** National Research Council Canada      **PROJECT No.:** 62739.10  
**Project:** Montreal Campus      **REPORT NO:** 1  
**Date Received:** n/a      **Date Tested:** 15-Jan-16

<b>Lab no.</b>	1	2				
<b>Core ID</b>	15-47 RC6	15-01 RC 4				
<b>Depth</b>	3.05-3.35	2.97-3.12				
<b>Cut length (mm)</b>	n/a	n/a				
<b>Ground length (mm)</b>	124.20	120.59				
<b>Diameter (mm)</b>	63.18	62.86				
<b>Ground Mass (g)</b>	1.05	1.01				
<b>Length:Diameter ratio</b>	1.97	1.92				
<b>Correction factor</b>	1.00	0.99				
<b>Failure load (kN)</b>	455.79	607.48				
<b>Uncorrected Strength (MPa)</b>	145.40	195.70				
<b>Corrected Strength (MPa)</b>	<b>145.40</b>	<b>193.70</b>				

Remarks

Checked by:   
Krystle Smith, Laboratory Manager

Reviewed by:   
Serge Bourque, P.Eng.





## **APPENDIX D**

### Photographs of Bedrock Cores

**BOREHOLE 15-01  
BORING DATE: 30/11/2015  
ROCK CORE DEPTHS: 2.1 to 4.2 METERS**



**Houle  
Chevrier  
Engineering**

32 Steacie Drive Ottawa, ON  
T: (613) 836-1422 | www.hceng.ca | ottawa@hceng.ca

Project  
GEOTECHNICAL INVESTIGATION  
NATIONAL RESEARCH CENTER  
MONTREAL ST CAMPUS

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D1</b>

Drawing  
BOREHOLE 15-01  
ROCK CORE PHOTO

**BOREHOLE 15-20A**  
**BORING DATE: 06/01/2016**  
**ROCK CORE DEPTHS: 0.6 to 3.2 METERS**



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 MONTREAL ST CAMPUS

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D2</b>

Drawing  
 BOREHOLE 15-20A  
 ROCK CORE PHOTO

**BOREHOLE 15-21C**  
**BORING DATE: 23/11/2016**  
**ROCK CORE DEPTHS: 1.2 to 6.5 METERS**



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 MONTREAL ST CAMPUS

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D3</b>

Drawing  
 BOREHOLE 15-21C  
 ROCK CORE PHOTO

**BOREHOLE 15-47**  
**BORING DATE: 01/12/2015**  
**ROCK CORE DEPTHS: 1.9 to 4.1 METERS**



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 MONTREAL ST CAMPUS

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D4</b>

Drawing  
 BOREHOLE 15-47  
 ROCK CORE PHOTO

**BOREHOLE 16-104 E**  
**BORING DATE: 6/01/2016**  
**ROCK CORE DEPTHS: 0.7 to 5.1 METERS**



32 Steacie Drive Ottawa, ON  
 T: (613) 836-1422 | www.hceng.ca | ottawa@hceng.ca

Project  
 GEOTECHNICAL INVESTIGATION  
 NATIONAL RESEARCH CENTER  
 MONTREAL ST CAMPUS

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D5</b>

Drawing  
 BOREHOLE 16-104E  
 ROCK CORE PHOTO



**BOREHOLE 16-108E**  
**BORING DATE: 12/01/2016**  
**ROCK CORE DEPTHS: 2.4 to 5.8 METERS**



32 Steacie Drive Ottawa, ON  
T: (613) 836-1422 | www.hceng.ca | ottawa@hceng.ca

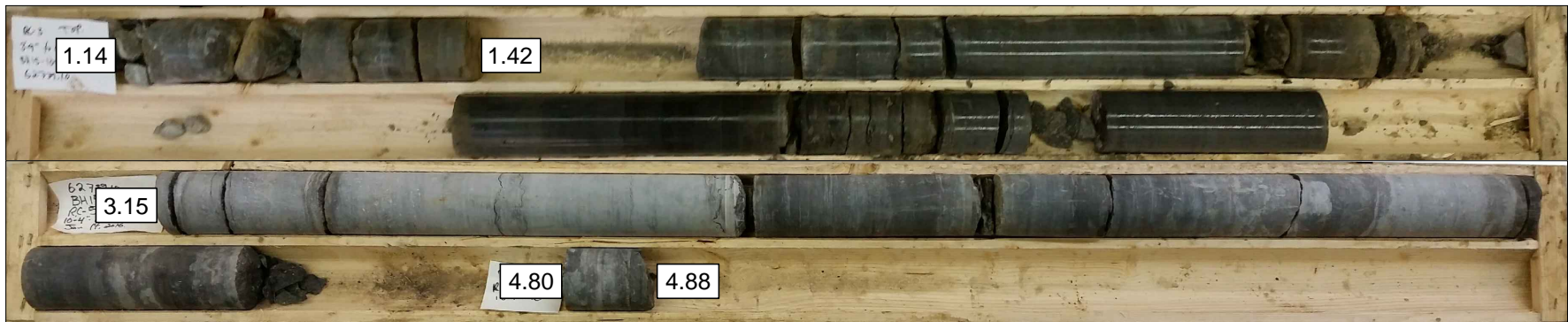
Project  
**GEOTECHNICAL INVESTIGATION  
NATIONAL RESEARCH CENTER  
MONTREAL ST CAMPUS**

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D6</b>

Drawing  
**BOREHOLE 16-108E  
ROCK CORE PHOTO**



**BOREHOLE 16-109E**  
**BORING DATE: 13-14/01/2016**  
**ROCK CORE DEPTHS: 1.1 to 4.9 METERS**



32 Steacie Drive Ottawa, ON  
T: (613) 836-1422 | www.hceng.ca | ottawa@hceng.ca

Project  
**GEOTECHNICAL INVESTIGATION  
NATIONAL RESEARCH CENTER  
MONTREAL ST CAMPUS**

Drwn By B.V.	Chkd By S.B.	Date FEBRUARY 2016
File No. 62739.10	Revision No. 0	<b>FIGURE D7</b>

Drawing  
**BOREHOLE 16-109E  
ROCK CORE PHOTO**



## **APPENDIX E**

### Chemical Testing of Soil

## Certificate of Analysis

**Houle Chevrier**

32 Steacie Drive  
Kanata, ON K2K 2A9  
Attn: Serge Bourque

Client PO:  
Project: 62739.10  
Custody:

Report Date: 11-Jan-2016  
Order Date: 6-Jan-2016

**Order #: 1602118**

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

<b>Parcel ID</b>	<b>Client ID</b>
1602118-01	BH 15-35 SA4
1602118-02	BH 15-8 SA5
1602118-03	BH 15-22 SA3

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis

Report Date: 11-Jan-2016

Client: Houle Chevrier

Order Date: 6-Jan-2016

Client PO:

Project Description: 62739.10

### Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	8-Jan-16	8-Jan-16
Conductivity	MOE E3138 - probe @25 °C, water ext	7-Jan-16	7-Jan-16
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	7-Jan-16	7-Jan-16
Resistivity	EPA 120.1 - probe, water extraction	7-Jan-16	7-Jan-16
Solids, %	Gravimetric, calculation	7-Jan-16	7-Jan-16

**Certificate of Analysis**

Report Date: 11-Jan-2016

Client: Houle Chevrier

Order Date: 6-Jan-2016

Client PO:

**Project Description: 62739.10**

<b>Client ID:</b>	BH 15-35 SA4	BH 15-8 SA5	BH 15-22 SA3	-
<b>Sample Date:</b>	27-Nov-15	01-Dec-15	26-Nov-15	-
<b>Sample ID:</b>	1602118-01	1602118-02	1602118-03	-
<b>MDL/Units</b>	Soil	Soil	Soil	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	92.3	70.8	71.4	-
----------	--------------	------	------	------	---

**General Inorganics**

Conductivity	5 uS/cm	142 [1]	1270 [1]	369 [1]	-
pH	0.05 pH Units	7.90 [1]	7.25 [1]	7.27 [1]	-
Resistivity	0.10 Ohm.m	70.5	7.85	27.1	-

**Anions**

Sulphate	5 ug/g dry	19 [1]	160 [1]	195 [1]	-
----------	------------	--------	---------	---------	---

Certificate of Analysis

Report Date: 11-Jan-2016

Client: Houle Chevrier

Order Date: 6-Jan-2016

Client PO:

**Project Description: 62739.10**
**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Sulphate	ND	5	ug/g						
<b>General Inorganics</b>									
Conductivity	ND	5	uS/cm						
Resistivity	ND	0.10	Ohm.m						

Certificate of Analysis

Report Date: 11-Jan-2016

Client: Houle Chevrier

Order Date: 6-Jan-2016

Client PO:

**Project Description: 62739.10**
**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Sulphate	ND	5	ug/g dry	ND				20	
<b>General Inorganics</b>									
Conductivity	148	5	uS/cm	142			4.1	6.2	
pH	7.88	0.05	pH Units	7.90			0.3	10	
Resistivity	67.7	0.10	Ohm.m	70.5			4.1	20	
<b>Physical Characteristics</b>									
% Solids	89.5	0.1	% by Wt.	91.8			2.6	25	

Certificate of Analysis

Report Date: 11-Jan-2016

Client: Houle Chevrier

Order Date: 6-Jan-2016

Client PO:

**Project Description: 62739.10**
**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Sulphate	96.6	5	ug/g	ND	96.6	78-111			



Certificate of Analysis

Client: **Houle Chevrier**

Client PO:

Report Date: 11-Jan-2016

Order Date: 6-Jan-2016

**Project Description: 62739.10**

**Qualifier Notes:**

***Login Qualifiers :***

Sample - One or more parameter received past hold time - Proceed with analysis

*Applies to samples: BH 15-35 SA4, BH 15-8 SA5, BH 15-22 SA3*

***Sample Qualifiers :***

1 : Holding time had been exceeded upon sample receipt.

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

Client Name: Houle Chevrier Engineering Ltd.	Project Reference: 62739.10	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day Date Required: _____
Contact Name: Serge Bourque	Quote #	
Address: 32 Steacie Drive, Ottawa, Ontario, K2K 2A9	PO #	
Telephone: 613-836-1422	Email Address: sbourque@hce.ca	

Criteria:  O. Reg. 153/04 (As Amended) Table  RSC Filing  O. Reg. 558/00  PWOO  CCME  SUB (Storm)  SUB (Sanitary) Municipality:  Other \_\_\_\_\_

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1602118				Required Analyses													
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PH/SO4	Elec/Resist	250ml x 2									
				Date	Time												
1 BH 15-35 SA 4	S		2	Nov 27/15		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 BH 15-6 SAS	S		2	Dec 1/15		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 BH 15-72 SA3	S		2	Nov 26/15		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments: Proceed with analysis regardless of hold times as per Andrew - RS.

Method of Delivery: walk-in

Relinquished By (Sign): <i>Beel</i>	Received by Driver/Depot: <i>Karin Gull</i>	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Andrew Beel	Date/Time: Jan 6/16 1:39	Date/Time: Jan 6/16 5:35	Date/Time: Jan 6/16 5:43
Date/Time: Jan 6/16 1:35	Temperature: 15.1 °C	Temperature: 12.8 °C	pH Verified <input checked="" type="checkbox"/> By: N/A



## **APPENDIX F**

### Laboratory Certificates of Analysis



**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 15T056416**

**TRACE ORGANICS REVIEWED BY: Gulhan Yalamova, Report Reviewer**

**DATE REPORTED: Jan 06, 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.**



## Certificate of Analysis

AGAT WORK ORDER: 15T056416

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

### PHCs F1 - F4 (Soil)

DATE RECEIVED: 2015-12-24

DATE REPORTED: 2016-01-06

Parameter	Unit	SAMPLE DESCRIPTION:				
		G / S	RDL	BH106 SA2	BH105 SA2	BH105 SA3B
				Soil	Soil	Soil
				12/23/2015	12/23/2015	12/23/2015
				7311454	7311458	7311460
Benzene	µg/g	0.02	<0.02	<0.02	<0.02	<0.02
Toluene	µg/g	0.08	<0.08	<0.08	<0.08	<0.08
Ethylbenzene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05
Xylene Mixture	µg/g	0.05	<0.05	<0.05	<0.05	<0.05
F1 (C6 to C10)	µg/g	5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	5	<5	<5	<5	<5
F2 (C10 to C16)	µg/g	10	<10	<10	<10	2600
F3 (C16 to C34)	µg/g	50	<50	<50	<50	<50
F4 (C34 to C50)	µg/g	50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	50	NA	NA	NA	NA
Moisture Content	%	0.1	19.5	8.8	16.4	16.4
<b>Surrogate</b>	<b>Unit</b>	<b>Acceptable Limits</b>				
Terphenyl	%	60-140	61	103	130	130

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

**7311454-7311460** Results are based on sample dry weight.  
 The C6-C10 fraction is calculated using Toluene response factor.  
 The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
 Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
 The chromatogram has returned to baseline by the retention time of nC50.  
 Total C6 - C50 results are corrected for BTEX contributions.  
 This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
 nC6 and nC10 response factors are within 30% of Toluene response factor.  
 nC10, nC16 and nC34 response factors are within 10% of their average.  
 C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
 Linearity is within 15%.  
 Extraction and holding times were met for this sample.  
 Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.  
 Quality Control Data is available upon request.

**Certified By:**

## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER  
**PROJECT:** 62739.10  
**SAMPLING SITE:**

**AGAT WORK ORDER:** 15T056416  
**ATTENTION TO:** Katherine Rispoli  
**SAMPLED BY:**

### Trace Organics Analysis

RPT Date: Jan 06, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
<b>PHCs F1 - F4 (Soil)</b>															
Benzene	7312041		< 0.02	< 0.02	NA	< 0.02	109%	60%	130%	114%	60%	130%	118%	60%	130%
Toluene	7312041		< 0.08	< 0.08	NA	< 0.08	95%	60%	130%	105%	60%	130%	127%	60%	130%
Ethylbenzene	7312041		< 0.05	< 0.05	NA	< 0.05	98%	60%	130%	111%	60%	130%	121%	60%	130%
Xylene Mixture	7312041		< 0.05	< 0.05	NA	< 0.05	103%	60%	130%	120%	60%	130%	124%	60%	130%
F1 (C6 to C10)	7312041		< 5	< 5	NA	< 5	110%	60%	130%	103%	85%	115%	99%	70%	130%
F2 (C10 to C16)	7310053		< 10	< 10	NA	< 10	107%	60%	130%	98%	80%	120%	100%	70%	130%
F3 (C16 to C34)	7310053		< 50	< 50	NA	< 50	104%	60%	130%	95%	80%	120%	103%	70%	130%
F4 (C34 to C50)	7310053		< 50	< 50	NA	< 50	92%	60%	130%	98%	80%	120%	97%	70%	130%

Comments: The soil sample was prepared in the lab using the Methanol extraction technique. The sample was not field preserved with methanol and an Encore was not provided for analysis.

When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

**Certified By:** \_\_\_\_\_





## Method Summary

CLIENT NAME: HOULE CHEVRIER

AGAT WORK ORDER: 15T056416

PROJECT: 62739.10

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID



# AGAT

## Laboratories

*Log Cabin*

5835 Coopers Avenue  
Mississauga, Ontario L4Z 1Y2  
Ph: 905.742.5100 Fax: 905.742.5122  
www.agatlabs.com webearth.agatlabs.com

### Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

#### Report Information:

Company: HAEC  
Contact: K. BISPOLI  
Address: 32 GREVILLE DR.  
OTTAWA, ON  
(613) 836-1422 Fax: \_\_\_\_\_  
Phone: Krispoli@hencor.ca  
Reports to be sent to: Spekkey@hencor.ca  
1. Email: \_\_\_\_\_  
2. Email: \_\_\_\_\_

#### Project Information:

Project: 62239.10  
Site Location: \_\_\_\_\_  
Sampled By: \_\_\_\_\_  
AGAT Quote #: \_\_\_\_\_  
PO: \_\_\_\_\_

#### Invoice Information:

Bill To Same: Yes  No   
Company: \_\_\_\_\_  
Contact: \_\_\_\_\_  
Address: \_\_\_\_\_  
Email: \_\_\_\_\_

#### Regulatory Requirements:

(Please check all applicable boxes)  
 Regulation 153/04  
Table \_\_\_\_\_ Indicate One  
 Sewer Use  
 Sanitary  
 Storm  
 Agriculture  
Soil Texture (Check one)  
 Coarse  
 Fine  
 Regulation 558  
 CCME  
 Prov. Water Quality Objectives (PWQO)  
 Other  
Region \_\_\_\_\_ Indicate one

Is this submission for a Record of Site Condition?

Yes  NO

Report Guideline on Certificate of Analysis

Yes  NO

#### Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	(Check Applicable)	Volatiles	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
BH106 SA2	23/12/15		2	S					ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr* <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO <sub>3</sub> /NO <sub>2</sub> <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR		<input checked="" type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM									
BH105 SA2	23/12/15		2	S					Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH <sub>3</sub> <input type="checkbox"/> TKN <input type="checkbox"/> NO <sub>3</sub> <input type="checkbox"/> NO <sub>2</sub> <input type="checkbox"/> NO <sub>3</sub> /NO <sub>2</sub>		<input checked="" type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM									
BH105 SA3B	23/12/15		2	S							<input checked="" type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM									

#### Laboratory Use

Work Order #: \_\_\_\_\_  
Cooler Quantity: 15TOS6416  
Arrival Temperature: 8.4 8.4 8.1  
Custody Seal Intact:  Yes  No  N/A  
Notes: \_\_\_\_\_

#### Turnaround Time (TAT) Required:

Regular TAT  5 to 7 Business Days  
Rush TAT (Rush Surcharges Apply)  
 3 Business Days  2 Business Days  1 Business Day  
OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
\*TAT is exclusive of weekends and statutory holidays

Samples Requisitioned By (Print Name and Sign): K. Rispoli Date: 23/12/15 Time: \_\_\_\_\_  
Samples Received By (Print Name and Sign): S. Sina Date: 24/12/15 Time: 11:00  
Page 011397 of \_\_\_\_\_  
No. T011397



**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 16T058448**

**TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor**

**DATE REPORTED: Jan 18, 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.**



## Certificate of Analysis

AGAT WORK ORDER: 16T058448

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

### PHCs F1 - F4 (Soil)

DATE RECEIVED: 2016-01-11

DATE REPORTED: 2016-01-18

SAMPLE DESCRIPTION: BH15-111 SA-3

SAMPLE TYPE: Soil

DATE SAMPLED: 1/8/2015

Parameter	Unit	G / S	RDL	7320088
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.08	<0.08
Ethylbenzene	µg/g		0.05	<0.05
Xylene Mixture	µg/g		0.05	<0.05
F1 (C6 to C10)	µg/g		5	<5
F1 (C6 to C10) minus BTEX	µg/g		5	<5
F2 (C10 to C16)	µg/g		10	<10
F3 (C16 to C34)	µg/g		50	<50
F4 (C34 to C50)	µg/g		50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	30.8
<b>Surrogate</b>	<b>Unit</b>	<b>Acceptable Limits</b>		
Terphenyl	%	60-140		107

**Comments:**

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

**7320088**

Results are based on sample dry weight.  
The C6-C10 fraction is calculated using Toluene response factor.  
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
The chromatogram has returned to baseline by the retention time of nC50.  
Total C6 - C50 results are corrected for BTEX contributions.  
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
nC6 and nC10 response factors are within 30% of Toluene response factor.  
nC10, nC16 and nC34 response factors are within 10% of their average.  
C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
Linearity is within 15%.  
Extraction and holding times were met for this sample.  
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.  
Quality Control Data is available upon request.

**Certified By:**

## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER  
**PROJECT:** 62739.10  
**SAMPLING SITE:**

**AGAT WORK ORDER:** 16T058448  
**ATTENTION TO:** Katherine Rispoli  
**SAMPLED BY:**

### Trace Organics Analysis

RPT Date: Jan 18, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
<b>PHCs F1 - F4 (Soil)</b>															
Benzene	7315670		< 0.02	< 0.02	NA	< 0.02	115%	60%	130%	109%	60%	130%	96%	60%	130%
Toluene	7315670		< 0.08	< 0.08	NA	< 0.08	108%	60%	130%	106%	60%	130%	95%	60%	130%
Ethylbenzene	7315670		< 0.05	< 0.05	NA	< 0.05	116%	60%	130%	111%	60%	130%	97%	60%	130%
Xylene Mixture	7315670		< 0.05	< 0.05	NA	< 0.05	116%	60%	130%	114%	60%	130%	99%	60%	130%
F1 (C6 to C10)	7315670		< 5	< 5	NA	< 5	99%	60%	130%	101%	85%	115%	113%	70%	130%
F2 (C10 to C16)	7324497		< 10	< 10	NA	< 10	95%	60%	130%	99%	80%	120%	100%	70%	130%
F3 (C16 to C34)	7324497		< 50	< 50	NA	< 50	102%	60%	130%	101%	80%	120%	99%	70%	130%
F4 (C34 to C50)	7324497		< 50	< 50	NA	< 50	81%	60%	130%	100%	80%	120%	94%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable(NA).

**Certified By:** \_\_\_\_\_



## Method Summary

**CLIENT NAME: HOULE CHEVRIER**
**AGAT WORK ORDER: 16T058448**
**PROJECT: 62739.10**
**ATTENTION TO: Katherine Rispoli**
**SAMPLING SITE:**
**SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID

## Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

**Report Information:**  
 Company: HOUSE CHEVRIER ENGINEERING LTD.  
 Contact: K. RISPOLI  
 Address: 32 STEACIE DRIVE  
OTTAWA, ON

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Reports to be sent to:  
 1. Email: Krispoli@hcheng.ca  
 2. Email: spelkey@hcheng.ca

**Project Information:**  
 Project: \_\_\_\_\_  
 Site Location: 62739.10  
 Sampled By: \_\_\_\_\_

AGAT Quote #: \_\_\_\_\_ PO: \_\_\_\_\_  
 Please note: If quotation number is not provided, client will be billed full price for analysis.

**Invoice Information:**

Bill To Same: Yes  No

Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Email: \_\_\_\_\_

**Sample Matrix Legend**  
 B Biota  
 GW Ground Water  
 O Oil  
 P Paint  
 S Soil  
 SD Sediment  
 SW Surface Water

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

Report Guideline on Certificate of Analysis  
 Yes  No

**Regulatory Requirements:**  No Regulatory Requirement  
 (Please check all applicable boxes)

Regulation 153/04  
 Table \_\_\_\_\_ Indicate One  
 Sewer Use  
 Sanitary  
 Storm  
 Agriculture  
 Coarse  
 Fine  
 Region \_\_\_\_\_ Indicate One  
 Regulation 558  
 CCME  
 Prov. Water Quality Objectives (PWQO)  
 Other \_\_\_\_\_ Indicate One

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr* <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub> <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH <sub>3</sub> <input type="checkbox"/> TKN <input type="checkbox"/> NO <sub>3</sub> <input type="checkbox"/> NO <sub>2</sub> <input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub>	Volatiles: <input type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
BH15-111 SA-3	JAN 8/15		2	S																	

Samples Received By (Print Name and Sign): K. RISPOLI Date: JAN 8/15 Time: \_\_\_\_\_  
 Samples Received By (Print Name and Sign): [Signature] Date: 1/11/16 Time: 9:35  
 Samples Received By (Print Name and Sign): \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Page \_\_\_\_\_ of \_\_\_\_\_  
 No: **T017205**  
 Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT  
 QW-75-1011-005

**Laboratory Use Only**  
 Work Order #: 16T058448  
 Cooler Quantity: \_\_\_\_\_  
 Arrival Temperatures: 9 | 5.9 | 9.1  
 Custody Seal Intact:  Yes  No  N/A  
 Notes: \_\_\_\_\_

**Turnaround Time (TAT) Required:**  
 Regular TAT  5 to 7 Business Days  
 Rush TAT (Rush Surcharges Apply)  
 3 Business Days  2 Business Days  1 Business Day  
 OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_  
 Please provide prior notification for rush TAT  
 \*TAT is exclusive of weekends and statutory holidays

**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 16T060260**

**TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist**

**DATE REPORTED: Jan 22, 2016**

**PAGES (INCLUDING COVER): 9**

**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.**



## Certificate of Analysis

AGAT WORK ORDER: 16T060260

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

### PHCs F1 - F4 (-BTEX) (Soil)

DATE RECEIVED: 2016-01-16

DATE REPORTED: 2016-01-22

SAMPLE DESCRIPTION: BH102 SA-2

SAMPLE TYPE: Soil

DATE SAMPLED: 1/15/2016

7329966

Parameter	Unit	G / S	RDL	7329966
F1 (C6 to C10)	µg/g		5	<5
F1 (C6 to C10) minus BTEX	µg/g		5	<5
F2 (C10 to C16)	µg/g		10	<10
F3 (C16 to C34)	µg/g		50	<50
F4 (C34 to C50)	µg/g		50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	4.4

Surrogate	Unit	Acceptable Limits
Terphenyl	%	60-140 85

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

7329966

Results are based on sample dry weight.  
The C6-C10 fraction is calculated using toluene response factor.  
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
The chromatogram has returned to baseline by the retention time of nC50.  
Total C6 - C50 results are corrected for BTEX contributions.  
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
nC6 and nC10 response factors are within 30% of Toluene response factor.  
nC10, nC16 and nC34 response factors are within 10% of their average.  
C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
Linearity is within 15%.  
Extraction and holding times were met for this sample.  
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 16T060260

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

### Volatile Organic Compounds in Soil

DATE RECEIVED: 2016-01-16

DATE REPORTED: 2016-01-22

SAMPLE DESCRIPTION: BH102 SA-2

SAMPLE TYPE: Soil

DATE SAMPLED: 1/15/2016

7329966

Parameter	Unit	G / S	RDL	7329966
Dichlorodifluoromethane	ug/g		0.05	<0.05
Chloromethane	ug/g		0.11	<0.11
Vinyl Chloride	ug/g		0.02	<0.02
Bromomethane	ug/g		0.05	<0.05
Chloroethane	ug/g		0.08	<0.08
Trichlorofluoromethane	ug/g		0.05	<0.05
Acetone	ug/g		0.50	<0.50
1,1-Dichloroethylene	ug/g		0.05	<0.05
Methylene Chloride	ug/g		0.05	<0.05
TRANS-1,2-Dichloroethylene	ug/g		0.05	<0.05
Methyl tert-butyl Ether	ug/g		0.05	<0.05
1,1-Dichloroethane	ug/g		0.02	<0.02
Methyl Ethyl Ketone	ug/g		0.50	<0.50
CIS 1,2-Dichloroethylene	ug/g		0.02	<0.02
Chloroform	ug/g		0.04	<0.04
1,2-Dichloroethane	ug/g		0.03	<0.03
1,1,1-Trichloroethane	ug/g		0.05	<0.05
Carbon Tetrachloride	ug/g		0.05	<0.05
Benzene	ug/g		0.02	<0.02
1,2-Dichloropropane	ug/g		0.03	<0.03
Trichloroethylene	ug/g		0.03	<0.03
Bromodichloromethane	ug/g		0.04	<0.04
CIS-1,3-Dichloropropene	ug/g		0.05	<0.05
Methyl Isobutyl Ketone	ug/g		0.50	<0.50
TRANS-1,3-Dichloropropene	ug/g		0.04	<0.04
1,1,2-Trichloroethane	ug/g		0.04	<0.04
Toluene	ug/g		0.05	<0.05
2-Hexanone	ug/g		0.26	<0.26
Dibromochloromethane	ug/g		0.03	<0.03
Ethylene Dibromide	ug/g		0.04	<0.04

Certified By:





## Certificate of Analysis

AGAT WORK ORDER: 16T060260

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

### Volatile Organic Compounds in Soil

DATE RECEIVED: 2016-01-16

DATE REPORTED: 2016-01-22

SAMPLE DESCRIPTION: BH102 SA-2

SAMPLE TYPE: Soil

DATE SAMPLED: 1/15/2016

7329966

Parameter	Unit	G / S	RDL	7329966
Tetrachloroethylene	ug/g		0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g		0.04	<0.04
Chlorobenzene	ug/g		0.05	<0.05
Ethylbenzene	ug/g		0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05
Bromoform	ug/g		0.03	<0.03
Styrene	ug/g		0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g		0.05	<0.05
o-Xylene	ug/g		0.05	<0.05
1,3-Dichlorobenzene	ug/g		0.05	<0.05
1,4-Dichlorobenzene	ug/g		0.05	<0.05
1,2-Dichlorobenzene	ug/g		0.05	<0.05
1,2,4-Trichlorobenzene	ug/g		0.05	<0.05
Xylene Mixture (Total)	ug/g		0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g		0.04	<0.04
n-Hexane	µg/g		0.05	<0.05
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	60-130	105	
4-Bromofluorobenzene	% Recovery	70-130	89	

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

7329966

The sample was analysed using the high level technique. The sample was extracted in the lab using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.

**Certified By:**

## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER

**AGAT WORK ORDER:** 16T060260

**PROJECT:** 62739.10

**ATTENTION TO:** Katherine Rispoli

**SAMPLING SITE:**

**SAMPLED BY:**

### Trace Organics Analysis

RPT Date: Jan 22, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

**Volatile Organic Compounds in Soil**

Dichlorodifluoromethane	7236400	< 0.05	< 0.05	NA	< 0.05	77%	60%	130%	88%	60%	130%	86%	60%	130%
Chloromethane	7236400	< 0.11	< 0.11	NA	< 0.11	85%	60%	130%	84%	60%	130%	74%	60%	130%
Vinyl Chloride	7236400	< 0.02	< 0.02	NA	< 0.02	84%	60%	130%	84%	60%	130%	83%	60%	130%
Bromomethane	7236400	< 0.05	< 0.05	NA	< 0.05	76%	60%	130%	81%	60%	130%	81%	60%	130%
Chloroethane	7236400	< 0.08	< 0.08	NA	< 0.08	83%	60%	130%	83%	60%	130%	85%	60%	130%
Trichlorofluoromethane	7236400	< 0.05	< 0.05	NA	< 0.05	92%	60%	130%	90%	60%	130%	85%	60%	130%
Acetone	7236400	< 0.50	< 0.50	NA	< 0.50	105%	60%	130%	107%	60%	130%	115%	60%	130%
1,1-Dichloroethylene	7236400	< 0.05	< 0.05	NA	< 0.05	77%	60%	130%	77%	60%	130%	97%	60%	130%
Methylene Chloride	7236400	< 0.05	< 0.05	NA	< 0.05	86%	60%	130%	99%	60%	130%	113%	60%	130%
TRANS-1,2-Dichloroethylene	7236400	< 0.05	< 0.05	NA	< 0.05	98%	60%	130%	96%	60%	130%	123%	60%	130%
Methyl tert-butyl Ether	7236400	< 0.05	< 0.05	NA	< 0.05	116%	60%	130%	92%	60%	130%	120%	60%	130%
1,1-Dichloroethane	7236400	< 0.02	< 0.02	NA	< 0.02	93%	60%	130%	87%	60%	130%	109%	60%	130%
Methyl Ethyl Ketone	7236400	< 0.50	< 0.50	NA	< 0.50	95%	60%	130%	96%	60%	130%	113%	60%	130%
CIS-1,2-Dichloroethylene	7236400	< 0.02	< 0.02	NA	< 0.02	102%	60%	130%	118%	60%	130%	119%	60%	130%
Chloroform	7236400	< 0.04	< 0.04	NA	< 0.04	109%	60%	130%	120%	60%	130%	107%	60%	130%
1,2-Dichloroethane	7236400	< 0.03	< 0.03	NA	< 0.03	111%	60%	130%	118%	60%	130%	121%	60%	130%
1,1,1-Trichloroethane	7236400	< 0.05	< 0.05	NA	< 0.05	75%	60%	130%	91%	60%	130%	105%	60%	130%
Carbon Tetrachloride	7236400	< 0.05	< 0.05	NA	< 0.05	95%	60%	130%	87%	60%	130%	118%	60%	130%
Benzene	7236400	< 0.02	< 0.02	NA	< 0.02	79%	60%	130%	82%	60%	130%	118%	60%	130%
1,2-Dichloropropane	7236400	< 0.03	< 0.03	NA	< 0.03	105%	60%	130%	98%	60%	130%	119%	60%	130%
Trichloroethylene	7236400	< 0.03	< 0.03	NA	< 0.03	89%	60%	130%	91%	60%	130%	110%	60%	130%
Bromodichloromethane	7236400	< 0.04	< 0.04	NA	< 0.04	105%	60%	130%	94%	60%	130%	100%	60%	130%
CIS-1,3-Dichloropropene	7236400	< 0.05	< 0.05	NA	< 0.05	99%	60%	130%	80%	60%	130%	85%	60%	130%
Methyl Isobutyl Ketone	7236400	< 0.50	< 0.50	NA	< 0.50	106%	60%	130%	118%	60%	130%	107%	60%	130%
TRANS-1,3-Dichloropropene	7236400	< 0.04	< 0.04	NA	< 0.04	96%	60%	130%	85%	60%	130%	74%	60%	130%
1,1,2-Trichloroethane	7236400	< 0.04	< 0.04	NA	< 0.04	119%	60%	130%	111%	60%	130%	102%	60%	130%
Toluene	7236400	< 0.05	< 0.05	NA	< 0.05	88%	60%	130%	93%	60%	130%	95%	60%	130%
2-Hexanone	7236400	< 0.26	< 0.26	NA	< 0.26	113%	60%	130%	115%	60%	130%	101%	60%	130%
Dibromochloromethane	7236400	< 0.03	< 0.03	NA	< 0.03	105%	60%	130%	98%	60%	130%	81%	60%	130%
Ethylene Dibromide	7236400	< 0.04	< 0.04	NA	< 0.04	114%	60%	130%	104%	60%	130%	96%	60%	130%
Tetrachloroethylene	7236400	< 0.05	< 0.05	NA	< 0.05	81%	60%	130%	86%	60%	130%	84%	60%	130%
1,1,1,2-Tetrachloroethane	7236400	< 0.04	< 0.04	NA	< 0.04	95%	60%	130%	94%	60%	130%	78%	60%	130%
Chlorobenzene	7236400	< 0.05	< 0.05	NA	< 0.05	100%	60%	130%	102%	60%	130%	97%	60%	130%
Ethylbenzene	7236400	< 0.05	< 0.05	NA	< 0.05	93%	60%	130%	97%	60%	130%	91%	60%	130%
m & p-Xylene	7236400	< 0.05	< 0.05	NA	< 0.05	99%	60%	130%	103%	60%	130%	95%	60%	130%
Bromoform	7236400	< 0.03	< 0.03	NA	< 0.03	113%	60%	130%	94%	60%	130%	72%	60%	130%
Styrene	7236400	< 0.05	< 0.05	NA	< 0.05	92%	60%	130%	95%	60%	130%	91%	60%	130%
1,1,2,2-Tetrachloroethane	7236400	< 0.05	< 0.05	NA	< 0.05	108%	60%	130%	120%	60%	130%	106%	60%	130%
o-Xylene	7236400	< 0.05	< 0.05	NA	< 0.05	102%	60%	130%	104%	60%	130%	98%	60%	130%



## Quality Assurance

CLIENT NAME: HOULE CHEVRIER  
 PROJECT: 62739.10  
 SAMPLING SITE:

AGAT WORK ORDER: 16T060260  
 ATTENTION TO: Katherine Rispoli  
 SAMPLED BY:

### Trace Organics Analysis (Continued)

RPT Date: Jan 22, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
1,3-Dichlorobenzene	7236400		< 0.05	< 0.05	NA	< 0.05	101%	60%	130%	100%	60%	130%	89%	60%	130%	
1,4-Dichlorobenzene	7236400		< 0.05	< 0.05	NA	< 0.05	104%	60%	130%	104%	60%	130%	93%	60%	130%	
1,2-Dichlorobenzene	7236400		< 0.05	< 0.05	NA	< 0.05	107%	60%	130%	105%	60%	130%	91%	60%	130%	
1,2,4-Trichlorobenzene	7236400		< 0.05	< 0.05	NA	< 0.05	92%	60%	130%	92%	60%	130%	75%	60%	130%	
1,3-Dichloropropene (Cis + Trans)	7236400		< 0.04	< 0.04	NA	< 0.04	98%	60%	130%	83%	60%	130%	80%	60%	130%	
n-Hexane	7236400		< 0.05	< 0.05	NA	< 0.05	97%	60%	130%	104%	60%	130%	78%	60%	130%	
<b>PHCs F1 - F4 (-BTEX) (Soil)</b>																
F1 (C6 to C10)	7328028		< 5	< 5	NA	< 5	82%	60%	130%	89%	85%	115%	94%	70%	130%	
F2 (C10 to C16)	7323931		< 10	< 10	NA	< 10	100%	60%	130%	100%	80%	120%	99%	70%	130%	
F3 (C16 to C34)	7323931		< 50	< 50	NA	< 50	102%	60%	130%	99%	80%	120%	101%	70%	130%	
F4 (C34 to C50)	7323931		< 50	< 50	NA	< 50	84%	60%	130%	94%	80%	120%	100%	70%	130%	

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

**Certified By:**

## Method Summary

**CLIENT NAME: HOULE CHEVRIER**
**AGAT WORK ORDER: 16T060260**
**PROJECT: 62739.10**
**ATTENTION TO: Katherine Rispoli**
**SAMPLING SITE:**
**SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P & T GC / FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method, SW846 5035	P & T GC / FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	GRAVIMETRIC ANALYSIS
Moisture Content	VOL-91-5009	CCME Tier 1 Method, SW846 5035,8015	BALANCE
Terphenyl	VOL-91-5009		GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
TRANS-1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
CIS 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Benzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
CIS-1,3-Dichloropropene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
TRANS-1,3-Dichloropropene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
2-Hexanone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1,2,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS

## Method Summary

CLIENT NAME: HOULE CHEVRIER

AGAT WORK ORDER: 16T060260

PROJECT: 62739.10

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,4-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2,4-Trichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Xylene Mixture (Total)	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS





**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli; Shaun Pelkey**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 16Z059332**

**TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor**

**DATE REPORTED: Jan 20, 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.**



## Certificate of Analysis

AGAT WORK ORDER: 16Z059332

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli; Shaun Pelkey

SAMPLING SITE:

SAMPLED BY:

### PHCs F1 - F4 (Soil)

DATE RECEIVED: 2016-01-13

DATE REPORTED: 2016-01-20

SAMPLE DESCRIPTION: BH15-108 SA-3 BH15-110 SA-3

Parameter	Unit	SAMPLE TYPE: Soil		DATE SAMPLED: 1/12/2016	
		G / S	RDL	7326083	7326087
Benzene	µg/g		0.02	<0.02	<0.02
Toluene	µg/g		0.08	<0.08	<0.08
Ethylbenzene	µg/g		0.05	<0.05	<0.05
Xylene Mixture	µg/g		0.05	<0.05	<0.05
F1 (C6 to C10)	µg/g		5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g		5	<5	<5
F2 (C10 to C16)	µg/g		10	<10	<10
F3 (C16 to C34)	µg/g		50	<50	<50
F4 (C34 to C50)	µg/g		50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA
Moisture Content	%		0.1	8.2	28.5
Surrogate	Unit	Acceptable Limits			
Terphenyl	%	60-140		98	82

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

**7326083-7326087** Results are based on sample dry weight.  
 The C6-C10 fraction is calculated using Toluene response factor.  
 The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
 Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
 The chromatogram has returned to baseline by the retention time of nC50.  
 Total C6 - C50 results are corrected for BTEX contributions.  
 This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
 nC6 and nC10 response factors are within 30% of Toluene response factor.  
 nC10, nC16 and nC34 response factors are within 10% of their average.  
 C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
 Linearity is within 15%.  
 Extraction and holding times were met for this sample.  
 Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.  
 Quality Control Data is available upon request.

**Certified By:**



## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER  
**PROJECT:** 62739.10  
**SAMPLING SITE:**

**AGAT WORK ORDER:** 16Z059332  
**ATTENTION TO:** Katherine Rispoli; Shaun Pelkey  
**SAMPLED BY:**

### Trace Organics Analysis

RPT Date: Jan 20, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
<b>PHCs F1 - F4 (Soil)</b>															
Benzene	7319431		0.06	0.08	NA	< 0.02	115%	60%	130%	109%	60%	130%	96%	60%	130%
Toluene	7319431		< 0.08	< 0.08	NA	< 0.08	108%	60%	130%	106%	60%	130%	95%	60%	130%
Ethylbenzene	7319431		< 0.05	< 0.05	NA	< 0.05	116%	60%	130%	111%	60%	130%	97%	60%	130%
Xylene Mixture	7319431		< 0.05	< 0.05	NA	< 0.05	116%	60%	130%	114%	60%	130%	99%	60%	130%
F1 (C6 to C10)	7319431		< 5	< 5	NA	< 5	99%	60%	130%	101%	85%	115%	113%	70%	130%
F2 (C10 to C16)	7324497		< 10	< 10	NA	< 10	95%	60%	130%	99%	80%	120%	100%	70%	130%
F3 (C16 to C34)	7324497		< 50	< 50	NA	< 50	102%	60%	130%	101%	80%	120%	99%	70%	130%
F4 (C34 to C50)	7324497		< 50	< 50	NA	< 50	81%	60%	130%	100%	80%	120%	94%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable(NA).

**Certified By:** \_\_\_\_\_



## Method Summary

**CLIENT NAME: HOULE CHEVRIER**
**AGAT WORK ORDER: 16Z059332**
**PROJECT: 62739.10**
**ATTENTION TO: Katherine Rispoli; Shaun Pelkey**
**SAMPLING SITE:**
**SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID



# AGAT

## Laboratories

Short Holding Time  
Unpreserved Soil for  
Volatiles

5835 Coopers Avenue  
Mississauga, Ontario L4Z 1V2  
Ph: 905.712.5100 Fax: 905.712.5122  
web@earth.agatabs.com

### Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

**Report Information:**  
 Company: MOULE CHEVRIER SAS LTD.  
 Contact: K. RISPOLL  
 Address: 32 STEACIE ST. DRYDEN, ON  
 Phone: (613) 836-1422 Fax: \_\_\_\_\_  
 Reports to be sent to: Krispoll Cheng, ca  
 1. Email: \_\_\_\_\_  
 2. Email: Spelkey@cheng.ca

**Project Information:**  
 Project: 62789.1D  
 Site Location: \_\_\_\_\_  
 Sampled By: \_\_\_\_\_  
 AGAT Quote #: \_\_\_\_\_ PO: \_\_\_\_\_

**Invoice Information:**  
 Company: \_\_\_\_\_ Bill To Same: Yes  No   
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Email: \_\_\_\_\_

**Regulatory Requirements:** (Please check all applicable boxes)

Regulation 153/04  
 Table \_\_\_\_\_ Indicate One  
 Sewer Use  
 Sanitary  
 Storm  
 Prov. Water Quality Objectives (PWQO)  
 Other \_\_\_\_\_ Indicate One

Regulation 558  
 CCME  
 Other \_\_\_\_\_ Indicate One

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

Report Guideline on Certificate of Analysis  
 Yes  No

- Sample Matrix Legend**
- B Biota
  - GW Ground Water
  - O Oil
  - P Paint
  - S Soil
  - SD Sediment
  - SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr6+ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO <sub>3</sub> /NO <sub>2</sub> <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH <sub>3</sub> <input type="checkbox"/> TKN <input type="checkbox"/> NO <sub>3</sub> <input type="checkbox"/> NO <sub>2</sub> <input type="checkbox"/> NO <sub>x</sub> /NO <sub>2</sub>	Volatiles: <input type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use		
BH15-108 SA-3	JANU 16	11AM	2	S																		
BH15-110 SA-3	JANU 16	11AM	2	S																		

Samples Received By (Print Name and Sign): K. RISPOLL Date: 16/1/14 Time: \_\_\_\_\_

Samples Received By (Print Name and Sign): Simone Date: 13-Jan-16 Time: 14h15

Samples Received By (Print Name and Sign): Benjamin Date: 16/1/14 Time: 9:00

Page 1 of 1

Document ID: DM-79-1211-009

Pink Copy - Client 1 Yellow Copy - AGAT 1 White Copy - AGAT

Date Rec'd: JAN 16 2015

017207

**Laboratory Use Only**

Work Order #: 167059332

Cooler Quantity: 1

Arrival Temperatures: 7.0 | 6.8 | 6.5

Custody Seal Intact:  Yes  No  N/A

Notes: 7 | 6.2 | 6.3

**Turnaround Time (TAT) Required:**

Regular TAT  5 to 7 Business Days

Rush TAT (Rush Surcharges Apply):  
 3 Business Days  2 Business Days  1 Business Day

OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
 \*TAT is exclusive of weekends and statutory holidays



**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli, Shaun McEwen**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 16Z059663**

**TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor**

**DATE REPORTED: Jan 20, 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.**



## Certificate of Analysis

AGAT WORK ORDER: 16Z059663

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli, Shaun McEwen

SAMPLING SITE:

SAMPLED BY:

### PHCs F1 - F4 (Soil)

DATE RECEIVED: 2016-01-14

DATE REPORTED: 2016-01-20

SAMPLE DESCRIPTION: BH15-109 SA2

SAMPLE TYPE: Soil

DATE SAMPLED: 1/13/2016

Parameter	Unit	G / S	RDL	7329469
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.08	<0.08
Ethylbenzene	µg/g		0.05	<0.05
Xylene Mixture	µg/g		0.05	<0.05
F1 (C6 to C10)	µg/g		5	<5
F1 (C6 to C10) minus BTEX	µg/g		5	<5
F2 (C10 to C16)	µg/g		10	<10
F3 (C16 to C34)	µg/g		50	<50
F4 (C34 to C50)	µg/g		50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	19.5
Surrogate	Unit	Acceptable Limits		
Terphenyl	%	60-140		104

**Comments:**

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

**7329469**

The soil sample was prepared in the lab using the Methanol extraction technique. The sample was not field preserved with methanol and an Encore was not provided for analysis. Results are based on sample dry weight.  
The C6-C10 fraction is calculated using Toluene response factor.  
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.  
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.  
The chromatogram has returned to baseline by the retention time of nC50.  
Total C6 - C50 results are corrected for BTEX contributions.  
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
nC6 and nC10 response factors are within 30% of Toluene response factor.  
nC10, nC16 and nC34 response factors are within 10% of their average.  
C50 response factor is within 70% of nC10 + nC16 + nC34 average.  
Linearity is within 15%.  
Extraction and holding times were met for this sample.  
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.  
Quality Control Data is available upon request.

**Certified By:**

## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER  
**PROJECT:** 62739.10  
**SAMPLING SITE:**

**AGAT WORK ORDER:** 16Z059663  
**ATTENTION TO:** Katherine Rispoli, Shaun McEwen  
**SAMPLED BY:**

### Trace Organics Analysis

RPT Date: Jan 20, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
<b>PHCs F1 - F4 (Soil)</b>															
Benzene	7328028		< 0.02	< 0.02	NA	< 0.02	94%	60%	130%	63%	60%	130%	84%	60%	130%
Toluene	7328028		< 0.08	< 0.08	NA	< 0.08	95%	60%	130%	61%	60%	130%	87%	60%	130%
Ethylbenzene	7328028		< 0.05	< 0.05	NA	< 0.05	98%	60%	130%	61%	60%	130%	82%	60%	130%
Xylene Mixture	7328028		< 0.05	< 0.05	NA	< 0.05	99%	60%	130%	68%	60%	130%	84%	60%	130%
F1 (C6 to C10)	7328028		< 5	< 5	NA	< 5	82%	60%	130%	89%	85%	115%	94%	70%	130%
F2 (C10 to C16)	7324497		< 10	< 10	NA	< 10	95%	60%	130%	99%	80%	120%	100%	70%	130%
F3 (C16 to C34)	7324497		< 50	< 50	NA	< 50	102%	60%	130%	101%	80%	120%	99%	70%	130%
F4 (C34 to C50)	7324497		< 50	< 50	NA	< 50	81%	60%	130%	100%	80%	120%	94%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable(NA).

**Certified By:** \_\_\_\_\_





## Method Summary

CLIENT NAME: HOULE CHEVRIER

AGAT WORK ORDER: 16Z059663

PROJECT: 62739.10

ATTENTION TO: Katherine Rispoli, Shaun McEwen

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID





# AGAT

## Laboratories

Short Holding Time  
Less Cooler

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

### Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

#### Report Information:

Company: MOORE CHEVRIER ENV LTD.  
Contact: K. RISPOLD  
Address: 82 STEACIES DR  
OTCHUWA, ON  
Phone: (613) 830-1422 Fax: \_\_\_\_\_  
Reports to be sent to: Krippoli@mceng.ca  
1. Email: Spelkey@mceng.ca  
2. Email: \_\_\_\_\_

#### Project Information:

Project: \_\_\_\_\_  
Site Location: 627-39.10  
Sampled By: \_\_\_\_\_  
AGAT Quote #: \_\_\_\_\_  
PO: \_\_\_\_\_  
Please note: if quotation number is not provided, client will be billed full price for analysis

#### Invoice Information:

Bill To Same: Yes  No   
Company: \_\_\_\_\_  
Contact: \_\_\_\_\_  
Address: \_\_\_\_\_  
Email: \_\_\_\_\_

#### Regulatory Requirements:

(Please check all applicable boxes)  
 Regulation 153/04  
 Sewer Use  
 Sanitary  
 Storm  
 CCME  
 Prov. Water Quality Objectives (PWQO)  
 Other  
 Regulation 558  
 Sanitary  
 Storm  
 Other  
 Coarse  
 Fine  
 Coarse  
 Fine

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

Report Guideline on Certificate of Analysis  
 Yes  No

#### Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix
<u>BH15109 SA 2 JAOB1/6</u>	<u>PM</u>	<u>2</u>	<u>5</u>	

Comments/Special Instructions

- Metals and Inorganics
- Metal Scan
- Hydride Forming Metals
- Client Custom Metals
- ORPs:  B-HWS  Cl  CN  Cr<sup>6+</sup>  EC  FOC  NO<sub>3</sub>/NO<sub>2</sub>  Total N  Hg  pH  SAR
- Nutrients:  TP  NH<sub>3</sub>  TKN  NO<sub>3</sub>  NO<sub>2</sub>  NO<sub>3</sub>/NO<sub>2</sub>
- Volatiles:  VOC  BTEX  THM
- CCME Fractions 1 to 4
- ABNs
- PAHs
- Chlorophenols
- PCBs
- Organochlorine Pesticides
- TCLP Metals/Inorganics
- Sewer Use

#### Laboratory Use Only

Work Order #: 1670591603  
Cooler Quantity: 1  
Arrival Temperatures: 9.6 9.1 10.0  
4.1 5.9 4.7  
Custody Seal Intact:  Yes  No  N/A  
Notes: \_\_\_\_\_

#### Turnaround Time (TAT) Required:

Regular TAT  5 to 7 Business Days  
Rush TAT (Rush Surcharges Apply)  
 3 Business Days  2 Business Days  1 Business Day  
OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_

Please provide prior notification for rush TAT  
\*TAT is exclusive of weekends and statutory holidays

Samples Seal Multiplied By (Print Name and Sign): K. RISPOLD Date: 11/11/16 Time: \_\_\_\_\_  
Samples Relinquished By (Print Name and Sign): Simon Date: 11/11/16 Time: 8:45  
Samples Received By (Print Name and Sign): Beatelet B... Date: \_\_\_\_\_ Time: \_\_\_\_\_  
Page 011309 of \_\_\_\_\_  
Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT





**CLIENT NAME: HOULE CHEVRIER  
32 STEACIE DRIVE  
OTTAWA, ON K2K2A9  
(613) 836-1422**

**ATTENTION TO: Katherine Rispoli**

**PROJECT: 62739.10**

**AGAT WORK ORDER: 16Z062589**

**TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor**

**DATE REPORTED: Feb 02, 2016**

**PAGES (INCLUDING COVER): 10**

**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.**



## Certificate of Analysis

AGAT WORK ORDER: 16Z062589

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY: ML

### O. Reg. 153(511) - PHCs F1 - F4 (-BTEX) (Water)

DATE RECEIVED: 2016-01-26

DATE REPORTED: 2016-02-02

Parameter	Unit	Well others A	
		G / S	RDL
SAMPLE DESCRIPTION: GW-101			
SAMPLE TYPE: Water			
DATE SAMPLED: 1/25/2016			
F1 (C6 to C10)	µg/L	25	<25
F1 (C6 to C10) minus BTEX	µg/L	25	<25
F2 (C10 to C16)	µg/L	100	<100
F3 (C16 to C34)	µg/L	100	<100
F4 (C34 to C50)	µg/L	100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	NA
Surrogate	Unit	Acceptable Limits	
Terphenyl	%	60-140	89

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard  
**7351485** The C6-C10 fraction is calculated using Toluene response factor.  
 The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.  
 Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.  
 The chromatogram has returned to baseline by the retention time of nC50.  
 Total C6-C50 results are corrected for BTEX contributions.  
 This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
 nC6 and nC10 response factors are within 30% of Toluene response factor.  
 nC10, nC16 and nC34 response factors are within 10% of their average.  
 C50 response factor is within 70% of nC10 + nC16 nC34 average.  
 Linearity is within 15%.  
 Extraction and holding times were met for this sample.  
 Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

**Certified By:**



## Certificate of Analysis

AGAT WORK ORDER: 16Z062589

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY: ML

### O. Reg. 153(511) - PHCs F1 - F4 (Water)

DATE RECEIVED: 2016-01-26

DATE REPORTED: 2016-02-02

Parameter	Unit	Well others A										
		SAMPLE DESCRIPTION: BH108E GW-1		BH109E GW-1		BH110E GW-1		BH111E GW-1		GW-1	Field blank	Trip blank
		SAMPLE TYPE: Water		Water		Water		Water		Water	Water	Water
		DATE SAMPLED: 1/25/2016		1/25/2016		1/25/2016		1/25/2016		1/25/2016	1/25/2016	1/25/2016
		G / S	RDL	7351429	7351437	7351441	7351446	7351468	7351494	7351503		
Benzene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		
Toluene	µg/L		0.20	0.49	<0.20	<0.20	0.27	<0.20	<0.20	<0.20		
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		
Xylene Mixture	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20		
F1 (C6 to C10)	µg/L		25	<25	<25	<25	<25	<25	<25	<25		
F1 (C6 to C10) minus BTEX	µg/L		25	<25	<25	<25	<25	<25	<25	<25		
F2 (C10 to C16)	µg/L		100	<100	<100	<100	<100	<100	<100	<100		
F3 (C16 to C34)	µg/L		100	<100	<100	<100	<100	<100	<100	<100		
F4 (C34 to C50)	µg/L		100	<100	<100	<100	<100	<100	<100	<100		
Gravimetric Heavy Hydrocarbons	µg/L		500	NA	NA	NA	NA	NA	NA	NA		
<b>Surrogate</b>	<b>Unit</b>	<b>Acceptable Limits</b>										
Terphenyl	%	60-140		96	101	115	104	92	66	62		

**Comments:** RDL - Reported Detection Limit; G / S - Guideline / Standard  
**7351429-7351503** The C6-C10 fraction is calculated using Toluene response factor.  
 The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.  
 Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.  
 The chromatogram has returned to baseline by the retention time of nC50.  
 Total C6-C50 results are corrected for BTEX contributions.  
 This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.  
 nC6 and nC10 response factors are within 30% of Toluene response factor.  
 nC10, nC16 and nC34 response factors are within 10% of their average.  
 C50 response factor is within 70% of nC10 + nC16 nC34 average.  
 Linearity is within 15%.  
 Extraction and holding times were met for this sample.  
 Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.  
 NA = Not Applicable

**Certified By:**



## Certificate of Analysis

AGAT WORK ORDER: 16Z062589

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY: ML

### O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2016-01-26

DATE REPORTED: 2016-02-02

Parameter	Unit	Well others A		
		G / S	RDL	7351485
Dichlorodifluoromethane	µg/L		0.20	<0.20
Vinyl Chloride	µg/L		0.17	<0.17
Bromomethane	µg/L		0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40
Acetone	µg/L		1.0	<1.0
1,1-Dichloroethylene	µg/L		0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30
trans- 1,2-Dichloroethylene	µg/L		0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20
Chloroform	µg/L		0.20	<0.20
1,2-Dichloroethane	µg/L		0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20
Benzene	µg/L		0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20
Trichloroethylene	µg/L		0.20	0.28
Bromodichloromethane	µg/L		0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0
1,1,2-Trichloroethane	µg/L		0.20	<0.20
Toluene	µg/L		0.20	0.39
Dibromochloromethane	µg/L		0.10	<0.10
Ethylene Dibromide	µg/L		0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10

Certified By:



## Certificate of Analysis

AGAT WORK ORDER: 16Z062589

PROJECT: 62739.10

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

CLIENT NAME: HOULE CHEVRIER

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:ML

### O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2016-01-26

DATE REPORTED: 2016-02-02

		Well others A		
	SAMPLE DESCRIPTION:	GW-101		
	SAMPLE TYPE:	Water		
	DATE SAMPLED:	1/25/2016		
Parameter	Unit	G / S	RDL	7351485
m & p-Xylene	µg/L		0.20	<0.20
Bromoform	µg/L		0.10	<0.10
Styrene	µg/L		0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10
o-Xylene	µg/L		0.10	<0.10
1,3-Dichlorobenzene	µg/L		0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10
1,3-Dichloropropene	µg/L		0.30	<0.30
Xylene Mixture	µg/L		0.20	<0.20
n-Hexane	µg/L		0.20	<0.20
Surrogate	Unit	Acceptable Limits		
Toluene-d8	% Recovery	50-140		88
4-Bromofluorobenzene	% Recovery	50-140		90

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

**Certified By:**

## Quality Assurance

**CLIENT NAME: HOULE CHEVRIER**
**AGAT WORK ORDER: 16Z062589**
**PROJECT: 62739.10**
**ATTENTION TO: Katherine Rispoli**
**SAMPLING SITE:**
**SAMPLED BY:ML**

Trace Organics Analysis														
RPT Date: Feb 02, 2016			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits
						Lower		Upper	Lower		Upper	Lower		Upper

**O. Reg. 153(511) - PHCs F1 - F4 (Water)**

Benzene	7354382		< 0.20	< 0.20	NA	< 0.20	78%	50%	140%	84%	60%	130%	70%	50%	140%
Toluene	7354382		< 0.20	< 0.20	NA	< 0.20	81%	50%	140%	77%	60%	130%	111%	50%	140%
Ethylbenzene	7354382		< 0.10	< 0.10	NA	< 0.10	90%	50%	140%	83%	60%	130%	81%	50%	140%
Xylene Mixture	7354382		< 0.20	< 0.20	NA	< 0.20	91%	50%	140%	86%	60%	130%	110%	50%	140%
F1 (C6 to C10)	7354382		< 25	< 25	NA	< 25	87%	60%	140%	97%	60%	140%	97%	60%	140%
F2 (C10 to C16)	7351494	7351494	< 100	< 100	NA	< 100	103%	60%	140%	68%	60%	140%	88%	60%	140%
F3 (C16 to C34)	7351494	7351494	< 100	< 100	NA	< 100	108%	60%	140%	82%	60%	140%	110%	60%	140%
F4 (C34 to C50)	7351494	7351494	< 100	< 100	NA	< 100	106%	60%	140%	99%	60%	140%	98%	60%	140%

**O. Reg. 153(511) - VOCs (Water)**

Dichlorodifluoromethane	7344370		< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	105%	50%	140%	122%	50%	140%
Vinyl Chloride	7344370		< 0.17	< 0.17	NA	< 0.17	122%	50%	140%	114%	50%	140%	114%	50%	140%
Bromomethane	7344370		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	108%	50%	140%	104%	50%	140%
Trichlorofluoromethane	7344370		< 0.40	< 0.40	NA	< 0.40	93%	50%	140%	101%	50%	140%	104%	50%	140%
Acetone	7344370		< 1.0	< 1.0	NA	< 1.0	93%	50%	140%	109%	50%	140%	120%	50%	140%
1,1-Dichloroethylene	7344370		< 0.30	< 0.30	NA	< 0.30	127%	50%	140%	88%	60%	130%	114%	50%	140%
Methylene Chloride	7344370		< 0.30	< 0.30	NA	< 0.30	123%	50%	140%	97%	60%	130%	115%	50%	140%
trans- 1,2-Dichloroethylene	7344370		< 0.20	< 0.20	NA	< 0.20	119%	50%	140%	88%	60%	130%	112%	50%	140%
Methyl tert-butyl ether	7344370		< 0.20	< 0.20	NA	< 0.20	109%	50%	140%	74%	60%	130%	98%	50%	140%
1,1-Dichloroethane	7344370		< 0.30	< 0.30	NA	< 0.30	86%	50%	140%	87%	60%	130%	79%	50%	140%
Methyl Ethyl Ketone	7344370		< 1.0	< 1.0	NA	< 1.0	90%	50%	140%	91%	50%	140%	112%	50%	140%
cis- 1,2-Dichloroethylene	7344370		< 0.20	< 0.20	NA	< 0.20	104%	50%	140%	72%	60%	130%	111%	50%	140%
Chloroform	7344370		< 0.20	< 0.20	NA	< 0.20	115%	50%	140%	74%	60%	130%	116%	50%	140%
1,2-Dichloroethane	7344370		< 0.20	< 0.20	NA	< 0.20	117%	50%	140%	95%	60%	130%	122%	50%	140%
1,1,1-Trichloroethane	7344370		< 0.30	< 0.30	NA	< 0.30	95%	50%	140%	74%	60%	130%	90%	50%	140%
Carbon Tetrachloride	7344370		< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	81%	60%	130%	95%	50%	140%
Benzene	7344370		< 0.20	< 0.20	NA	< 0.20	110%	50%	140%	96%	60%	130%	104%	50%	140%
1,2-Dichloropropane	7344370		< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	87%	60%	130%	102%	50%	140%
Trichloroethylene	7344370		< 0.20	< 0.20	NA	< 0.20	103%	50%	140%	92%	60%	130%	105%	50%	140%
Bromodichloromethane	7344370		< 0.20	< 0.20	NA	< 0.20	110%	50%	140%	92%	60%	130%	108%	50%	140%
Methyl Isobutyl Ketone	7344370		< 1.0	< 1.0	NA	< 1.0	86%	50%	140%	81%	50%	140%	96%	50%	140%
1,1,2-Trichloroethane	7344370		< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	105%	60%	130%	109%	50%	140%
Toluene	7344370		< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	99%	60%	130%	100%	50%	140%
Dibromochloromethane	7344370		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	96%	60%	130%	101%	50%	140%
Ethylene Dibromide	7344370		< 0.10	< 0.10	NA	< 0.10	91%	50%	140%	98%	60%	130%	106%	50%	140%
Tetrachloroethylene	7344370		< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	101%	60%	130%	96%	50%	140%
1,1,1,2-Tetrachloroethane	7344370		< 0.10	< 0.10	NA	< 0.10	99%	50%	140%	88%	60%	130%	97%	50%	140%
Chlorobenzene	7344370		< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	102%	60%	130%	102%	50%	140%
Ethylbenzene	7344370		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	93%	60%	130%	92%	50%	140%

## Quality Assurance

**CLIENT NAME:** HOULE CHEVRIER  
**PROJECT:** 62739.10  
**SAMPLING SITE:**


**AGAT WORK ORDER:** 16Z062589  
**ATTENTION TO:** Katherine Rispoli  
**SAMPLED BY:** ML

### Trace Organics Analysis (Continued)

RPT Date: Feb 02, 2016			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
m & p-Xylene	7344370		< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	102%	60%	130%	98%	50%	140%	
Bromoform	7344370		< 0.10	< 0.10	NA	< 0.10	115%	50%	140%	97%	60%	130%	105%	50%	140%	
Styrene	7344370		< 0.10	< 0.10	NA	< 0.10	94%	50%	140%	93%	60%	130%	94%	50%	140%	
1,1,2,2-Tetrachloroethane	7344370		< 0.10	< 0.10	NA	< 0.10	115%	50%	140%	109%	60%	130%	118%	50%	140%	
o-Xylene	7344370		< 0.10	< 0.10	NA	< 0.10	106%	50%	140%	105%	60%	130%	104%	50%	140%	
1,3-Dichlorobenzene	7344370		< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	92%	60%	130%	94%	50%	140%	
1,4-Dichlorobenzene	7344370		< 0.10	< 0.10	NA	< 0.10	112%	50%	140%	104%	60%	130%	103%	50%	140%	
1,2-Dichlorobenzene	7344370		< 0.10	< 0.10	NA	< 0.10	106%	50%	140%	96%	60%	130%	97%	50%	140%	
1,3-Dichloropropene	7344370		< 0.30	< 0.30	NA	< 0.30	79%	50%	140%	81%	60%	130%	76%	50%	140%	
n-Hexane	7344370		< 0.20	< 0.20	NA	< 0.20	77%	50%	140%	84%	60%	130%	82%	50%	140%	

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

**Certified By:** \_\_\_\_\_



## Method Summary

**CLIENT NAME: HOULE CHEVRIER**
**AGAT WORK ORDER: 16Z062589**
**PROJECT: 62739.10**
**ATTENTION TO: Katherine Rispoli**
**SAMPLING SITE:**
**SAMPLED BY: ML**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
<b>Trace Organics Analysis</b>			
F1 (C6 to C10)	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC E3421	GC / FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC E3421	GC / FID
F4 (C34 to C50)	VOL-91-5010	MOE PHC E3421	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC E3421	BALANCE
Terphenyl	VOL-91-5010		GC/FID
Benzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Toluene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Ethylbenzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Xylene Mixture	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10)	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL -91- 5010	MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC-E3421	BALANCE
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS





## Method Summary

CLIENT NAME: HOULE CHEVRIER

AGAT WORK ORDER: 16Z062589

PROJECT: 62739.10

ATTENTION TO: Katherine Rispoli

SAMPLING SITE:

SAMPLED BY:ML

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

## Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption)

**Report Information:**  
 Company: Home Cheaper Fees  
 Contact: Kathleen Rispoli  
 Address: 325 Spencer Drive  
 Phone: 613 836 1422 Fax: \_\_\_\_\_  
 Reports to be sent to: Krispolic@hcey.ca  
 1. Email: \_\_\_\_\_  
 2. Email: \_\_\_\_\_

**Project Information:**  
 Project: 62739, 110  
 Site Location: nick L.  
 Sampled By: \_\_\_\_\_  
 AGAT Quote #: \_\_\_\_\_  
 PO: \_\_\_\_\_

**Invoice Information:**  
 Bill To Same: Yes  No   
 Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Email: \_\_\_\_\_

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions
BH 108 E GW-1	Jan 5 2016	am	4	GW	
BH 109 E GW-1	Jan 5 2016	am	4	GW	
BH 110 E GW-1	Jan 5 2016	am	4	GW	
BH 111 E GW-1	Jan 5 2016	am	4	GW	
Well others A GW-1	Jan 5 2016	pm	7	GW	
Well others A GW-1	Jan 5 2016	pm	3	GW	
Field Hawk	Jan 5 2016	pm	1	GW	
Try Hawk	Jan 5 2016	pm	3	GW	

**Regulatory Requirements:**  No Regulatory Requirement  
(Please check all applicable boxes)  
 Regulation 153/04  
 Table \_\_\_\_\_  
 Sewer Use  
 Sanitary  
 Res/Park  
 Agriculture  
 Soil Texture (check one)  
 Coarse  
 Fine  
 Regulation 558  
 CCME  
 Prov. Water Quality Objectives (PWQO)  
 Other \_\_\_\_\_  
 Region \_\_\_\_\_  
 Indicate One

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

Report Guideline on Certificate of Analysis  
 Yes  No

**Sample Matrix Legend**  
 B Biota  
 GW Ground Water  
 O Oil  
 P Paint  
 S Soil  
 SD Sediment  
 SW Surface Water

Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	Nutrients	Volatiles	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use
				ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr <sup>6+</sup> <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub> <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	<input type="checkbox"/> TP <input type="checkbox"/> NH <sub>3</sub> <input type="checkbox"/> TKN <input type="checkbox"/> NO <sub>2</sub> <input type="checkbox"/> NO <sub>3</sub> <input type="checkbox"/> NO <sub>2</sub> /NO <sub>3</sub>	<input type="checkbox"/> VOC <input checked="" type="checkbox"/> BTEX <input type="checkbox"/> THM							VOC'S

Sampler Requisitioned By (Print Name and Sign): nick L.  
 Date: Jan 5 2016 Time: 4:18 pm  
 Samples Requisitioned By (Print Name and Sign): \_\_\_\_\_  
 Date: Jan 5 2016 Time: \_\_\_\_\_  
 Sampler Received By (Print Name and Sign): Ubert Holot  
 Date: Jan 5 2016 Time: 9:00  
 Samples Received By (Print Name and Sign): \_\_\_\_\_  
 Date: Jan 5 2016 Time: 9:00  
 Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT  
 Page 1 of 1  
 No: **T 018428**  
 Date Rec'd: November 2, 2015

**Laboratory Use Only**  
 Work Order #: 107E062589  
 Cooler Quantity: \_\_\_\_\_  
 Arrival Temperatures: 7.31 7.11 8.1  
 Custody Seal Intact:  Yes  No  N/A  
 Notes: 7 1 6 9 1 7 6

**Turnaround Time (TAT) Required:**  
 Regular TAT:  5 to 7 Business Days  
 Rush TAT (Rush Surcharges Apply):  
 3 Business Days  2 Business Days  1 Business Day  
 OR Date Required (Rush Surcharges May Apply): \_\_\_\_\_  
 Please provide prior notification for rush TAT  
 \*TAT is exclusive of weekends and statutory holidays



## **APPENDIX G**

Table G1 and G2

**TABLE G1  
SOIL ANALYTICAL RESULTS  
PETROLEUM HYDROCARBONS**

Parameter	Units	SSRO (within 30 m of a building) <sup>4</sup>				Sample Location:							
		CCME <sup>1,2</sup>	Ontario Reg. 153/04	Surface Soil (0 to 1.5 m)	Subsurface Soil (>1.5 m)	BH105 Sample ID: BH105 SA-2 Date Sampled: 12/23/2015	BH16-105 Sample ID: BH16-105 SA-3B Date Sampled: 12/23/2015	BH106 Sample ID: BH106 SA-2 Date Sampled: 12/23/2015	BH15-108 Sample ID: BH15-108 SA-3 Date Sampled: 01/12/2016	BH109 Sample ID: BH15-109 SA-2 Date Sampled: 01/13/2016	BH15-110 Sample ID: BH15-110 SA-3 Date Sampled: 01/12/2016	BH15-111E Sample ID: BH15-111E SA-3 Date Sampled: 01/08/2015	
Benzene	µg/g	0.0	0.32			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Toluene	µg/g	0.4	68			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	
Ethylbenzene	µg/g	0.1	9.5			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Xylene Mixture	µg/g	11.0	26			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
F1 (C6 to C10)	µg/g					<5	<5	<5	<5	<5	<5	<5	
F1 (C6 to C10) minus BTEX	µg/g	320	55	320	7500	<5	<5	<5	<5	<5	<5	<5	
F2 (C10 to C16)	µg/g	260	230	480	61000	<10	<b>2600</b>	<10	<10	<10	<10	<10	
F3 (C16 to C34)	µg/g	1700	1700	NC	NC	<50	<50	<50	<50	<50	<50	<50	
F4 (C34 to C50)	µg/g	3300	3300	NC	NC	<50	<50	<50	<50	<50	<50	<50	
Gravimetric Heavy Hydrocarbons	µg/g					NA	NA	NA	NA	NA	NA	NA	
Moisture Content	µg/g					8.8	16.4	19.5	8.2	19.5	28.5	30.8	
Terphenyl	µg/g					103	130	61	98	104	82	107	

- Notes:**
- 1 Canadian Council of Ministers of the Environment (CCME), Canada-Wide Standards (CWS) for petroleum hydrocarbons (PHC) in Soil, Tier 1 levels (commercial land use, non-potable groundwater, coarse textured soil, 2001, as updated 2008);
  - 2 CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Commercial Land-Use; coarse textured soil, 2004
  - 3 Ontario Regulation 153 Standards: Table 3: Non-potable groundwater use, Industrial/Commercial/Community Property use and coarse-textured soils, 2011
  - 4 Site specific remedial objectives calculated by Stantec (HHERA Task 1, 2012) for the contaminants of concern present in soil at the Site. Surface and Subsurface soil.
  - 5 **BOLD** - Exceeds one or multiple of the above standards

**TABLE G2  
GROUNDWATER ANALYTICAL RESULTS  
PETROLEUM HYDROCARBONS**

Parameter	Units	Government of Canada <sup>1</sup>	Ontario Reg. 153/04	RDL	Sample ID:	BH15-104E	BH15-105E	BH15-106E	BH108E GW-1	BH109E GW-1	BH110E GW-1	BH111E GW-1	Field blank	Trip blank
					Date Sampled:	01/06/2016	01/05/2016	01/05/2016	01/25/2016	01/25/2016	01/25/2016	01/25/2016	01/25/2016	01/25/2016
Benzene	µg/L	690	0.5	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	83	0.8	0.20	<0.20	<0.20	<0.20	<0.20	0.49	<0.20	<0.20	0.27	<0.20	<0.20
Ethylbenzene	µg/L	3200	0.5	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylene Mixture	µg/L	13000	72	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
F1 (C6 to C10)	µg/L			25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L	9100	420	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 (C10 to C16)	µg/L	1300	150	100	<100	<b>9500</b>	<100	<100	<100	<100	<100	<100	<100	<100
F3 (C16 to C34)	µg/L		500	100	110	140	<100	<100	<100	<100	<100	<100	<100	<100
F4 (C34 to C50)	µg/L		500	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L			500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Terphenyl	%				81	67	92	96	101	115	104	66	62	

**Notes:**

- 1 Government of Canada, Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (Version 3), November 2015
- 2 Ontario Regulation 153 Standards: Table 3: Non-potable groundwater use, Industrial/Commercial/Community Property use and coarse-textured soils, 2011
- 3 **BOLD** - Exceeds one or multiple of the above standards
- 4 RDL - Reported Detection Limit



geotechnical  
environmental  
hydrogeology  
materials testing & inspection

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National Research Council (NRC)

Project No. 5097

Sanitary and Storm Separation – Phase 4, 1200 Montreal Road

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APPENDIX B

APPENDIX B: Supplemental Geotechnical Report, Houle Chevrier Engineering, December 22, 2016



Houle Chevrier Engineering Ltd. tel: 613.836.1422  
32 Steacie Drive fax: 613.836.9731  
Ottawa, Ontario info@hceng.ca  
K2K 2A9 www.hceng.ca

National Research Council Canada  
1200 Montreal Road  
Ottawa, Ontario  
K1A 0R6

December 22, 2016  
Project: 62739.10

**Re: Supplemental Geotechnical Investigation  
Proposed Sanitary and Storm Sewer  
National Research Council Canada  
Montreal Road Campus  
Ottawa, Ontario**

## INTRODUCTION

This letter presents the results of a supplemental subsurface investigation carried out at the Montreal Road Campus of the National Research Council Canada (NRC) in Ottawa, Ontario.

Houle Chevrier Engineering Ltd. (HCEL) had previously conducted a geotechnical investigation and limited Phase II Environmental Site Assessment for the proposed works and this letter should be read in conjunction with that report titled, "Geotechnical Investigation, Proposed Sanitary and Storm Sewer, National Research Council Canada, Montreal Road Campus, Ottawa, Ontario" from March, 2016.

It is understood that the alignment of a section of the proposed works near buildings M22 and M23 has been altered since our initial investigation. The purposed of this investigation is to assess the subsurface soil, bedrock, and groundwater conditions along the new alignment with a limited borehole investigation and to provide any additional comments and recommendations in reference to our original report.

This investigation was carried out in general accordance with our proposal dated October 31, 2016.



## SITE AND PROJECT DESCRIPTION

### Project Description

It is understood that plans are being prepared to construct sanitary and storm sewers throughout the Montreal Road Campus of the NRC to replace the existing combined storm and sanitary sewers. It is our understanding that the alignment of the services has been altered from buildings M22 and M23 to building M32 for a length of about 300 metres.

We have assumed that the invert depths for the proposed services will be a maximum of 5 metres below ground surface.

### Previous Investigation

HCEL advanced five (5) boreholes in the area of buildings M22, M23 and M32 as part of our initial geotechnical investigation (boreholes 15-23, 15-33, 15-34, 15-35, and 15-36). In general, the soil conditions encountered in this area consist of fill material overlying silty clay and/or glacial till. It should be noted that subsurface conditions were not logged in borehole 15-33. Auger refusal on inferred bedrock was encountered in two (2) of the boreholes (boreholes 15-35 and 15-36) at depths of about 3.9 and 4.8 metres below ground surface (elevation 89.9 and 92.9 metres, geodetic datum).

## METHODOLOGY

The field work for this investigation was carried out on November 29, 2016. At the time of this investigation four (4) boreholes were advanced using a truck mounted drill rig supplied and operated George Downing Estate Drilling Ltd. of Grenville-sur-la-Rouge, Quebec.

Standard penetration tests (SPT) were carried out within the subsurface deposits at regular intervals. The soil conditions in the boreholes were identified by examining the materials retrieved from the 50 millimetre diameter drive open sampler and manually sampling the upper portions of the holes. Bedrock coring was carried out in two (2) borehole locations upon auger refusal in order to prove bedrock and determine the type and quality of the bedrock. In addition, standpipe piezometers were installed in two (2) boreholes from which static groundwater measurements were obtained.

The borehole locations are shown on the Borehole Location Plan, Figure 1, following the text of this report. The Record of Borehole sheets are provided in Attachment A.

Following the field work, the soil and bedrock samples were returned to our laboratory at 32 Steacie Drive in Ottawa, Ontario for examination by a geotechnical engineer. Select bedrock core samples were tested for unconfined compressive strength. The results of the unconfined compression tests are provided in Attachment B. One (1) sample of the overburden soil was

submitted to Paracel Laboratories for sulphate and chloride testing to assess the corrosive potential of the soil on exposed concrete.

The borehole locations were selected by NRC and the consulting team and positioned in the field using our Trimble R10 GPS survey instrument. The elevations in this report and on the Record of Borehole sheets are referenced to geodetic datum.

## **SUBSURFACE CONDITIONS**

### **General**

As previously indicated, the subsurface and groundwater conditions identified in the boreholes are given on the Record of Borehole sheets (Attachment A). The logs indicate the subsurface conditions at the specific test locations only. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of exploration, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at other than the borehole locations may vary from the conditions encountered in the boreholes. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties.

The groundwater conditions described in this report refer only to those observed at the place and time of observation noted in the report. These conditions may vary seasonally or as a consequence of construction activities in the area.

The soil descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and Houle Chevrier Engineering Ltd. does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice.

The following presents an overview of the subsurface conditions encountered in the boreholes advanced as part of this investigation.

### **Pavement Structure**

Asphaltic concrete was encountered from the surface at all borehole locations. The thickness of the asphaltic concrete ranges from 50 to 220 millimetres, averaging 95 millimetres.

The asphaltic concrete is underlain by a roadway granular base/subbase layer at boreholes 16-1 and 16-4. The thickness of the granular base/subbase material ranges from about 0.3 to 0.6 metres at these locations and is composed of dark grey crushed sand and gravel with trace amounts of silt.

## **Fill Material**

The asphaltic concrete is underlain by fill material at boreholes 16-2 and 16-3. The thickness of the fill material at these locations is about 1.1 and 1.3 metres, respectively. The fill material varies in composition at each borehole location. The fill material in borehole 16-2 can be described as dark brown sandy gravel with some silt and trace amounts of clay. The fill material in borehole 16-3 can be described as grey silty clay with some sand and trace amounts of gravel.

One (1) SPT N value recorded in the fill material in borehole 16-3 measured 6 blows per 0.3 metres of penetration, which reflects a loose relative density.

## **Silt and Clay**

A layer of stiff to very stiff grey brown silt and clay with trace amounts of sand was encountered underlying the fill material in borehole 16-3 at a depth of about 1.4 metres below surface grade. The thickness of the silt and clay layer is about 2.0 metres. The silt and clay material encountered is generally similar in composition with the silt and clay encountered in the nearby borehole 15-23 as part of our original investigation.

The SPT N values recorded in the silt and clay layer measured 12 and 13 blows per 0.3 metres of penetration. Based on our experience with native clays in the Ottawa region, N values greater than or equal to 2 blows per 0.3 metres of penetration reflect a stiff to very stiff consistency.

## **Glacial Till**

A native deposit of glacial till was encountered at all borehole locations at depths ranging from about 0.6 to 3.4 metres below ground surface. The thickness of the glacial till deposit ranges from about 1.1 to 4.1 metres. The thickness of the glacial till deposit was proven at boreholes 16-1 and 16-4 by coring the underlying bedrock. The thickness of the glacial till deposit in boreholes 16-2 and 16-3 was estimated from auger refusal depths. It should be noted that auger refusal can occur on boulders within the glacial till.

Glacial till is a heterogeneous mixture of all grain sizes. For this site, the glacial till composition is generally described as grey to grey brown silty sand, with some gravel, trace to some amounts of clay, and likely containing varying amounts of cobbles and boulders. The glacial till is generally similar in composition with the glacial till encountered in nearby boreholes 15-23, 15-35, and 15-36 as part of our original investigation.

The SPT N values recorded within the glacial till range from 2 to over 50 blows per 0.3 metres of penetration, which indicates a very loose to very dense relative density. The variable results likely represent the presence of cobbles and boulders within the glacial till.

## Soil Chemistry Relating to Corrosion

Soil corrosivity testing (pH, sulphate, chloride, resistivity, and conductivity) was completed on one (1) of the soil samples. The results are provided in Attachment C and summarized below:

- pH 8.01
- Sulphate Content ( $\mu\text{g/g}$ ) 84
- Chloride Content ( $\mu\text{g/g}$ ) 153
- Resistivity (Ohm.m) 21.4
- Conductivity ( $\mu\text{S/cm}$ ) 467

## Bedrock

Bedrock was cored and proven at two (2) borehole locations (16-1 and 16-4) using HQ sized diamond coring equipment. The confirmed bedrock depths measured about 2.4 and 4.7 metres below surface grade, respectively (elevation 93.1 and 93.6 metres, geodetic datum).

The bedrock encountered is interbedded grey limestone and shale. The rock quality designation (RQD) ranges from 41 to 90 percent, averaging 68 percent. Therefore, the average bedrock quality may be described as fair. Unconfined compressive strength tests were carried out on two (2) bedrock core samples. The compressive strength of the samples measure 84 and 105 MPa; therefore the bedrock strength classification is strong to very strong.

Auger refusal was encountered at the other two (2) boreholes (16-2 and 16-3) at depths of about 3.6 and 4.5 metres below surface grade, respectively (elevation 92.0 and 92.6 metres, geodetic datum). It should be noted that auger refusal can also occur on cobbles and boulders found in glacial till.

## Groundwater Conditions

Standpipe piezometers were installed in boreholes 16-1 and 16-4 from which groundwater measurements were taken. The groundwater levels were measured on December 7, 2016 and are summarized in Table 1.

**Table 1: Summary of Groundwater Levels in Piezometers**

Location	Well Screen Formation	Depth Below Surface Grade (metres)	Geodetic Elevation (metres)
16-1	Bedrock	2.8	92.7
16-4	Glacial Till	3.9	94.5

It should be noted that the groundwater levels may be higher during wet periods of the year such as the early spring or following periods of precipitation.

The monitoring wells were purged until the well was dry in order to determine the rate of inflow from the overburden (borehole 16-4) and the bedrock (borehole 16-1). The groundwater levels were measured over a time period of 20 minutes and summarized in Table 2.

**Table 2: Summary of Groundwater Inflow**

Time (minutes)	Groundwater Levels (metres)	
	BH 16-1 (Bottom depth at 4.5 metres)	BH 16-4 (Bottom depth at 4.7 metres)
0.5	2.9	4.3
1	2.9	4.3
2	2.9	4.2
3	2.9	4.2
5	2.8	4.2
7	2.8	4.2
10	2.8	4.2
15	2.8	4.2
20	2.8	4.2

## DISCUSSION

Based on the results of this investigation the subsurface conditions encountered are generally consistent with the conditions encountered in the nearby boreholes drilled as part of our previous investigation.

The bedrock depth encountered as part of this investigation was proven at two (2) borehole locations and inferred based on auger refusal at the other two (2) borehole locations. The confirmed bedrock depth ranges from 2.4 metres below surface grade at borehole location 16-1 to 4.7 metres below surface grade at borehole location 16-4 (elevation 93.1 to 93.6 metres, geodetic datum, respectively). The inferred bedrock elevation ranges from 92.0 to 92.6 metres, geodetic datum at boreholes 16-2 and 16-3.

Based on the measured stabilized groundwater levels, some amount of dewatering will be required for the excavations. The anticipated rate of groundwater inflow into the excavations within the overburden at these locations is relatively low. The anticipated rate of groundwater inflow will be more substantial for excavation extending into the fractured bedrock below the groundwater table. Groundwater conditions are generally similar to those encountered in our previous investigation.

The measured sulphate concentration in the soil sample collected was measured to be 84 micrograms per gram. According to Canadian Standards Association (CSA) "Concrete Materials and Methods of Concrete Construction", the concentration of sulphate in the soil can be classified as low. For low exposure conditions, any concrete that will be in contact with the native soil or groundwater could be batched with General Use (GU) type cement. Therefore, the soil can generally be classified as non-aggressive towards unprotected steel.

Based on the results of this supplemental investigation, in our opinion, the recommendations for excavation (overburden and bedrock), groundwater pumping, pipe bedding, trench backfill, seepage barriers, and roadway reinstatement provided in our report dated March 2016, are suitable for the new sewer alignment in the vicinity of building M22 and M23.

We trust this letter provides sufficient information for your present purposes. If you have any questions concerning this report, contact the undersigned.

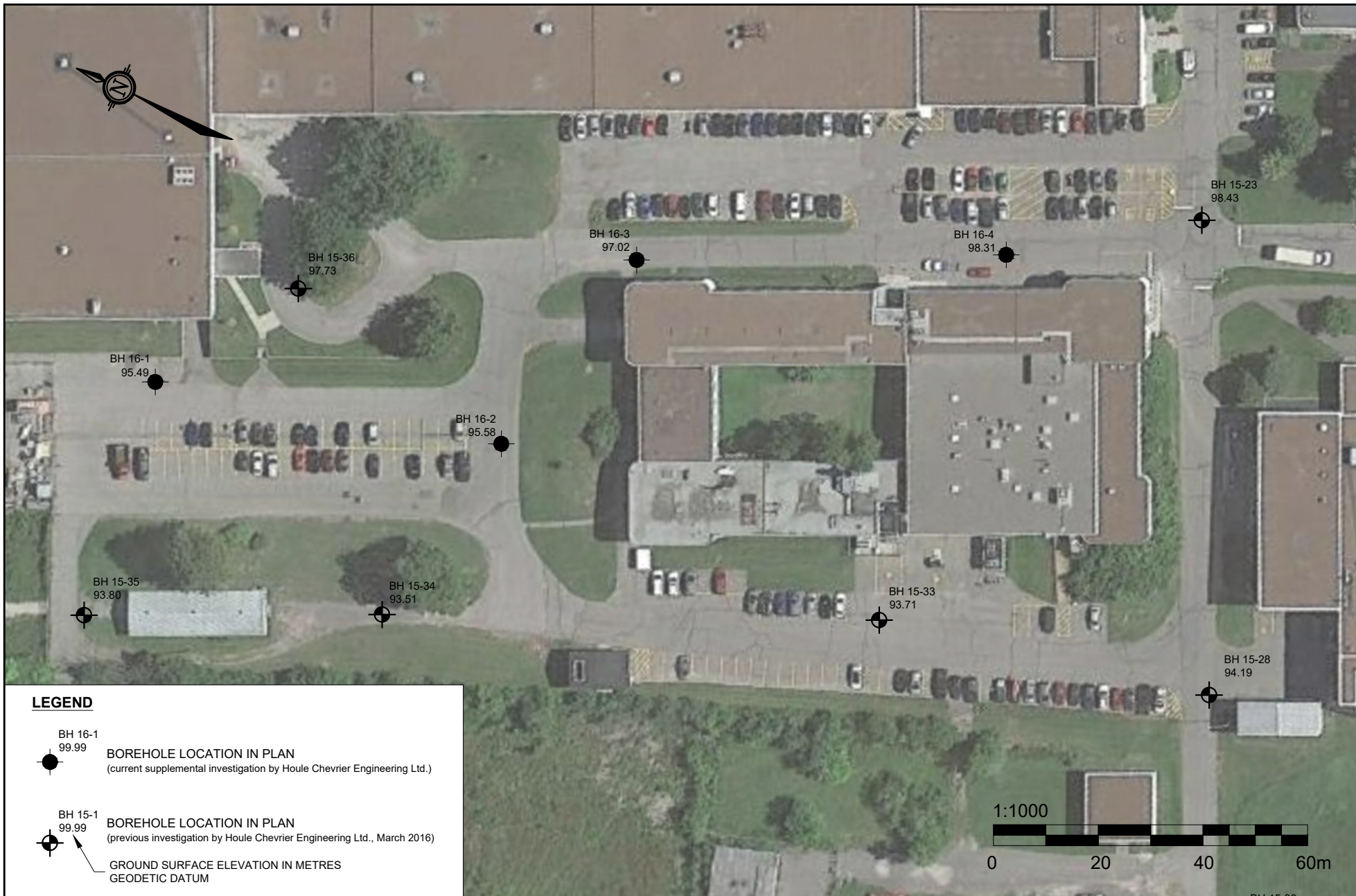
  
Blasco Vijayabaskaran, E.I.T.






Brent Wiebe, P.Eng.  
Senior Geotechnical Engineer  
P:\0. Files\62700\62739.10\Supplementary Geotechnical Investigation  
2016\Report\62739.10\_LTR\_V01\_2016-12-15.docx







**LEGEND**

- 
 BH 16-1  
99.99  
 BOREHOLE LOCATION IN PLAN  
 (current supplemental investigation by Houle Chevrier Engineering Ltd.)
- 
 BH 15-1  
99.99  
 BOREHOLE LOCATION IN PLAN  
 (previous investigation by Houle Chevrier Engineering Ltd., March 2016)
- 
 GROUND SURFACE ELEVATION IN METRES  
 GEODETIC DATUM



32 Steacie Drive, Ottawa, ON  
 T: (613) 836-1422 | www.hceng.ca | ottawa@hceng.ca

Project  
 Supplemental Geotechnical Investigation  
 Proposed Sanitary and Storm Sewer  
 National Research Council Canada  
 Montreal Road Campus  
 Ottawa, Ontario

Drwn By	Chkd By	Date
P.C.	B.V.	DECEMBER 2016
File No.	Revision No.	<b>FIGURE 1</b>
62739.10	0	

Drawing  
**BOREHOLE LOCATION PLAN**



## **ATTACHMENT A**

Record of Borehole Sheets  
List of Abbreviations and Terminology



PROJECT: 62739.10

# RECORD OF BOREHOLE 16-1

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure

DATUM: Geodetic

BORING DATE: November 29, 2016

SPT HAMMER: 63.5 kg; 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - +			rem. V - ⊕
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.49											Flushmount cap Bentonite seal Soil cuttings Bentonite seal Filter sand 51 mm Diameter, 1.52 metres long well screen
		Asphaltic concrete		0.05	1	G.S.									
		Dark grey crushed sand and gravel, trace silt (BASE/SUBBASE MATERIAL)		94.88											
1		Compact to very dense, grey brown silty sand, some gravel, trace clay, probable cobbles and boulders (GLACIAL TILL)		0.61	2	50 D.O.	11								
2	Rotary Diamond Drill HQ Casing	Grey interbedded LIMESTONE and SHALE bedrock	[Strata Plot]	93.10	4	50 D.O.	> 50 for 25 mm							U	
				2.39	5	R.C. TCR = 96%, SCR = 96%, RQD = 87%									
3					6	R.C. TCR = 94%, SCR = 91%, RQD = 90%									
4		End of Borehole		91.02											
				4.47											
5															
6															
7															
8															
9															
10															

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16-07-12	2.80	▽ 92.69

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG 62739.10\_GINT LOGS\_V01\_GPJ\_HOULE CHEVRIER 2015.GDT 12-22-16

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-2

SHEET 1 OF 1

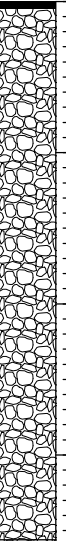
LOCATION: See Borehole Location Plan, Figure

DATUM: Geodetic

BORING DATE: November 29, 2016

SPT HAMMER: 63.5 kg; 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT						
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊕ U - ○	Wp
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.58												
		Asphaltic concrete		0.05	1	G.S.									Cold patch repair	
		Dark brown sandy gravel, some silt, trace clay (FILL MATERIAL)														
1			Very loose to very dense, grey brown silty sand, some gravel, trace clay, probable cobbles and boulders (GLACIAL TILL)		94.46	2	50 D.O.	10								Backfilled with auger cuttings
					1.12											
2					3	50 D.O.	2									
					4	50 D.O.	> 50 for 25 mm									
3					5	50 D.O.	> 50 for 100 mm									
4		End of Borehole Auger Refusal		92.02												
				3.56												



BOREHOLE LOG 62739.10\_GINT LOGS\_V01\_GPJ\_HOULE CHEVRIER 2015.GDT 12-22-16

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-3

SHEET 1 OF 1

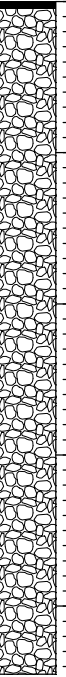
LOCATION: See Borehole Location Plan, Figure

DATUM: Geodetic

BORING DATE: November 29, 2016

SPT HAMMER: 63.5 kg; 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - + Q - ●			rem. V - ⊕ U - ○
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		97.02											
		Asphaltic concrete		0.06	1	G.S.									Cold patch repair
		Grey silty clay, some sand, trace gravel (FILL MATERIAL)													Backfilled with auger cuttings
1				95.65	2	50 D.O.	6								
		Stiff to very stiff, grey brown SILT and CLAY, trace sand		1.37	3	50 D.O.	13								
2					4	50 D.O.	12								
3				93.67	5	50 D.O.	6								
		Compact, grey brown silty sand, some clay, trace gravel (GLACIAL TILL)		3.35	6	50 D.O.	30								
4				92.57											
		End of Borehole Auger Refusal		4.45											
5															
6															
7															
8															
9															
10															



DEPTH SCALE

1 to 50

LOGGED: M.L.

CHECKED:

BOREHOLE LOG 62739.10\_GINT LOGS\_V01\_GPJ\_HOULE CHEVRIER 2015.GDT 12-22-16

PROJECT: 62739.10

# RECORD OF BOREHOLE 16-4

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure

DATUM: Geodetic

BORING DATE: November 29, 2016

SPT HAMMER: 63.5 kg; 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa	nat. V - + Q - ● rem. V - ⊕ U - ○	WATER CONTENT, PERCENT Wp  -----  W  -----  WI 20 40 60 80				
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.31										Flushmount cap Bentonite seal  Soil cuttings  Bentonite seal Filter sand 51 mm Diameter, 1.52 metres long well screen  Bentonite seal
		Asphaltic concrete		98.09										
		Dark grey crushed sand and gravel, trace silt (BASE/SUBBASE MATERIAL)		0.22	1	G.S.								
				97.76										
				0.55										
1			Compact to very dense, grey brown silty sand, some gravel, trace clay, probable cobbles and boulders (GLACIAL TILL)			2	50 D.O.	73						
2					3	50 D.O.	> 50 for 25 mm							
3					4	50 D.O.	22							
4					5	50 D.O.	21							
5					6	50 D.O.	> 50 for 25 mm							
5	Rotary Diamond Drill HQ Casing	Grey interbedded LIMESTONE and SHALE bedrock		93.64	7	R.C.	TCR = 65%, SCR = 65%, RQD = 54%							
				4.67										
6					8	R.C.	TCR = 100%, SCR = 73%, RQD = 41%							
7		End of Borehole		91.81										
				6.50										

DEPTH SCALE

1 to 50

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
16-07-12	3.85	94.46

BOREHOLE LOG 62739.10\_GINT LOGS\_V01\_GPJ\_HOULE CHEVRIER 2015.GDT 12-22-16

## LIST OF ABBREVIATIONS AND TERMINOLOGY

### SAMPLE TYPES

AS	auger sample
CA	casing sample
CS	chunk sample
BS	Borros piston sample
GS	grab sample
DO	drive open
MS	manual sample
RC	rock core
ST	slotted tube
TO	thin-walled open Shelby tube
TP	thin-walled piston Shelby tube
WS	wash sample

### PENETRATION RESISTANCE

#### Standard Penetration Resistance, N

The number of blows by a 63.5 kg hammer dropped 760 millimetre required to drive a 50 mm drive open sampler for a distance of 300 mm. For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

#### Dynamic Penetration Resistance

The number of blows by a 63.5 kg hammer dropped 760 mm to drive a 50 mm diameter, 60° cone attached to 'A' size drill rods for a distance of 300 mm.

#### WH

Sampler advanced by static weight of hammer and drill rods.

#### WR

Sampler advanced by static weight of drill rods.

#### PH

Sampler advanced by hydraulic pressure from drill rig.

#### PM

Sampler advanced by manual pressure.

### SOIL TESTS

C	consolidation test
H	hydrometer analysis
M	sieve analysis
MH	sieve and hydrometer analysis
U	unconfined compression test
Q	undrained triaxial test
V	field vane, undisturbed and remoulded shear strength

### SOIL DESCRIPTIONS

<u>Relative Density</u>	<u>'N' Value</u>
-------------------------	------------------

Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

<u>Consistency</u>	<u>Undrained Shear Strength (kPa)</u>
--------------------	---------------------------------------

Very soft	0 to 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	over 100

<u>Consistency</u>	<u>'N' Value</u>
--------------------	------------------

Stiff to Very Stiff	≥ 2
---------------------	-----

The consistency of unweathered, grey clay should only be based on the undrained shear strength.

### LIST OF COMMON SYMBOLS

$c_u$	undrained shear strength
$e$	void ratio
$C_c$	compression index
$C_v$	coefficient of consolidation
$k$	coefficient of permeability
$I_p$	plasticity index
$n$	porosity
$u$	pore pressure
$w$	moisture content
$w_L$	liquid limit
$w_P$	plastic limit
$\phi^1$	effective angle of friction
$\gamma$	unit weight of soil
$\gamma^1$	unit weight of submerged soil
$\sigma$	normal stress



## **ATTACHMENT B**

### Compressive Strength of Bedrock Core Samples





COMPRESSIVE STRENGTH  
of ROCK CORE

Houle Chevrier Engineering Ltd.  
32 Steacie Drive  
Ottawa, ON  
K2K 2A9  
Tel.: 613-836-1422  
Fax.:613-836-9731

CLIENT: National Research Council Canada      PROJECT No.: 62739.10  
Project: Montreal Campus      REPORT NO: 1  
Date Received: 12-Dec-16      Date Tested: 19-Dec-16

Lab no.	748	749				
Core ID	16-4 SA7	16-1 SA 5				
Depth	4.64-6.47	2.39-2.97				
Cut length (mm)	-	-				
Ground length (mm)	118.99	119.43				
Diameter (mm)	62.97	62.87				
Ground Mass (g)	1.00	1.00				
Length:Diameter ratio	1.89	1.90				
Correction factor	0.99	0.99				
Failure load (kN)	264.03	328.25				
Uncorrected Strength (MPa)	84.80	105.70				
Corrected Strength (MPa)	<b>84.00</b>	<b>104.60</b>				

Remarks

Checked by:   
Krystle Smith, Laboratory Manager  
Reviewed by:   
Brent Wiebe, P.Eng.





## **ATTACHMENT C**

Results of Chemical Testing  
Paracel Laboratories Order No. 1651188



## Certificate of Analysis

**Houle Chevrier**

32 Steacie Drive  
Kanata, ON K2K 2A9  
Attn: Brent Wiebe

Client PO:  
Project: 62739.10  
Custody:

Report Date: 19-Dec-2016  
Order Date: 13-Dec-2016

**Order #: 1651188**

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

<b>Parcel ID</b>	<b>Client ID</b>
1651188-01	16-4 SA4 (7.5'-9.5')

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis

Client: Houle Chevrier

Client PO:

Report Date: 19-Dec-2016

Order Date: 13-Dec-2016

Project Description: 62739.10

### Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC, water extraction	19-Dec-16	19-Dec-16
Conductivity	MOE E3138 - probe @25 °C, water ext	14-Dec-16	15-Dec-16
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	16-Dec-16	16-Dec-16
Resistivity	EPA 120.1 - probe, water extraction	14-Dec-16	15-Dec-16
Solids, %	Gravimetric, calculation	14-Dec-16	14-Dec-16

Certificate of Analysis

Report Date: 19-Dec-2016

Client: Houle Chevrier

Order Date: 13-Dec-2016

Client PO:

Project Description: 62739.10

<b>Client ID:</b>	16-4 SA4 (7.5'-9.5')	-	-	-
<b>Sample Date:</b>	29-Nov-16	-	-	-
<b>Sample ID:</b>	1651188-01	-	-	-
<b>MDL/Units</b>	Soil	-	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	91.5	-	-	-
----------	--------------	------	---	---	---

**General Inorganics**

Conductivity	5 uS/cm	467	-	-	-
pH	0.05 pH Units	8.01	-	-	-
Resistivity	0.10 Ohm.m	21.4	-	-	-

**Anions**

Chloride	5 ug/g dry	153	-	-	-
Sulphate	5 ug/g dry	84	-	-	-

Certificate of Analysis  
**Client: Houle Chevrier**  
**Client PO:**

Report Date: 19-Dec-2016  
 Order Date: 13-Dec-2016  
**Project Description: 62739.10**

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	ND	5	ug/g						
Sulphate	ND	5	ug/g						
<b>General Inorganics</b>									
Conductivity	ND	5	uS/cm						
Resistivity	ND	0.10	Ohm.m						

Certificate of Analysis  
 Client: Houle Chevrier  
 Client PO:

Report Date: 19-Dec-2016  
 Order Date: 13-Dec-2016  
 Project Description: 62739.10

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	154	5	ug/g dry	153			1.0	20	
Sulphate	97.2	5	ug/g dry	83.6			15.1	20	
<b>General Inorganics</b>									
Conductivity	2500	5	uS/cm	2490			0.2	6.2	
pH	8.65	0.05	pH Units	8.65			0.0	10	
<b>Physical Characteristics</b>									
% Solids	97.1	0.1	% by Wt.	96.3			0.8	25	

Certificate of Analysis  
 Client: Houle Chevrier  
 Client PO:

Report Date: 19-Dec-2016  
 Order Date: 13-Dec-2016  
 Project Description: 62739.10

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Anions</b>									
Chloride	242	5	ug/g	153	88.9	78-113			
Sulphate	194	5	ug/g	83.6	110	78-111			

Certificate of Analysis

**Client: Houle Chevrier**

**Client PO:**

Report Date: 19-Dec-2016

Order Date: 13-Dec-2016

**Project Description: 62739.10**

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.





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National Research Council (NRC)

Project No. 5097

Sanitary and Storm Separation – Phase 4, 1200 Montreal Road

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APPENDIX C

APPENDIX C: Construction Photographic Documentation Service

## **Construction Photographic Documentation Services**

### **1. General Requirements**

The comprehensive Construction Photographic Documentation service and process for the Project will be comprised of the following basic functions:

- Digital photographic documentation of the construction process will be provided from the site survey stage and progressively throughout the construction period.
- All documentation access will be via a web-based Platform and provide real-time optimized password protected, online web-browser viewing of all documentation.
- Mobile application for Apple iOS and Android OS devices to provide direct mobile access to online documentation and mobile application-supported software features.
- The Construction Photo Documentation will be electronically indexed and have password protected web-based navigation and all storage/hosting of documentation will be cloud-based.
- The Construction Photo Documentation service will provide the NRC and the Contractor with all technical support, and ensure security of information related to the Project.
- The Phase 4 Photo Documentation will be archived along with the previous Phase 1, 2 and 3 Project Documentation .

Photo Documentation Contractor for this Phase 4 Project for RFP purposes:

- a. Multivista Ottawa: 208-101 Innes Park Way, Ottawa, Ontario
- b. Contact: Huw Roberts: 514-805-6679: [h.roberts@multivista.com](mailto:h.roberts@multivista.com)

### **2. Photographic Documentation Platform Details**

The Construction Photo Documentation service shall be applied to the construction of Phase 4 of sanitary and storm sewer separation project and be integrated with previous Phases 1, 2 and 3 of the Project Documentation.

The Photo Documentation will be carried out by Multivista Ottawa throughout the Project duration and be augmented with NRC and Contractor's Digital Photo Documentation to provide a complete as-built record package for the NRC.

The Photo Documentation can be accessed by authorized NRC/Contractor Project personnel with password protected login via a web-based Platform to provide optimized web-browser viewing of all online photo documentation during and after construction.

The Photo Documentation indexing and navigation system will utilize aerial Photo layouts and Satellite based mapping applications as the basis for an interactive online interface. The overall aerial Layout for Phase 4 may be separated into sub-layouts due to size and complexity of the Phase 4 Site area.

All Photo Documentation will be indexed and organized within the web-based Platform via time (date-stamped) and location throughout the project. The web-based Platform interface will provide recent

documentation activity summaries, as weekly photos are uploaded to the Project. The Photo Documentation interface will provide an aerial Site map view that pinpoints the physical location of all photos of the Phase 4 Project. The Site map view will be interactive and can be used by the project team to view/collate/annotate all project photos.

The Photo Documentation will combine a detailed user friendly indexing and navigation system with inspection-grade high-resolution digital photography performed by Multivista Ottawa. The Photo Documentation is designed to capture actual construction conditions throughout the project duration and particularly at critical milestones of the construction process.

The web-based online interface will allow the project team to upload its own digital photographic images to the documentation indexing and navigation system. All authorized users will be able to link images to the project layout for customized location-based indexing.

The Photo Documentation online interface will provide inherent functions such as the ability to add comments and descriptive details to any of the Project Digital Photos. The online interface will allow project team users to mark-up any of the images using integrated annotation functionality.

The online interface will also allow users to upload files to the project documentation indexing and navigation system. The supported file formats will include, at minimum, PDF, Microsoft Word documents, and Microsoft Excel spreadsheets, Microsoft PowerPoint presentations, JPEG, PNG, GIF, MPEG and Folders. These files can be Contractor inspection and testing reports as an example, so the web-based Multivista System will become a “one stop” repository for all applicable project related documentation in addition to the base Photo Documentation.

The web-based Multivista Construction Photo Documentation System will adhere to industry standards for information security and protection of data.

### **3. Mobile Application for Photographic Documentation Platform Details**

All project construction documentation that is accessible online through the web-based Internet connection will also be accessible via a native Multivista mobile application (“mobile app”).

The operation of supported features on the mobile app may vary slightly from the online interface (standard/desktop web-browser interface) to accommodate the mobile application environment and improve the mobile experience. Mobile app will be supported for Apple iOS and Android OS devices, and will be available for download via the Apple App Store and Google Play Store.

Using the Mobile Application the Project team will be able to access all project photographic documentation by selecting photo sets (shoots and albums) or by navigating the project layout. The Project Team will be able to instantaneously and seamlessly capture/upload their own digital photographic images to the project site, without the need to save/load the photos onto the Mobile device such as a Tablet or Phone.

#### **4. Photographic Documentation Scope of Work.**

##### **.1 Pre-Construction Site Survey (Phase 4)**

Prior to construction mobilization by the Contractor, the existing conditions of the proposed work layout including all terrain, roadways, paths, landscaping and structures surrounding the proposed Project layout will be aerially photo documented using overlapping photographic techniques.

The initial Site Survey Project layout will be accomplished using Drone technology (125' to 130' height of flight path); all required flight credentials/licensing and flight authorization will be covered by this contractor.

The Drone generated Site Layout Digital Photos will be indexed into a photographic layout of the project construction path for all milestone/progression based construction photo documentation.

The site layout will be uploaded to the NRC/Multivista Project website and navigation through the site survey condition photo documentation can be accomplished through the web-based interactive Project webpage. The Photo documentation will allow for interactive commenting and annotation features directly onto the Site Photos. The photos will be used for indication and isolation of pre-construction site issues and log of existing site conditions for NRC records.

The Site Survey process and setup will be a one day scheduled event with the NRC Representative, the Design Engineers and the Contractor.

##### **.2 Construction Progression and Record of Installation Detail (Phase 4)**

Commencing at the start of the Construction, the Project Construction progress for all trades will be tracked via the above noted Photo Documentation platform, on a scheduled interval by Multivista Ottawa.

This scheduled site visit as coordinated with the General Contractor work schedule, will generate Construction Progression/as built Photo Documentation which will comprehensively track the overall project installation progress and record the underground installation prior to/after backfill.

The coordination of the Multivista Photo Documentation scheduled milestone work will be the responsibility of the Contractor in conjunction with the Multivista Ottawa Technical representative. All efforts will be made to schedule the Photo Documentation on a timely basis to avoid missing any critical installation details. Multivista will allow for flexibility in scheduling the work; ie during critical stages of the installation, multiple weekly visits may be required to properly capture the installation progress.

The Project Digital Photos will be indexed and navigation shall be accomplished through the web-based interactive site layout drawings. The Photo Documentation will be utilized by the NRC for "exact-built" project records of the installation.

Miscellaneous events/items that occur during the construction process can be captured and uploaded to the project website by the NRC or the Contractor independently. All uploaded photos will be dated, labeled and inserted into a NRC defined Project Album.

The Construction progress/as built Photo Documentation will occur as per the General Contractor schedule work activity for the duration of the Project.

### **.3 Additional Information**

Multivista Ottawa will furnish all technical support and Project Team training/orientation related to using the Multivista Photo Documentation System for this project.

Upon completion of this project, final copies of the Construction Documentation (the “Permanent Record”) will be provided in a digital media format to the NRC. The project web-based on-line access terminates upon delivery of the permanent record or as agreed between Multivista Ottawa and the NRC.

All Intellectual property rights associated with the digital media prepared in direct service of the project shall transfer, along with the media itself, to the NRC. The project permanent record will be provided with the underlying housing software, indexing and navigation system, typically as a DVD or thumb drive. The multiple-user license for use of the underlying housing software, indexing and navigation is included for accessing the archived digital media specific to the project.

**END OF APPENDIX C**

APPENDIX D: Existing Septic Tank Information

**NRC - Montreal Road Campus - Sewer Rehabilitation Project - Phase 4**

**APPENDIX D - Existing Septic Tanks Information**

<b>Building</b>	<b>Number of tanks</b>	<b>Tank Volume(s) gallons</b>	<b>Usage</b>
M-08	0		Storage. Dry.
M-10	3	1548 (A), 625 (B), 1069 (C)	20% office space, gas turbine test cells, chemical storage (in cabinet), has floor drain. Has machine shop, welding shop and compressors.
M-12	1		Hg issue unresolved, not approved. Laboratories (70%), 15% offices, 15% storage.
M-13	1	516	Potential for metals contamination from grinding activities. Lab analysis will be required for approval. 40% offices, 10% storage.
M-14	2	1240	Aerospace research, structural testing, stress testing, no chemical use, 'salt fog' machines discharge copper sulphate. 20% offices
M-16	1	254	Office space (5%) and storage (95%)
M-17	1	1024	Library and offices for aerospace research (50%), lab/test cells (50%). Was refrigeration plant in the 1980's
M-18	0		dry. Storage
M-19	1	2577	Office space (60%), storage, facilities (parking bay, stores), former machine shop. No processes/chemical use

**Information provided by NRC (2017-03-15)**



**TP1 Amount Payable – General**

1.1 Subject to any other provisions of the contract, Her Majesty shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which

1.1.1 the aggregate of the amounts described in TP2 exceeds

1.1.2 the aggregate of the amounts described in TP3

and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by him in respect of the work to which the payment relates.

**TP2 Amounts Payable to the Contractor**

2.1 The amounts referred to in TP1.1.1 are the aggregate of

2.1.1 the amounts referred to in the Articles of Agreement, and

2.1.2 the amounts, if any, that are payable to the Contractor pursuant to the General Conditions.

**TP3 Amounts Payable to Her Majesty**

3.1 The amounts referred to in TP1.1.2 are the aggregate of the amounts, in any, that the Contractor is liable to pay Her Majesty pursuant to the contract.

3.2 When making any payments to the Contractor, the failure of Her Majesty to deduct an amount referred to in TP3.1 from an amount referred to in TP2 shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

**TP4 Time of Payment**

4.1 In these Terms of Payment

4.1.1 The “payment period” means a period of 30 consecutive days or such other longer period as is agreed between the Contractor and the Departmental Representative.

4.1.2 An amount is “due and payable” when it is due and payable by Her Majesty to the Contractor according to TP4.4, TP4.7 or TP4.10.

4.1.3 An amount is overdue when it is unpaid on the first day following the day upon which it is due and payable.

4.1.4 The “date of payment” means the date of the negotiable instrument of an amount due and payable by the Receiver General for Canada and given for payment.

4.1.5 The “Bank Rate” means the discount rate of interest set by the Bank of Canada in effect at the opening of business on the date of payment.





- 4.2 The Contractor shall, on the expiration of a payment period, deliver to the Departmental Representative in respect of that payment period a written progress claim that fully describes any part of the work that has been completed, and any material that was delivered to the work site but not incorporated into the work during that payment period.
- 4.3 The Departmental Representative shall, not later than ten days after receipt by him of a progress claim referred to in TP4.2,
- 4.3.1 inspect the part of the work and the material described in the progress claim; and
- 4.3.2 issue a progress report, a copy of which the Departmental Representative will give to the Contractor, that indicates the value of the part of the work and the material described in the progress claim that, in the opinion of the Departmental Representative,
- 4.3.2.1 is in accordance with the contract, and
- 4.3.2.2 was not included in any other progress report relating to the contract.
- 4.4 Subject to TP1 and TP4.5 Her Majesty shall, not later than 30 days after receipt by the Departmental Representative of a progress claim referred to in TP4.2, pay the Contractor
- 4.4.1 an amount that is equal to 95% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has been furnished by the Contractor, or
- 4.4.2 an amount that is equal to 90% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has not been furnished by the Contractor.
- 4.5 It is a condition precedent to Her Majesty's obligation under TP4.4 that the Contractor has made and delivered to the Departmental Representative,
- 4.5.1 a statutory declaration described in TP4.6 in respect of a progress claim referred to in TP4.2,
- 4.5.2 in the case of the Contractor's first progress claim, a construction schedule in accordance with the relevant sections of the Specifications, and
- 4.5.3 if the requirement for a schedule is specified, an update of the said schedule at the times identified in the relevant sections of the Specifications.
- 4.6 A statutory declaration referred to in TP4.5 shall contain a deposition by the Contractor that
- 4.6.1 up to the date of the Contractor's progress claim, the Contractor has complied with all his lawful obligations with respect to the Labour Conditions; and
- 4.6.2 up to the date of the Contractor's immediately preceding progress claim, all lawful obligations of the Contractor to subcontractors and suppliers of material in respect of the



work under the contract have been fully discharged.

- 4.7 Subject to TP1 and TP4.8, Her Majesty shall, not later than 30 days after the date of issue of an Interim Certificate of Completion referred to in GC44.2, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.7.1 the sum of all payments that were made pursuant to TP4.4;
  - 4.7.2 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty or rectifying defects described in the Interim Certificate of Completion; and
  - 4.7.3 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty of completing the parts of the work described in the Interim Certificate of Completion other than the defects referred to in TP4.7.2.
- 4.8 It is a condition precedent to Her Majesty's obligation under TP4.7 that the Contractor has made and delivered to the Departmental Representative,
- 4.8.1 a statutory declaration described in TP4.9 in respect of an Interim Certificate of Completion referred to in GC44.2, and
  - 4.8.2 if so specified in the relevant sections of the Specifications, and update of the construction schedule referred to in TP4.5.2 and the updated schedule shall, in addition to the specified requirements, clearly show a detailed timetable that is acceptable to the Departmental Representative for the completion of any unfinished work and the correction of all defects.
- 4.9 A statutory declaration referred to in TP4.8 shall contain a deposition by the contractor that up to the date of the Interim Certificate of Completion the Contractor has
- 4.9.1 complied with all of the Contractor's lawful obligations with respect to the Labour Conditions;
  - 4.9.2 discharged all of the Contractor's lawful obligations to the subcontractors and suppliers of material in respect of the work under the contract; and
  - 4.9.3 discharged the Contractor's lawful obligations referred to in GC14.6.
- 4.10 Subject to TP1 and TP4.11, Her Majesty shall, not later than 60 days after the date of issue of a Final Certificate of Completion referred to in GC44.1, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.10.1 the sum of all payments that were made pursuant to TP4.4; and
  - 4.10.2 the sum of all payments that were made pursuant to TP4.7.
- 4.11 It is a condition precedent to Her Majesty's obligation under TP4.10 that the Contractor has made and delivered a statutory declaration described in TP4.12 to the Departmental Representative.



- 4.12 A statutory declaration referred to in TP4.11 shall, in addition to the depositions described in TP4.9, contain a deposition by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the contract have been discharged and satisfied.

**TP5 Progress Report and Payment Thereunder Not Binding on Her Majesty**

- 5.1 Neither a progress report referred to in TP4.3 nor any payment made by Her Majesty pursuant to these Terms of Payment shall be construed as an admission by Her Majesty that the work, material or any part thereof is complete, is satisfactory or is in accordance with the contract.

**TP6 Delay in Making Payment**

- 6.1 Notwithstanding GC7 any delay by Her Majesty in making any payment when it is due pursuant to these Terms of Payment shall not be a breach of the contract by Her Majesty.

- 6.2 Her Majesty shall pay, without demand from the Contractor, simple interest at the Bank Rate plus 1 -1/4 per centum on any amount which is overdue pursuant to TP4.1.3, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment except that

- 6.2.1 interest shall not be payable or paid unless the amount referred to in TP6.2 has been overdue for more than 15 days following

6.2.1.1 the date the said amount became due and payable, or

6.2.1.2 the receipt by the Departmental Representative of the Statutory Declaration referred to in TP4.5, TP4.8 or TP4.11,

whichever is the later, and

- 6.6.2 interest shall not be payable or paid on overdue advance payments if any.

**TP7 Right of Set-off**

- 7.1 Without limiting any right of set-off or deduction given or implied by law or elsewhere in the contract, Her Majesty may set off any amount payable to Her Majesty by the Contractor under this contract or under any current contract against any amount payable to the Contractor under this contract.

- 7.2 For the purposes of TP7.1, "current contract" means a contract between Her Majesty and the Contractor

7.2.1 under which the Contractor has an undischarged obligation to perform or supply work, labour or material, or

7.2.2 in respect of which Her Majesty has, since the date of which the Articles of Agreement were made, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.



**TP8 Payment in Event of Termination**

- 8.1 If the contract is terminated pursuant to GC41, Her Majesty shall pay the Contractor any amount that is lawfully due and payable to the Contractor as soon as is practicable under the circumstances.

**TP9 Interest on Settled Claims**

- 9.1 Her Majesty shall pay to the Contractor simple interest on the amount of a settled claim at an average Bank Rate plus 1 ¼ per centum from the date the settled claim was outstanding until the day prior to the date of payment.
- 9.2 For the purposes of TP9.1,
- 9.2.1 a claim is deemed to have been settled when an agreement in writing is signed by the Departmental Representative and the Contractor setting out the amount of the claim to be paid by Her Majesty and the items or work for which the said amount is to be paid.
- 9.2.2 an "average Bank Rate" means the discount rate of interest set by the Bank of Canada in effect at the end of each calendar month averaged over the period the settled claim was outstanding.
- 9.2.3 a settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the contract had it not been disputed.
- 9.3 For the purposes of TP9 a claim means a disputed amount subject to negotiation between Her Majesty and the Contractor under the contract.



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## **GC1 Interpretation**

### **1.1 In the contract**

- 1.1.1 where reference is made to a part of the contract by means of numbers preceded by letters, the reference shall be construed to be a reference to the particular part of the contract that is identified by that combination of letters and numbers and to any other part of the contract referred to therein;
- 1.1.2 “contract” means the contract document referred to in the Articles of Agreement;
- 1.1.3 “contract security” means any security given by the Contractor to Her Majesty in accordance with the contract;
- 1.1.4 “Departmental Representative” means the officer or employee of Her Majesty who is designated pursuant to the Articles of Agreement and includes a person specially authorized by him to perform, on his behalf, any of his functions under the contract and is so designated in writing to the Contractor;
- 1.1.5 “material” includes all commodities, articles and things required to be furnished by or for the Contractor under the contract for incorporation into the work;
- 1.1.6 “Minister” includes a person acting for, or if the office is vacant, in place of the Minister and his successors in the office, and his or their lawful deputy and any of his or their representatives appointed for the purposes of the contract;
- 1.1.7 “person” includes, unless the context otherwise requires, a partnership, proprietorship, firm, joint venture, consortium and a corporation;
- 1.1.8 “plant” includes all animals, tools, implements, machinery, vehicles, buildings, structures, equipment and commodities, articles and things other than material, that are necessary for the due performance of the contract;
- 1.1.9 “subcontractor” means a person to whom the Contractor has, subject to GC4, subcontracted the whole or any part of the work;
- 1.1.10 “superintendent” means the employee of the Contractor who is designated by the Contractor to act pursuant to GC19;
- 1.1.11 “work includes, subject only to any express stipulation in the contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the contract.

1.2 The headings in the contract documents, other than in the Plans and Specifications, form no part of the contract but are inserted for convenience of reference only.

1.3 In interpreting the contract, in the event of discrepancies or conflicts between anything in the Plans and Specifications and the General Conditions, the General Conditions govern.



- 1.4 In interpreting the Plans and Specifications, in the event of discrepancies or conflicts between
- 1.4.1 the Plans and Specifications, the Specifications govern;
  - 1.4.2 the Plans, the Plans drawn with the largest scale govern; and
  - 1.4.3 figured dimensions and scaled dimensions, the figured dimensions govern.

**GC2 Successors and Assigns**

- 2.1 The contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and assigns.

**GC3 Assignment of Contract**

- 3.1 The contract may not be assigned by the Contractor, either in whole or in part, without the written consent of the Minister.

**GC4 Subcontracting by Contractor**

- 4.1 Subject to this General Condition, the Contractor may subcontract any part of the work.
- 4.2 The Contractor shall notify the Departmental Representative in writing of his intention to subcontract.
- 4.3 A notification referred to in GC4.2 shall identify the part of the work, and the subcontractor with whom it is intended to subcontract.
- 4.4 The Departmental Representative may object to the intended subcontracting by notifying the Contractor in writing within six days of receipt by the Departmental Representative of a notification referred to in GC4.2.
- 4.5 If the Departmental Representative objects to a subcontracting pursuant to GC4.4, the Contractor shall not enter into the intended subcontract.
- 4.6 The contractor shall not, without the written consent of the Departmental Representative, change a subcontractor who has been engaged by him in accordance with this General Condition.
- 4.7 Every subcontract entered into by the Contractor shall adopt all of the terms and conditions of this contract that are of general application.
- 4.8 Neither a subcontracting nor the Departmental Representative's consent to a subcontracting by the Contractor shall be construed to relieve the Contractor from any obligation under the contract or to impose any liability upon Her Majesty.

**GC5 Amendments**



- 5.1 No amendment or change in any of the provisions of the contract shall have any force or effect until it is reduced to writing.

**GC6 No Implied Obligations**

- 6.1 No implied terms or obligations of any kind by or on behalf of Her Majesty shall arise from anything in the contract and the express covenants and agreements therein contained and made by Her Majesty are the only covenants and agreements upon which any rights against Her Majesty are to be founded.
- 6.2 The contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work that were made prior to the date of the contract.

**GC7 Time of Essence**

- 7.1 Time is of the essence of the contract.

**GC8 Indemnification by Contractor**

- 8.1 The Contractor shall indemnify and save Her Majesty harmless from and against all claims, demand, losses, costs, damages, actions, suits, or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by or attributable to the activities of the Contractor, his servants, agents, subcontractors and sub-subcontractors in performing the work including an infringement or an alleged infringement of a patent of invention or any other kind of intellectual property.
- 8.2 For the purpose of GC8.1, "activities" includes any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

**GC9 Indemnification by Her Majesty**

- 9.1 Her Majesty shall, subject to the Crown Liability Act, the Patent Act, and any other law that affects Her Majesty's rights, powers, privileges or obligations, indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of his activities under the contract that are directly attributable to
- 9.1.1 lack of or a defect in Her Majesty's title to the work site whether real or alleged; or
- 9.1.2 an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the contract employing a model, plan or design or any other thing related to the work that was supplied by Her Majesty to the Contractor.

**GC10 Members of House of Commons Not to Benefit**





- 10.1 As required by the Parliament of Canada Act, it is an express condition of the contract that no member of the House of Commons shall be admitted to any share of part of the contract or to any benefit arising therefrom.

### **GC11 Notices**

- 11.1 Any notice, consent, order, decision, direction or other communication, other than a notice referred to in GC11.4, that may be given to the Contractor pursuant to the contract may be given in any manner.
- 11.2 Any notice, consent, order, decision, direction or other communication required to be given in writing, to any party pursuant to the contract shall, subject to GC11.4, be deemed to have been effectively given
- 11.2.1 to the Contractor, if delivered personally to the Contractor or the Contractor's superintendent, or forwarded by mail, telex or facsimile to the Contractor at the address set out in A4.1, or
- 11.2.2 to Her Majesty, if delivered personally to the Departmental Representative, or forwarded by mail, telex or facsimile to the Departmental Representative at the address set out in A1.2.1.
- 11.3 Any such notice, consent, order, decision, direction or other communication given in accordance with GC11.2 shall be deemed to have been received by either party
- 11.3.1 if delivered personally, on the day that it was delivered,
- 11.3.2 if forwarded by mail, on the earlier of the day it was received and the sixth day after it was mailed, and
- 11.3.3 if forwarded by telex or facsimile, 24 hours after it was transmitted.
- 11.4 A notice given under GC38.1.1, GC40 and GC41, if delivered personally, shall be delivered to the Contractor if the Contractor is doing business as sole proprietor or, if the Contractor is a partnership or corporation, to an officer thereof.

### **GC12 Material, Plant and Real Property Supplied by Her Majesty**

- 12.1 Subject to GC12.2, the Contractor is liable to Her Majesty for any loss of or damage to material, plant or real property that is supplied or placed in the care, custody and control of the Contractor by Her Majesty for use in connection with the contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.
- 12.2 The Contractor is not liable to Her Majesty for any loss or damage to material, plant or real property referred to in GC12.1 if that loss or damage results from and is directly attributable to reasonable wear and tear.
- 12.3 The Contractor shall not use any material, plant or real property referred to in GC12.1 except for



the purpose of performing this contract.

- 12.4 When the Contractor fails to make good any loss or damage for which he is liable under GC12.1 within a reasonable time after being required to do so by the Departmental Representative, the Departmental Representative may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to Her Majesty for the cost thereof and shall, on demand, pay to Her Majesty an amount equal to that cost.
- 12.5 The Contractor shall keep such records of all material, plant and real property referred to in GC12.1 as the Departmental Representative from time to time requires and shall satisfy the Departmental Representative, when requested, that such material, plant and real property are at the place and in the condition which they ought to be.

### **GC13 Material, Plant and Real Property Become Property of Her Majesty**

- 13.1 Subject to GC14.7 all material and plant and the interest of the Contractor in all real property, licenses, powers and privileges purchased, used or consumed by the Contractor for the contract shall, after the time of their purchase, use or consumption be the property of Her Majesty for the purposes of the work and they shall continue to be the property of Her Majesty.
- 13.1.1 in the case of material, until the Departmental Representative indicates that he is satisfied that it will not be required for the work, and
- 13.1.2 in the case of plant, real property, licenses, powers and privileges, until the Departmental Representative indicates that he is satisfied that the interest vested in Her Majesty therein is no longer required for the purposes of the work.
- 13.2 Material or plant that is the property of Her Majesty by virtue of GC13.1 shall not be taken away from the work site or used or disposed of except for the purposes of the work without the written consent of the Departmental Representative.
- 13.3 Her Majesty is not liable for loss of or damage from any cause to the material or plant referred to in GC13.1 and the Contractor is liable for such loss or damage notwithstanding that the material or plant is the property of Her Majesty.

### **GC14 Permits and Taxes Payable**

- 14.1 The Contractor shall, within 30 days after the date of the contract, tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the work were being performed for a person other than Her Majesty.
- 14.2 Within 10 days of making a tender pursuant to GC14.1, the Contractor shall notify the Departmental Representative of his action and of the amount tendered and whether or not the municipal authority has accepted that amount.
- 14.3 If the municipal authority does not accept the amount tendered pursuant to GC14.1 the Contractor shall pay that amount to Her Majesty within 6 days after the time stipulated in GC14.2.



- 14.4 For the purposes of GC14.1 to GC14.3 “municipal authority” means any authority that would have jurisdiction respecting permission to perform the work if the owner were not Her Majesty.
- 14.5 Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the work under the contract.
- 14.6 In accordance with the Statutory Declaration referred to in TP4.9, a Contractor who has neither residence nor place of business in the province in which work under the contract is being performed shall provide Her Majesty with proof of registration with the provincial sales tax authorities in the said province.
- 14.7 For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the work under the contract, the Contractor shall, notwithstanding the fact that all material, plant and interest of the Contractor in all real property, licenses, powers and privileges, have become the property of Her Majesty after the time of purchase, be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that material, plant or interest of the Contractor in accordance with the relevant legislation.

#### **GC15 Performance of Work under Direction of Departmental Representative**

- 15.1 The Contractor shall
- 15.1.1 permit the Departmental Representative to have access to the work and its site at all times during the performance of the contract;
  - 15.1.2 furnish the Departmental Representative with such information respecting the performance of the contract as he may require; and
  - 15.1.3 give the Departmental Representative every possible assistance to enable the Departmental Representative to carry out his duty to see that the work is performed in accordance with the contract and to carry out any other duties and exercise any powers specially imposed or conferred on the Departmental Representative under the contract.

#### **CG16 Cooperation with Other Contractors**

- 16.1 Where, in the opinion of the Departmental Representative, it is necessary that other contractors or workers with or without plant and material, be sent onto the work or its site, the Contractor shall, to the satisfaction of the Departmental Representative, allow them access and cooperate with them in the carrying out of their duties and obligation.
- 16.2 If
- 16.2.1 the sending onto the work or its site of other contractors or workers pursuant to GC16.1 could not have been reasonably foreseen or anticipated by the Contractor when entering into the contract, and



16.2.2 the Contractor incurs, in the opinion of the Departmental Representative, extra expense in complying with GC16.1, and

16.2.3 The Contractor has given the Departmental Representative written notice of his claim for the extra expense referred to in GC16.2.2 within 30 days of the date that the other contractors or workers were sent onto the work or its site,

Her Majesty shall pay the Contractor the cost, calculated in accordance with GC48 to GC50, of the extra labour, plant and material that was necessarily incurred.

### **GC17 Examination of Work**

17.1 If, at any time after the commencement of the work but prior to the expiry of the warranty or guarantee period, the Departmental Representative has reason to believe that the work or any part thereof has not been performed in accordance with the contract, the Departmental Representative may have that work examined by an expert of his choice.

17.2 If, as a result of an examination of the work referred to in GC17.1, it is established that the work was not performed in accordance with the contract, then, in addition to and without limiting or otherwise affecting any of Her Majesty's rights and remedies under the contract either at law or in equity, the Contractor shall pay Her Majesty, on demand, all reasonable costs and expenses that were incurred by Her Majesty in having that examination performed.

### **GC18 Clearing of Site**

18.1 The Contractor shall maintain the work and its site in a tidy condition and free from the accumulation of waste material and debris, in accordance with any directions of the Departmental Representative.

18.2 Before the issue of an interim certificate referred to in GC44.2, the Contractor shall remove all the plant and material not required for the performance of the remaining work, and all waste material and other debris, and shall cause the work and its site to be clean and suitable for occupancy by Her Majesty's servants, unless otherwise stipulated in the contract.

18.3 Before the issue of a final certificate referred to in GC44.1, the Contractor, shall remove from the work and its site all of the surplus plant and material and any waste material and other debris.

18.4 The Contractor's obligations described in GC18.1 to GC18.3 do not extend to waste material and other debris caused by Her Majesty's servants or contractors and workers referred to in GC16.1.

### **GC19 Contractor's Superintendent**

19.1 The Contractor shall, forthwith upon the award of the contract, designate a superintendent.

19.2 The Contractor shall forthwith notify the Departmental Representative of the name, address and telephone number of a superintendent designate pursuant to GC19.1.



- 19.3 A superintendent designated pursuant to GC19.1 shall be in full charge of the operations of the Contractor in the performance of the work and is authorized to accept any notice, consent, order, direction, decision or other communication on behalf of the Contractor that may be given to the superintendent under the contract.
- 19.4 The Contractor shall, until the work has been completed, keep a competent superintendent at the work site during working hours.
- 19.5 The Contractor shall, upon the request of the Departmental Representative, remove any superintendent who, in the opinion of the Departmental Representative, is incompetent or has been conducting himself improperly and shall forthwith designate another superintendent who is acceptable to the Departmental Representative.
- 19.6 Subject to GC19.5, the Contractor shall not substitute a superintendent without the written consent of the Departmental Representative.
- 19.7 A breach by the Contractor of GC19.6 entitles the Departmental Representative to refuse to issue any certificate referred to in GC44 until the superintendent has returned to the work site or another superintendent who is acceptable to the Departmental Representative has been substituted.

#### **GC20 National Security**

- 20.1 If the Minister is of the opinion that the work is of a class or kind that involves the national security, he may order the Contractor
- 20.1.1 to provide him with any information concerning persons employed or to be employed by him for purposes of the contract; and
  - 20.1.2 to remove any person from the work and its site if, in the opinion of the Minister, that person may be a risk to the national security.
- 20.2 The Contractor shall, in all contracts with persons who are to be employed in the performance of the contract, make provision for his performance of any obligation that may be imposed upon him under GC19 to GC21.
- 20.3 The Contractor shall comply with an order of the Minister under GC20.1

#### **GC21 Unsuitable Workers**

- 21.1 The Contractor shall, upon the request of the Departmental Representative, remove any person employed by him for purposes of the contract who, in the opinion of the Departmental Representative, is incompetent or has conducted himself improperly, and the Contractor shall not permit a person who has been removed to return to the work site.

#### **GC22 Increased or Decreased Costs**



- 22.1 The amount set out in the Articles of Agreement shall not be increased or decreased by reason of any increase or decrease in the cost of the work that is brought about by an increase or decrease in the cost of labour, plant or material or any wage adjustment arising pursuant to the Labour Conditions.
- 22.2 Notwithstanding GC22.1 and GC35, an amount set out in the Articles of Agreement shall be adjusted in the manner provided in GC22.3, if any change in a tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property
- 22.2.1 occurs after the date of the submission by the Contractor of his tender for the contract,
- 22.2.2 applies to material, and
- 22.2.3 affects the cost to the Contractor of that material.
- 22.3 If a change referred to in GC22.2 occurs, the appropriate amount set out in the Articles of Agreement shall be increased or decreased by an amount equal to the amount that is established by an examination of the relevant records of the Contractor referred to in GC51 to be the increase or decrease in the cost incurred that is directly attributable to that change.
- 22.4 For the purpose of GC22.2, where a tax is changed after the date of submission of the tender but public notice of the change has been given by the Minister of Finance before that date, the change shall be deemed to have occurred before the date of submission of the tender.

### **GC23 Canadian Labour and Material**

- 23.1 The Contractor shall use Canadian labour and material in the performance of the work to the full extent to which they are procurable, consistent with proper economy and expeditious carrying out of the work.
- 23.2 Subject to GC23.1, the Contractor shall, in the performance of the work, employ labour from the locality where the work is being performed to the extent to which it is available, and shall use the offices of the Canada Employment Centres for the recruitment of workers wherever practicable.
- 23.3 Subject to GC23.1 and GC23.2, the Contractor shall, in the performance of the work, employ a reasonable proportion of persons who have been on active service with the armed forces of Canada and have been honourably discharged therefrom.

### **GC24 Protection of Work and Documents**

- 24.1 The Contractor shall guard or otherwise protect the work and its site, and protect the contract, specifications, plans, drawings, information, material, plant and real property, whether or not they are supplied by Her Majesty to the Contractor, against loss or damage from any cause, and he shall not use, issue, disclose or dispose of them without the written consent of the Minister, except as may be essential for the performance of the work.



- 24.2 If any document or information given or disclosed to the Contractor is assigned a security rating by the person who gave or disclosed it, the Contractor shall take all measures directed by the Departmental Representative to be taken to ensure the maintenance of the degree of security that is ascribed to that rating.
- 24.3 The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the Minister to inspect or to take security measures in respect of the work and its site.
- 24.4 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure compliance with or to remedy a breach of GC24.1 to GC24.3.

### **GC25 Public Ceremonies and Signs**

- 25.1 The Contractor shall not permit any public ceremony in connection with the work without the prior consent of the Minister.
- 25.2 The Contractor shall not erect or permit the erection of any sign or advertising on the work or its site without the prior consent of the Departmental Representative.

### **GC26 Precautions against Damage, Infringement of Rights, Fire, and Other Hazards**

- 26.1 The Contractor shall, at his own expense, do whatever is necessary to ensure that
- 26.1.1 no person, property, right, easement or privilege is injured, damaged or infringed by reasons of the Contractor's activities in performing the contract;
  - 26.1.2 pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted or endangered by the performance or existence of the work or plant;
  - 26.1.3 fire hazards in or about the work or its site are eliminated and, subject to any direction that may be given by the Departmental Representative, any fire is promptly extinguished;
  - 26.1.4 the health and safety of all persons employed in the performance of the work is not endangered by the method or means of its performance;
  - 26.1.5 adequate medical services are available to all persons employed on the work or its site at all times during the performance of the work;
  - 26.1.6 adequate sanitation measures are taken in respect of the work and its site; and
  - 26.1.7 all stakes, buoys and marks placed on the work or its site by or under the authority of the Departmental Representative are protected and are not removed, defaced, altered or destroyed.
- 26.2 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure



compliance with or to remedy a breach of GC26.1.

- 26.3 The Contractor shall, at his own expense, comply with a direction of the Departmental Representative made under GC26.2.

#### **GC27 Insurance**

- 27.1 The Contractor shall, at his own expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the Departmental Representative in accordance with the requirements of the Insurance Conditions "E".

- 27.2 The insurance contracts referred to in GC27.1 shall

27.2.1 be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in Insurance Conditions "E", and

27.2.2 provide for the payment of claims under such insurance contracts in accordance with GC28.

#### **GC28 Insurance Proceeds**

- 28.1 In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid directly to Her Majesty, and

28.1.1 the monies so paid shall be held by Her Majesty for the purposes of the contract, or

28.1.2 if Her Majesty elects, shall be retained by Her Majesty, in which event they vest in Her Majesty absolutely.

- 28.2 In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid by the insurer directly to the claimant.

- 28.3 If an election is made pursuant to GC28.1, the Minister may cause an audit to be made of the accounts of the Contractor and of Her Majesty in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between

28.3.1 the aggregate of the amount of the loss or damage suffered or sustained by Her Majesty, including any cost incurred in respect of the clearing and cleaning of the work and its site and any other amount that is payable by the Contractor to Her Majesty under the contract, minus any monies retained pursuant to GC28.12, and

28.3.2 the aggregate of the amounts payable by Her Majesty to the Contractor pursuant to the contract up to the date of the loss or damage.

- 28.4 A difference that is established pursuant to GC28.3 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the





creditor.

- 28.5 When payment of a deficiency has been made pursuant to GC28.4, all rights and obligations of Her Majesty and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in GC28.3, be deemed to have been expended and discharged.
- 28.6 If an election is not made pursuant to GC28.1.2 the Contractor shall, subject to GC28.7, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at his own expense as if that part of the work had not yet been performed.
- 28.7 When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in GC 28.6, Her Majesty shall pay him out of the monies referred to in GC28.1 so far as they will thereunto extend.
- 28.8 Subject to GC28.7, payment by Her Majesty pursuant to GC28.7 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding TP4.4.1 and TP4.4.2.

### **GC29 Contract Security**

- 29.1 The Contractor shall obtain and deliver contract security to the Departmental Representative in accordance with the provisions of the Contract Security Conditions.
- 29.2 If the whole or a part of the contract security referred to in GC29.1 is in the form of a security deposit, it shall be held and disposed of in accordance with GC43 and GC45.
- 29.3 If a part of the contract security referred to in GC29.1 is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond on the work site.

### **GC30 Changes in the Work**

- 30.1 Subject to GC5, the Departmental Representative may, at any time before he issues his Final Certificate of Completion,
- 30.1.1 order work or material in addition to that provided for in the Plans and Specifications;  
and
- 30.1.2 delete or change the dimensions, character, quantity, quality, description, location or position of the whole or any part of the work or material provided for in the Plans and Specifications or in any order made pursuant to GC30.1.1,
- if that additional work or material, deletion, or change is, in his opinion, consistent with the general intent of the original contract.
- 30.2 The Contractor shall perform the work in accordance with such orders, deletions and changes that are made by the Departmental Representative pursuant to GC30.1 from time to time as if they had appeared in and been part of the Plans and Specifications.



- 30.3 The Departmental Representative shall determine whether or not anything done or omitted by the Contractor pursuant to an order, deletion or change referred to in GC30.1 increased or decreased the cost of the work to the Contractor.
- 30.4 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been increased, Her Majesty shall pay the Contractor the increased cost that the Contractor necessarily incurred for the additional work calculated in accordance with GC49 or GC50.
- 30.5 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been decreased, Her Majesty shall reduce the amount payable to the Contractor under the contract by an amount equal to the decrease in the cost caused by the deletion or change referred to in GC30.1.2 and calculated in accordance with GC49.
- 30.6 GC30.3 to GC30.5 are applicable only to a contract or a portion of a contract for which a Fixed Price Arrangement is stipulated in the contract.
- 30.7 An order, deletion or change referred to in GC30.1 shall be in writing, signed by the Departmental Representative and given to the Contractor in accordance with GC11.

### **GC31 Interpretation of Contract by Departmental Representative**

- 31.1 If, at any time before the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, any question arises between the parties about whether anything has been done as required by the contract or about what the Contractor is required by the contract to do, and, in particular but without limiting the generality of the foregoing, about
- 31.1.1 the meaning of anything in the Plans and Specification,
  - 31.1.2 the meaning to be given to the Plans and Specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their working or intention,
  - 31.1.3 whether or not the quality or quantity of any material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the contract,
  - 31.1.4 whether or not the labour, plant or material provided by the Contractor for performing the work and carrying out the contract are adequate to ensure that the work will be performed in accordance with the contract and that the contract will be carried out in accordance with its terms,
  - 31.1.5 what quantity of any kind of work has been completed by the Contractor, or
  - 31.1.6 the timing and scheduling of the various phases of the performance of the work,
- the question shall be decided by the Departmental Representative whose decision shall be final and conclusive in respect of the work.
- 31.2 The Contractor shall perform the work in accordance with any decisions of the Departmental



Representative that are made under GC31.1 and in accordance with any consequential directions given by the Departmental Representative.

### **GC32 Warranty and Rectification of Defects in Work**

32.1 Without restricting any warranty or guarantee implied or imposed by law or contained in the contract documents, the Contractor shall, at his own expense,

32.1.1 rectify and make good any defect or fault that appears in the work or comes to the attention of the Minister with respect to those parts of the work accepted in connection with the Interim Certificate of Completion referred to GC44.2 within 12 months from the date of the Interim Certificate of Completion;

32.1.2 rectify and make good any defect or fault that appears in or comes to the attention of the Minister in connection with those parts of the work described in the Interim Certificate of Completion referred to in GC44.2 within 12 months from the date of the Final Certificate of Completion referred to in GC44.1.

32.2 The Departmental Representative may direct the Contractor to rectify and make good any defect or fault referred to in GC32.1 or covered by any other expressed or implied warranty or guarantee.

32.3 A direction referred to in GC32.2 shall be in writing, may include a stipulation in respect of the time within which a defect or fault is required to be rectified and made good by the Contractor, and shall be given to the Contractor in accordance with GC11.

32.4 The Contractor shall rectify and make good any defect or fault described in a direction given pursuant to GC32.2 within the time stipulated therein.

### **GC33 Non-Compliance by Contractor**

33.1 If the Contractor fails to comply with any decision or direction given by the Departmental Representative pursuant to GC18, GC24, GC26, GC31 or GC32, the Departmental Representative may employ such methods as he deems advisable to do that which the Contractor failed to do.

33.2 The Contractor shall, on demand, pay Her Majesty an amount that is equal to the aggregate of all cost, expenses and damage incurred or sustained by Her Majesty by reason of the Contractor's failure to comply with any decision or direction referred to in GC33.1, including the cost of any methods employed by the Departmental Representative pursuant to GC33.1.

### **GC34 Protesting Departmental Representative's Decisions**

34.1 The Contractor may, within ten days after the communication to him of any decision or direction referred to in GC30.3 or GC33.1, protest that decision or direction.

34.2 A protest referred to in GC34.1 shall be in writing, contain full reasons for the protest, be signed



by the Contractor and be given to Her Majesty by delivery to the Departmental Representative.

- 34.3 If the Contractor gives a protest pursuant to GC34.2, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action he considers appropriate in the circumstances.
- 34.4 The giving of a protest by the Contractor pursuant to GC34.2 shall not relieve him from complying with the decision or direction that is the subject of the protest.
- 34.5 Subject to GC34.6, the Contractor shall take any action referred to in GC34.3 within three months after the date that a Final Certificate of Completion is issued under GC44.1 and not afterwards.
- 34.6 The Contractor shall take any action referred to in GC34.3 resulting from a direction under GC32 within three months after the expiry of a warranty or guarantee period and not afterwards.
- 34.7 Subject to GC34.8, if Her Majesty determines that the Contractor's protest is justified, Her Majesty shall pay the Contractor the cost of the additional labour, plant and material necessarily incurred by the Contractor in carrying out the protested decision or direction.
- 34.8 Costs referred to in GC34.7 shall be calculated in accordance with GC48 to GC50.

### **GC35 Changes in Soil Conditions and Neglect or Delay by Her Majesty**

- 35.1 Subject to GC35.2 no payment, other than a payment that is expressly stipulated in the contract, shall be made by Her Majesty to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.
- 35.2 If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to
- 35.2.1 a substantial difference between the information relating to soil conditions at the work site that is contained in the Plans and Specifications or other documents supplied to the Contractor for his use in preparing his tender or a reasonable assumption of fact based thereon made by the Contractor, and the actual soil conditions encountered by the Contractor at the work site during the performance of the contract, or
- 35.2.2 any neglect or delay that occurs after the date of the contract on the part of Her Majesty in providing any information or in doing any act that the contract either expressly requires Her Majesty to do or that would ordinarily be done by an owner in accordance with the usage of the trade,

he shall, within ten days of the date the actual soil conditions described in GC35.2.1 were encountered or the neglect or delay described in GC35.2.2 occurred, give the Departmental Representative written notice of his intention to claim for that extra expense or that loss or damage.

- 35.3 When the Contractor has given a notice referred to in GC35.2, he shall give the Departmental Representative a written claim for extra expense or loss or damage within 30 days of the date that



a Final Certificate of Completion referred to in GC44.1 is issued and not afterwards.

- 35.4 A written claim referred to in GC35.3 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable the Departmental Representative to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as the Departmental Representative requires from time to time.
- 35.5 If the Departmental Representative determines that a claim referred to in GC35.3 is justified, Her Majesty shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC47 to GC50.
- 35.6 If, in the opinion of the Departmental Representative, an occurrence described in GC35.2.1 results in a savings of expenditure by the Contractor in performing the contract, the amount set out in the Articles of Agreement shall, subject to GC35.7, be reduced by an amount that is equal to the saving.
- 35.7 The amount of the saving referred to in GC35.6 shall be determined in accordance with GC47 to GC49.
- 35.8 If the Contractor fails to give a notice referred to in GC35.2 and a claim referred to in GC35.3 within the times stipulated, an extra payment shall not be made to him in respect of the occurrence.

### **GC36 Extension of Time**

- 36.1 Subject to GC36.2, the Departmental Representative may, on the application of the Contractor made before the day fixed by the Articles of Agreement for completion of the work or before any other date previously fixed under this General Condition, extend the time for its completion by fixing a new date if, in the opinion of the Departmental Representative, causes beyond the control of the Contractor have delayed its completion.
- 36.2 An application referred to in GC36.1 shall be accompanied by the written consent of the bonding company whose bond forms part of the contract security.

### **GC37 Assessments and Damages for Late Completion**

- 37.1 For the purposes of this General Condition
- 37.1.1 the work shall be deemed to be completed on the date that an Interim Certificate of Completion referred to in GC44.2 is issued, and
- 37.1.2 "period of delay" means the number of days commencing on the day fixed by the Articles of Agreement for completion of the work and ending on the day immediately preceding the day on which the work is completed but does not include any day within a period of extension granted pursuant to GC36.1, and any other day on which, in the opinion of the Departmental Representative, completion of the work was delayed for reasons beyond the control of the Contractor.



- 37.2 If the Contractor does not complete the work by the day fixed for its completion by the Articles of Agreement but completes it thereafter, the Contractor shall pay Her Majesty an amount equal to the aggregate of
- 37.2.1 all salaries, wages and travelling expenses incurred by Her Majesty in respect of persons overseeing the performance of the work during the period of delay;
  - 37.2.2 the cost incurred by Her Majesty as a result of the inability to use the completed work for the period of delay; and
  - 37.2.3 all other expenses and damages incurred or sustained by Her Majesty during the period of delay as a result of the work not being completed by the day fixed for its completion.
- 37.3 The Minister may waive the right of Her Majesty to the whole or any part of the amount payable by the Contractor pursuant to GC37.2 I, in the opinion of the Minister, it is in the public interest to do so.

#### **GC38 Taking the Work Out of the Contractor's Hands**

- 38.1 The Minister may, at his sole discretion, by giving a notice in writing to the Contractor in accordance with GC11, take all or any part of the work out of the Contractor's hands, and may employ such means as he sees fit to have the work completed if the Contractor
- 38.1.1 Has not, within six days of the Minister or the Departmental Representative giving notice to the Contractor in writing in accordance with GC11, remedied any delay in the commencement or any default in the diligent performance of the work to the satisfaction of the Departmental Representative;
  - 38.1.2 has defaulted in the completion of any part of the work within the time fixed for its completion by the contract;
  - 38.1.3 has become insolvent;
  - 38.1.4 has committed an act of bankruptcy;
  - 38.1.5 has abandoned the work;
  - 38.1.6 has made an assignment of the contract without the consent required by GC3.1; or
  - 38.1.7 has otherwise failed to observe or perform any of the provisions of the contract.
- 38.2 If the whole or any part of the work is taken out of the Contractor's hands pursuant to GC38.1,
- 38.2.1 the Contractor's right to any further payment that is due or accruing due under the contract is, subject only to GC38.4, extinguished, and
  - 38.2.2 the Contractor is liable to pay Her Majesty, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by Her Majesty in respect of the



Contractor's failure to complete the work.

- 38.3 If the whole or any part of the work that is taken out of the Contractor's hands pursuant to GC38.1 is completed by Her Majesty, the Departmental Representative shall determine the amount, if any, of the holdback or a progress claim that had accrued and was due prior to the date on which the work was taken out of the Contractor's hands and that is not required for the purposes of having the work performed or of compensating Her Majesty for any other loss or damage incurred or sustained by reason of the Contractor's default.
- 38.4 Her Majesty may pay the Contractor the amount determined not to be required pursuant to GC38.3.

**GC39 Effect of Taking the Work Out of the Contractor's Hands**

- 39.1 The taking of the work or any part thereof out of the Contractor's hands pursuant to GC38 does not operate so as to relieve or discharge him from any obligation under the contract or imposed upon him by law except the obligation to complete the performance of that part of the work that was taken out of his hands.
- 39.2 If the work or any part thereof is taken out of the Contractor's hands pursuant to GC38, all plant and material and the interest of the Contractor is all real property, licenses, powers and privileges acquired, used or provided by the Contractor under the contract shall continue to be the property of Her Majesty without compensation to the Contractor.
- 39.3 When the Departmental Representative certifies that any plant, material, or any interest of the Contractor referred to in GC39.2 is no longer required for the purposes of the work, or that it is not in the interest of Her Majesty to retain that plant, material or interest, it shall revert to the Contractor.

**G40 Suspension of Work by Minister**

- 40.1 The Minister may, when in his opinion it is in the public interest to do so, require the Contractor to suspend performance of the work either for a specified or an unspecified period by giving a notice of suspension in writing to the Contractor in accordance with GC11.
- 40.2 When a notice referred to in GC40.1 is received by the Contractor in accordance with GC11, he shall suspend all operations in respect of the work except those that, in the opinion of the Departmental Representative, are necessary for the care and preservation of the work, plant and material.
- 40.3 The Contractor shall not, during a period of suspension, remove any part of the work, plant or material from its site without the consent of the Departmental Representative.
- 40.4 If a period of suspension is 30 days or less, the Contractor shall, upon the expiration of that period, resume the performance of the work and he is entitled to be paid the extra cost, calculated in accordance with GC48 to GC50, of any labour, plant and material necessarily incurred by him as a result of the suspension.



- 40.5 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor agree that the performance of the work will be continued by the Contractor, the Contractor shall resume performance of the work subject to any terms and conditions agreed upon by the Minister and the Contractor.
- 40.6 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor do not agree that performance of the work will be continued by the Contractor or upon the terms and conditions under which the Contractor will continue the work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC41.

#### **GC41 Termination of Contract**

- 41.1 The Minister may terminate the contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC11.
- 41.2 When a notice referred to in GC41.1 is received by the Contractor in accordance with GC11, he shall, subject to any conditions stipulated in the notice, forthwith cease all operations in performance of the contract.
- 41.3 If the contract is terminated pursuant to GC41.1, Her Majesty shall pay the Contractor, subject to GC41.4, an amount equal to
- 41.3.1 the cost to the contractor of all labour, plant and material supplied by him under the contract up to the date of termination in respect of a contract or part thereof for which a Unit Price Arrangement is stipulated in the contract, or
  - 41.3.2 the lesser of
    - 41.3.2.1 an amount, calculated in accordance with the Terms and Payment, that would have been payable to the Contractor had he completed the work, and
    - 41.3.2.2 an amount that is determined to be due to the Contractor pursuant to GC49 in respect of a contract or part thereof for which a Fixed Price Arrangement is stipulated in the contract
- less the aggregate of all amounts that were paid to the Contractor by Her Majesty and all amounts that are due to Her Majesty from the Contractor pursuant to the contract.
- 41.4 If Her Majesty and the Contractor are unable to agree about an amount referred to in GC41.3 that amount shall be determined by the method referred to in GC50.

#### **GC42 Claims Against and Obligations of the Contractor or Subcontractor**

- 42.1 Her Majesty may, in order to discharge lawful obligations of and satisfy claims against the Contractor or a subcontractor arising out of the performance of the contract, pay any amount that is due and payable to the Contractor pursuant to the contract directly to the obligees of and the claimants against the Contractor or the subcontractor but such amount if any, as is paid by Her Majesty, shall not exceed that amount which the Contractor would have been obliged to pay to





such claimant had the provisions of the Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, been applicable to the work. Any such claimant need not comply with the provisions of such legislation setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which claimant might have had;

42.2 Her Majesty will not make any payment as described in GC42.1 unless and until that claimant shall have delivered to Her Majesty:

42.2.1 a binding and enforceable Judgment or Order of a court of competent jurisdiction setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.2 a final and enforceable award of an arbitrator setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.3 the consent of the Contractor authorizing a payment.

For the purposes of determining the entitlement of a claimant pursuant to GC42.2.1 and GC42.2.2, the notice required by GC42.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by any applicable legislation.

42.3 The Contractor shall, by the execution of his contract, be deemed to have consented to submit to binding arbitration at the request of any claimant those questions that need be answered to establish the entitlement of the claimant to payment pursuant to the provisions of GC42.1 and such arbitration shall have as parties to it any subcontractor to whom the claimant supplied material, performed work or rented equipment should such subcontractor wish to be adjoined and the Crown shall not be a party to such arbitration and, subject to any agreement between the Contractor and the claimant to the contrary, the arbitration shall be conducted in accordance with the Provincial or Territorial legislation governing arbitration applicable in the Province or Territory in which the work is located.

42.4 A payment made pursuant to GC42.1 is, to the extent of the payment, a discharge of Her Majesty's liability to the Contractor under the contract and may be deducted from any amount payable to the Contractor under the contract.

42.5 To the extent that the circumstances of the work being performed for Her Majesty permit, the Contractor shall comply with all laws in force in the Province or Territory where the work is being performed relating to payment period, mandatory holdbacks, and creation and enforcement of mechanics' liens, builders' liens or similar legislation or in the Province of Quebec, the law relating to privileges.

42.6 The Contractor shall discharge all his lawful obligations and shall satisfy all lawful claims against him arising out of the performance of the work at least as often as the contract requires Her



Majesty to pay the Contractor.

- 42.7 The Contractor shall, whenever requested to do so by the Departmental Representative, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in GC42.6.
- 42.8 GC42.1 shall only apply to claims and obligations
- 42.8.1 the notification of which has been received by the Departmental Representative in writing before payment is made to the Contractor pursuant to TP4.10 and within 120 days of the date on which the claimant
- 42.8.1.1 should have been paid in full under the claimant's contract with the Contractor or subcontractor where the claim is for money that was lawfully required to be held back from the claimant; or
- 42.8.1.2 performed the last of the services, work or labour, or furnished the last of the material pursuant to the claimant's contract with the Contractor or subcontractor where the claim is not for money referred to in GC42.8.1.1, and
- 42.8.2 the proceedings to determine the right to payment of which, pursuant to GC42.2. shall have commenced within one year from the date that the notice referred to in GC42.8.1 was received by the Departmental Representative, and
- the notification required by GC42.8.1 shall set forth the amount claimed to be owing and the person who by contract is primarily liable.
- 42.9 Her Majesty may, upon receipt of a notice of claim under GC42.8.1, withhold from any amount that is due and payable to the Contractor pursuant to the contract the full amount of the claim or any portion thereof.
- 42.10 The Departmental Representative shall notify the Contractor in writing of receipt of any claim referred to in GC42.8.1 and of the intention of Her Majesty to withhold funds pursuant to GC42.9 and the Contractor may, at any time thereafter and until payment is made to the claimant, be entitled to post, with Her Majesty, security in a form acceptable to Her Majesty in an amount equal to the value of the claim, the notice of which is received by the Departmental Representative and upon receipt of such security Her Majesty shall release to the Contractor any funds which would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of GC42.9 in respect of the claim of any claimant for whom the security stands.

### **GC43 Security Deposit – Forfeiture or Return**

- 43.1 If
- 43.1.1 the work is taken out of the Contractor's hands pursuant to GC38,
- 43.1.2 the contract is terminated pursuant to GC41, or
- 43.1.3 the Contractor is in breach of or in default under the contract,



Her Majesty may convert the security deposit, if any, to Her own use.

- 43.2 If Her Majesty converts the contract security pursuant to GC43.1, the amount realized shall be deemed to be an amount due from Her Majesty to the Contractor under the contract.
- 43.3 Any balance of an amount referred to in GC43.2 that remains after payment of all losses, damage and claims of Her Majesty and others shall be paid by Her Majesty to the Contractor if, in the opinion of the Departmental Representative, it is not required for the purposes of the contract.

#### **GC44 Departmental Representative's Certificates**

44.1 On the date that

44.1.1 the work has been completed, and

44.1.2 the Contractor has complied with the contract and all orders and directions made pursuant thereto,

both to the satisfaction of the Departmental Representative, the Departmental Representative shall issue a Final Certificate of Completion to the Contractor.

44.2 If the Departmental Representative is satisfied that the work is substantially complete he shall, at any time before he issues a certificate referred to in GC44.1, issue an Interim Certificate of Completion to the Contractor, and

44.2.1 for the purposes of GC44.2 the work will be considered to be substantially complete,

44.2.1.1 when the work under the contract or a substantial part thereof is, in the opinion of the Departmental Representative, ready for use by Her Majesty or is being used for the purpose intended; and

44.2.1.2 when the work remaining to be done under the contract is, in the opinion of the Departmental Representative, capable of completion or correction at accost of not more than

44.2.1.2.1 -3% of the first \$500,000, and

44.2.1.2.2 -2% of the next \$500,000, and

44.2.1.2.3 -1% of the balance

of the value of the contract at the time this cost is calculated.

44.3 For the sole purpose of GC44.2.1.2, where the work or a substantial part thereof is ready for use or is being used for the purposes intended and the remainder of the work or a part thereof cannot be completed by the time specified in A2.1, or as amended pursuant to GC36, for reasons beyond the control of the Contractor or where the Departmental Representative and the Contractor agree not to complete a part of the work within the specified time, the cost of that part of the work



which was either beyond the control of the Contractor to complete or the Departmental Representative and the Contractor have agreed not to complete by the time specified shall be deducted from the value of the contract referred to GC44.2.1.2 and the said cost shall not form part of the cost of the work remaining to be done in determining substantial completion.

44.4 An Interim Certificate of Completion referred to in GC44.2 shall describe the parts of the work not completed to the satisfaction of the Departmental Representative and all things that must be done by the Contractor

44.4.1 before a Final Certificate of Completion referred to in GC44.1 will be issued, and

44.4.2 before the 12-month period referred to in GC32.1.2 shall commence for the said parts and all the said things.

44.5 The Departmental Representative may, in addition to the parts of the work described in an Interim Certificate of Completion referred to in GC44.2, require the Contractor to rectify any other parts of the work not completed to his satisfaction and to do any other things that are necessary for the satisfactory completion of the work.

44.6 If the contract or a part thereof is subject to a Unit Price Arrangement, the Departmental Representative shall measure and record the quantities of labour, plant and material, performed, used and supplied by the Contractor in performing the work and shall, at the request of the Contractor, inform him of those measurements.

44.7 The Contractor shall assist and co-operate with the Departmental Representative in the performance of his duties referred to in GC44.6 and shall be entitled to inspect any record made by the Departmental Representative pursuant to GC44.6.

44.8 After the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, he shall, if GC44.6 applies, issue a Final Certificate of Measurement.

44.9 A Final Certificate of Measurement referred to in GC44.8 shall

44.9.1 contain the aggregate of all measurements of quantities referred to in GC44.6, and

44.9.2 be binding upon and conclusive between Her Majesty and the Contractor as to the quantities referred to therein.

#### **GC45 Return of Security Deposit**

45.1 After an Interim Certificate of Completion referred to in GC44.2 has been issued, Her Majesty shall, if the Contractor is not in breach of or in default under the contract, return to the Contractor all or any part of the security deposit that, in the opinion of the Departmental Representative, is not required for the purposes of the contract.

45.2 After a Final Certificate of Completion referred to in GC44.1 has been issued, Her Majesty shall return to the Contractor the remainder of any security deposit unless the contract stipulates otherwise.



- 45.3 If the security deposit was paid into the Consolidated Revenue Fund of Canada, Her Majesty shall pay interest thereon to the Contractor at a rate established from time to time pursuant to section 21(2) of the Financial Administration Act.

#### **GC46 Clarification of Terms in GC47 to GC50**

- 46.1 For the purposes of GC47 to GC50,
- 46.1.1 "Unit Price Table" means the table set out in the Articles of Agreement, and
- 46.1.2 "plant" does not include tools customarily provided by a tradesman in practicing his trade.

#### **GC47 Additions or Amendments to Unit Price Table**

- 47.1 Where a Unit Price Arrangement applies to the contract or a part thereof the Departmental Representative and the Contractor may, by an agreement in writing,
- 47.1.1 add classes of labour or material, and units of measurement, prices per unit and estimated quantities to the Unit Price Table if any labour, plant or material that is to be included in the Final Certificate of Measurement referred to in GC44.8 is not included in any class of labour, plant or material set out in the Unit Price Table; or
- 47.1.2 subject to GC47.2 and GC47.3, amend a price set out in the Unit Price Table for any class of labour, plant or material included therein if the Final Certificate of Measurement referred to in GC44.8 shows or is expected to show that the total quantity of that class of labour, plant or material actually performed, used or supplied by the Contractor in performing the work is
- 47.1.2.1 less than 85% of that estimated total quantity, or
- 47.1.2.2 in excess of 115% of that estimated total quantity.
- 47.2 In no event shall the total cost of an item set out in the Unit Price Table that has been amended pursuant to GC47.1.2.1 exceed the amount that would have been payable to the Contractor had the estimated total quantity actually been performed, used or supplied.
- 47.3 An amendment that is made necessary by GC47.1.2.2 shall apply only to the quantities that are in excess of 115%.
- 47.4 If the Departmental Representative and the Contractor do not agree as contemplated in GC47.1, the Departmental Representative shall determine the class and the unit of measurement of the labour, plant or material and, subject to GC47.2 and GC47.3, the price per unit therefore shall be determined in accordance with GC50.

#### **GC48 Determination of Cost – Unit Price Table**



- 48.1 Whenever, for the purposes of the contract, it is necessary to determine the cost of labour, plant or material, it shall be determined by multiplying the quantity of that labour, plant or material expressed in the unit set out in column 3 of the Unit Price Table by the price of that unit set out in column 5 of the Unit Price Table.

#### **GC49 Determination of Cost – Negotiation**

- 49.1 If the method described in GC48 cannot be used because the labour, plant or material is of a kind or class that is not set out in the Unit Price Table, the cost of that labour, plant or material for the purposes of the contract shall be the amount agreed upon from time to time by the Contractor and the Departmental Representative.
- 49.2 For the purposes of GC49.1, the Contractor shall submit to the Departmental Representative any necessary cost information requested by the Departmental Representative in respect of the labour, plant and material referred to in GC49.1

#### **GC50 Determination of Cost – Failing Negotiation**

- 50.1 If the methods described in GC47, GC48 or GC49 fail for any reason to achieve a determination of the cost of labour, plant and material for the purposes referred to therein, that cost shall be equal to the aggregate of
- 50.1.1 all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, plant and material that falls within one of the classes of expenditure described in GC50.2 that are directly attributable to the performance of the contract,
  - 50.1.2 an allowance for profit and all other expenditures or costs, including overhead, general administration cost, financing and interest charges, and every other cost, charge and expenses, but not including those referred to in GC50.1.1 or GC50.1.3 or a class referred to in GC50.2, in an amount that is equal to 10% of the sum of the expenses referred to in GC50.1.1, and
  - 50.1.3 interest on the cost determined under GC50.1.1 and GC50.1.2, which interest shall be calculated in accordance with TP9,

provide that the total cost of an item set out in the Unit Price Table that is subject to the provisions of GC47.1.2.1 does not exceed the amount that would have been payable to the Contractor had the estimated total quantity of the said item actually be performed, used or supplied.

- 50.2 For purposes of GC50.1.1 the classes of expenditure that may be taken into account in determining the cost of labour, plant and material are,
- 50.2.1 payments to subcontractors;
  - 50.2.2 wages, salaries and travelling expenses of employees of the Contractor while they are actually and properly engaged on the work, other than wages, salaries, bonuses, living



and travelling expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor unless they are engaged at the work site with the approval of the Departmental Representative,

- 50.2.3 assessments payable under any statutory authority relating to workmen's compensation, unemployment insurance, pension plan or holidays with pay;
- 50.2.4 rent that is paid for plant or an amount equivalent of the said rent if the plant is owned by the Contractor that is necessary for and used in the performance of the work, if the rent of the equivalent amount is reasonable and use of that plant has been approved by the Departmental Representative;
- 50.2.5 payments for maintaining and operating plant necessary for and used in the performance of the work, and payments for effecting such repairs thereto as, in the opinion of the Departmental Representative, are necessary to the proper performance of the contract other than payments for any repairs to the plant arising out of defects existing before its allocation to the work;
- 50.2.6 payments for material that is necessary for and incorporated in the work, or that is necessary for and consumed in the performance of the contract;
- 50.2.7 payments for preparation, delivery, handling, erection, installation, inspection protection and removal of the plant and material necessary for and used in the performance of the contract; and
- 50.2.8 any other payments made by the Contractor with the approval of the Departmental Representative that are necessary for the performance of the contract.

#### **GC51 Records to be kept by Contractor**

##### **51.1 The Contractor shall**

- 51.1.1 maintain full records of his estimated and actual cost of the work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto.
- 51.1.2 make all records and material referred to in GC5.1.1 available to audit and inspection by the Minister and the Deputy Receiver General for Canada or by persons acting on behalf of either of both of them, when requested;
- 51.1.3 allow any of the person referred to in GC51.1.2 to make copies of and to take extracts from any of the records and material referred to in GC51.1.1; and
- 51.1.4 furnish any person referred to in GC51.1.2 with any information he may require from time to time in connection with such records and material.

51.2 The records maintained by the Contractor pursuant to GC51.1.1 shall be kept intact by the Contractor until the expiration of two years after the date that a Final Certificate of Completion referred to in GC44.1 was issued or until the expiration of such other period of time as the



Minister may direct.

- 51.3 The Contractor shall cause all subcontractors and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with GC51.1 and GC51.2 as if they were the Contractor.

**GC52 Conflict of Interest**

- 52.1 It is a term of this contract that no former public office holder who is not in compliance with the Conflict of Interest and Post-Employment Code for Public Office Holders shall derive a direct benefit from this contract.

**GC53 Contractor Status**

- 53.1 The Contractor shall be engaged under the contract as an independent contractor.
- 53.2 The Contractor and any employee of the said Contractor is not engaged by the contract as an employee, servant or agent of Her Majesty.
- 53.3 For the purposes of GC53.1 and GC53.2 the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Unemployment Insurance, Worker's Compensation or Income Tax.





## **GENERAL CONDITONS**

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- IC 2 Risk Management**
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## **GENERAL INSUANCE COVERAGES**

- GCI 1 Insured**
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## **COMMERCIAL GENERAL LIABILITY**

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## **BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

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- BR 4 Amount of Insurance**
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## **INSURER'S CERTIFICATE OF INSURANCE**



## **General Conditions**

### **IC 1 Proof of Insurance (02/12/03)**

Within thirty (30) days after acceptance of the Contractor's tender, the Contractor shall, unless otherwise directed in writing by the Contracting Officer, deposit with the Contracting Officer an Insurer's Certificate of Insurance in the form displayed in this document and, if requested by the Contracting Officer, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the Insurance Coverage Requirements shown hereunder.

### **IC 2 Risk Management (01/10/94)**

The provisions of the Insurance Coverage Requirements contained hereunder are not intended to cover all of the Contractor's obligations under GC8 of the General Conditions "C" of the contract. Any additional risk management measures or additional insurance coverages the Contractor may deem necessary to fulfill its obligations under GC8 shall be at its own discretion and expense.

### **IC 3 Payment of Deductible (01/10/94)**

The payment of monies up to the deductible amount made in satisfaction of a claim shall be borne by the Contractor.

### **IC 4 Insurance Coverage (02/12/03)**

The Contractor has represented that it has in place and effect the appropriate and usual liability insurance coverage as required by these Insurance Conditions and the Contractor has warranted that it shall obtain, in a timely manner and prior to commencement of the Work, the appropriate and usual property insurance coverage as required by these Insurance Conditions and, further, that it shall maintain all required insurance policies in place and effect as required by these Insurance Conditions.



## INSURANCE COVERAGE REQUIREMENTS

### PART I GENERAL INSURANCE COVERAGES (GIC)

#### **GCI 1 Insured (02/12/03)**

Each insurance policy shall insure the Contractor, and shall include, as an Additional Named Insured, Her Majesty the Queen in right of Canada, represented by the National Research Council Canada.

#### **GIC 2 Period of Insurance (02/12/03)**

Unless otherwise directed in writing by the Contracting Officer or otherwise stipulated elsewhere in these Insurance Conditions, the policies required hereunder shall be in force and be maintained from the date of the contract award until the day of issue of the Departmental Representative's Final Certificate of Completion.

#### **GIC 3 Proof of Insurance (01/10/94)**

Within twenty five (25) days after acceptance of the Contractor's tender, the Insurer shall, unless otherwise directed by the Contractor, deposit with the Contractor an Insurer's Certificate of Insurance in the form displayed in the document and, if requested, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the requirements of these Insurance Coverages.

#### **GIC 4 Notification (01/10/94)**

Each Insurance policy shall contain a provision that (30) days prior written notice shall be given by the Insurer to Her Majesty in the event of any material change in or cancellation of coverage. Any such notice received by the Contractor shall be transmitted forthwith to Her Majesty.

### PART II COMMERCIAL GENERAL LIABILITY

#### **CGL 1 Scope of Policy (01/10/94)**

The policy shall be written on a form similar to that known and referred to in the insurance industry as IBC 2100 – Commercial General Liability policy (Occurrence form) and shall provide for limit of liability of not less than \$2,000,000 inclusive for Bodily Injury and Property Damage for any one occurrence or series of occurrences arising out of one cause. Legal or defence cost incurred in respect of a claim or claims shall not operate to decrease the limit of liability.

#### **CGL 2 Coverages/Provisions (01/10/94)**



The policy shall include but not necessarily be limited to the following coverages/provisions.

- 2.1 Liability arising out of or resulting from the ownership, existence, maintenance or use of premises by the Contractor and operations necessary or incidental to the performance of this contract.
- 2.2 "Broad Form" Property Damage including the loss of use of property.
- 2.3 Removal or weakening of support of any building or land whether such support be natural or otherwise.
- 2.4 Elevator liability (including escalators, hoists and similar devices).
- 2.5 Contractor's Protective Liability
- 2.6 Contractual and Assumed Liabilities un this contact.
- 2.7 Completed Operations Liability – The insurance, including all aspects of this Part II of these Insurance Conditions shall continue for a period of at least one (1) year beyond the date of the Departmental Representative's Final Certificate of Completion for the Completed Operations.
- 2.8 Cross Liability – The Clause shall be written as follows:

Cross Liability – The insurance as is afforded by this policy shall apply in respect to any claim or action brought against any one Insured by any other Insured. The coverage shall apply in the same manner and to the same extent as though a separate policy had been issued to each Insured. The inclusion herein of more than one Insured shall not increase the limit of the Insurer's liability.

- 2.9 Severability of Interests – The Clause shall be written as follows:

Severability of Interests – This policy, subject to the limits of liability stated herein, shall apply separately to each Insured in the same manner and to the same extent as if a separate policy had been issued to each. The inclusion herein of more than one insured shall not increase the limit of the Insurer's liability.

### **CGL 3 Additional Exposures (02/12/03)**

The policy shall either include or be endorsed to include the following exposures of hazards if the Work is subject thereto:

- 3.1 Blasting
- 3.2 Pile driving and calsson work
- 3.3 Underpinning
- 3.4 Risks associated with the activities of the Contractor on an active airport



- 3.5 Radioactive contamination resulting from the use of commercial isotopes
- 3.6 Damage to the portion of an existing building beyond that directly associated with an addition, renovation or installation contract.
- 3.7 Marine risks associated with the contraction of piers, wharves and docks.

**CGL 4 Insurance Proceeds  
(01/10/94)**

Insurance Proceeds from this policy are usually payable directly to a Claimant/Third Party.

**CGL 5 Deductible  
(02/12/03)**

This policy shall be issued with a deductible amount of not more than \$10,000 per occurrence applying to Property Damage claims only.

**PART III  
BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

**BR 1 Scope of Policy  
(01/10/94)**

The policy shall be written on an "All Risks" basis granting coverages similar to those provided by the forms known and referred to in the insurance industry as "Builder's Risk Comprehensive Form" or "Installation Floater – All Risks".

**BR 2 Property Insured  
(01/10/94)**

The property insured shall include:

- 2.1 The Work and all property, equipment and materials intended to become part of the finished Work at the site of the project while awaiting, during and after installation, erection or construction including testing.
- 2.2 Expenses incurred in the removal from the construction site of debris of the property insured, including demolition of damaged property, de-icing and dewatering, occasioned by loss, destruction or damage to such property and in respect of which insurance is provided by this policy.

**BR 3 Insurance Proceeds  
(01/10/94)**

- 3.1 Insurance proceeds from this policy are payable in accordance with GC28 of the General Conditions "C" of the contract.
- 3.2 This policy shall provide that the proceeds thereof are payable to Her Majesty or as the Minister may direct.



- 3.3 The Contractor shall do such things and execute such documents as are necessary to effect payment of the proceeds.

**BR 4 Amount of Insurance**  
(01/10/94)

The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Her Majesty at the site of the project to be incorporated into and form part of the finished Work.

**BR 5 Deductible**  
(02/12/03)

The Policy shall be issued with a deductible amount of not more than \$10,000.

**BR 6 Subrogation**  
(01/10/94)

The following Clause shall be included in the policy:

"All rights of subrogation or transfer of rights are hereby waived against any corporation, firm, individual or other interest, with respect to which, insurance is provided by this policy".

**BR 7 Exclusion Qualifications**  
(01/10/94)

The policy may be subject to the standard exclusions but the following qualifications shall apply:

- 7.1 Faulty materials, workmanship or design may be excluded only to the extent of the cost of making good thereof and shall not apply to loss or damage resulting therefrom.
- 7.2 Loss or damage caused by contamination by radioactive material may be excluded except for loss or damage resulting from commercial isotopes used for industrial measurements, inspection, quality control radiographic or photographic use.
- 7.3 Use and occupancy of the project or any part of section thereof shall be permitted where such use and occupancy is for the purpose for which the project is intended upon completion.



**INSURER'S CERTIFICATE OF INSURANCE**

(TO BE COMPLETED BY INSURER (NOT BOKER) AND DELIVERD TO NATIONAL RESEARCH COUNCIL CANADA WITH 30 DAYS FOLLOWING ACCEPTANCE OF TENDER)

**CONTRACT**

DESCRIPTION OF WORK	CONTRACT NUMBER	AWARD DATE
LOCATION		

**INSURER**

NAME
ADDRESS

**BROKER**

NAME
ADDRESS

**INSURED**

NAME OF CONTRACTOR
ADDRESS

**ADDITIONAL INSURED**

HER MAJESTY THE QUEEN IN RIGHT OF CANADA AS REPRESENTED BY THE NATIONAL RESEARCH COUNCIL CANADA
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THIS DOCUENT CERTIFIES THAT THE FOLLOWING POLICES OF INSURANCE ARE AT PRESENT IN FORCE COVERING ALL OPERATIONS OF THE INSURE IN CONNECTION WITH THE CONTRACT MADE BETWEEN THE NAMED INSURED AND THE NATIONAL RESEARCH COUNCIL CANADA AND IN ACCORDANCE WITH THE INSURANCE CONDITIONS "E"

POLICY					
TYPE	NUMBER	INCEPTION DATE	EXPIRY DATE	LIMITS OF LIABILITY	DEDUCTIBLE
COMMERCIAL GENERAL LIABILITY					
BUILDERS RISK "AL RISKS"					
INSTALLATION FLOATER "ALL RISKS"					

THE INSURER AGREES TO NOTIFY THE NATIONAL RESEARCH COUNCIL CANADA IN WRITING 30 DAYS PRIOR TO ANY MATERIAL CHANGE IN OR CANCELLATION OF ANY POLICY OR COVERAGE SPECIFICALLY RELATED TO THE CONTRACT

NAME OF INSURER'S OFFICER OR AUTHORIZED EMPLOYEE	SIGNATURE	DATE:
		TELEPHONE NUMBER:

ISSUANCE OF THIS CERTIFIATE SHALL NOT LIMIT OR RESTRICT THE RIGHT OF THE NATIONAL RESEARCH COUNCIL CANADA TO REQUEST AT ANY TIME DUPLICATE COPIES OF SAID INSURANCE POLICIES



**CS1 Obligation to provide Contract Security**

- 1.1 The Contractor shall, at the Contractor's own expense, provide one or more of the forms of contract security prescribed in CS2.
- 1.2 The Contractor shall deliver to the Departmental Representative the contract security referred to in CS1.1 within 14 days after the date that the Contractor receives notice that the Contractor's tender or offer was accepted by Her Majesty.

**CS2 Prescribed Types and Amounts of Contract Security**

- 2.1 The Contractor shall deliver to the Departmental Representative pursuant to CS1
  - 2.1.1 a performance bond and a labour and material payment bond each in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, or
  - 2.1.2 a labour and material payment bond in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, and a security deposit in an amount that is equal to
    - 2.1.2.1 not less than 10% of the contract amount referred to in the Articles of Agreement where that amount does not exceed \$250,000, or
    - 2.1.2.2 \$25,000 plus 5% of the part of the contract amount referred to in the Articles of Agreement that exceeds \$250,000, or
  - 2.1.3 a security deposit in an amount prescribed by CS2.1.2 plus an additional amount that is equal to 10% of the contract amount referred to in the Articles of Agreement.
- 2.2 A performance bond and a labour and material payment bond referred to in CS2.1 shall be in a form and be issued by a bonding or surety company that is approved by Her Majesty.
- 2.3 The amount of a security deposit referred to in CS2.1.2 shall not exceed \$250,000 regardless of the contract amount referred to in the Articles of Agreement.
- 2.4 A security deposit referred to in CS2.1.2 and CS2.1.3 shall be in the form of
  - 2.4.1 a bill of exchange made payable to the Receiver General of Canada and certified by an approved financial institution or drawn by an approved financial institution on itself, or
  - 2.4.2 bonds of or unconditionally guaranteed as to principal and interest by the Government of Canada.
- 2.5 For the purposes of CS2.4
  - 2.5.1 a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a sum certain of money to, or to the order





of, the Receiver General for Canada, and

- 2.5.2 If a bill of exchange is certified by a financial institution other than a chartered bank then it must be accompanied by a letter or stamped certification confirming that the financial institution is in at least one of the categories referred to in CS2.5.3
- 2.5.3 an approved financial institution is
  - 2.5.3.1 any corporation or institution that is a member of the Canadian Payments Association,
  - 2.5.3.2 a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec to the maximum permitted by law,
  - 2.5.3.3 a credit union as defined in paragraph 137(6)(b) of the *Income Tax Act*,
  - 2.5.3.4 a corporation that accepts deposits from the public, if repayment of the deposit is guaranteed by Her Majesty in right of a province, or
  - 2.5.3.5 The Canada Post Corporation.
- 2.5.4 the bonds referred to in CS2.4.2 shall be
  - 2.5.4.1 made payable to bearer, or
  - 2.5.4.2 accompanied by a duly executed instrument of transfer of the bonds to the Receiver General for Canada in the form prescribed by the Domestic Bonds of Canada Regulations, or
  - 2.5.4.3 registered, as to principal or as to principal and interest in the name of the Receiver General for Canada pursuant to the Domestic Bonds of Canada Regulations, and
  - 2.5.4.4 provided on the basis of their market value current at the date of the contract.



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**SECURITY REQUIREMENTS CHECK LIST (SRCL)  
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

**PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE**

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine	2. Branch or Directorate / Direction générale ou Direction
3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant

4. Brief Description of Work / Brève description du travail

5. a) Will the supplier require access to Controlled Goods?  
Le fournisseur aura-t-il accès à des marchandises contrôlées?  No / Non  Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations?  
Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?  No / Non  Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets?  
Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS?  
(Specify the level of access using the chart in Question 7. c)  
(Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)  No / Non  Yes / Oui

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted.  
Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.  No / Non  Yes / Oui

6. c) Is this a commercial courier or delivery requirement with **no** overnight storage?  
S'agit-il d'un contrat de messagerie ou de livraison commerciale **sans** entreposage de nuit?  No / Non  Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada <input type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
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7. b) Release restrictions / Restrictions relatives à la diffusion

No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>  Not releasable À ne pas diffuser <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :	All NATO countries Tous les pays de l'OTAN <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :	No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>  Restricted to: / Limité à : <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays :
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7. c) Level of information / Niveau d'information

PROTECTED A PROTÉGÉ A <input type="checkbox"/> PROTECTED B PROTÉGÉ B <input type="checkbox"/> PROTECTED C PROTÉGÉ C <input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/> SECRET SECRET <input type="checkbox"/> TOP SECRET TRÈS SECRET <input type="checkbox"/> TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>	NATO UNCLASSIFIED NATO NON CLASSIFIÉ <input type="checkbox"/> NATO RESTRICTED NATO DIFFUSION RESTREINTE <input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL <input type="checkbox"/> NATO SECRET NATO SECRET <input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET <input type="checkbox"/>	PROTECTED A PROTÉGÉ A <input type="checkbox"/> PROTECTED B PROTÉGÉ B <input type="checkbox"/> PROTECTED C PROTÉGÉ C <input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/> SECRET SECRET <input type="checkbox"/> TOP SECRET TRÈS SECRET <input type="checkbox"/> TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>
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Security Classification / Classification de sécurité
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Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**PART A (continued) / PARTIE A (suite)**

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui  
 If Yes, indicate the level of sensitivity:  
 Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?  
 Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?  No / Non  Yes / Oui  
 Short Title(s) of material / Titre(s) abrégé(s) du matériel :  
 Document Number / Numéro du document :

**PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)**

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

<input type="checkbox"/> RELIABILITY STATUS COTE DE FIABILITÉ	<input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL	<input type="checkbox"/> SECRET SECRET	<input type="checkbox"/> TOP SECRET TRÈS SECRET
<input type="checkbox"/> TOP SECRET-SIGINT TRÈS SECRET - SIGINT	<input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL	<input type="checkbox"/> NATO SECRET NATO SECRET	<input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET
<input type="checkbox"/> SITE ACCESS ACCÈS AUX EMBLEMES			

Special comments:  
 Commentaires spéciaux : \_\_\_\_\_

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.  
 REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?  
 Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?  No / Non  Yes / Oui  
 If Yes, will unscreened personnel be escorted?  
 Dans l'affirmative, le personnel en question sera-t-il escorté?  No / Non  Yes / Oui

**PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)**

**INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS**

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?  
 Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui

11. b) Will the supplier be required to safeguard COMSEC information or assets?  
 Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?  No / Non  Yes / Oui

**PRODUCTION**

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?  
 Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?  No / Non  Yes / Oui

**INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)**

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?  
 Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?  No / Non  Yes / Oui

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?  
 Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?  No / Non  Yes / Oui



**PART C - (continued) / PARTIE C - (suite)**

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.

Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.

Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

**SUMMARY CHART / TABLEAU RÉCAPITULATIF**

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ			CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
											A	B	C			
Information / Assets / Renseignements / Biens / Production																
IT Media / Support TI																
IT Link / Lien électronique																

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?  No  Yes  
 La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?  Non  Oui

**If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".**  
**Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.**

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?  No  Yes  
 La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?  Non  Oui

**If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).**  
**Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).**



Contract Number / Numéro du contrat
Security Classification / Classification de sécurité

**PART D - AUTHORIZATION / PARTIE D - AUTORISATION**

13. Organization Project Authority / Chargé de projet de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
14. Organization Security Authority / Responsable de la sécurité de l'organisme			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date
15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached? Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?			<input type="checkbox"/> No / Non <input type="checkbox"/> Yes / Oui
16. Procurement Officer / Agent d'approvisionnement			
Name (print) - Nom (en lettres moulées) Collin Long		Title - Titre Senior Contracting Officer	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel Collin.Long@nrc-cnrc.gc.ca	Date
17. Contracting Security Authority / Autorité contractante en matière de sécurité			
Name (print) - Nom (en lettres moulées)		Title - Titre	Signature
Telephone No. - N° de téléphone	Facsimile No. - N° de télécopieur	E-mail address - Adresse courriel	Date