NRC·CNRC Administrative Services and Property Management

SPECIFICATIONS

SOLICITATION #: 15-22095

BUILDING: M-46
1200 Montreal Road Campus
Ottawa, Ontario

PROJECT: M-46 Sound Barrier Wall

PROJECT #: M46-5105

Date: September 2015

National Research Council Canada | Conseil national de recherches Canada

Canada

SPECIFICATION

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NRC·CNRC

From **Discovery** to **Innovation...**

Directions to the Ottawa Research Facilities — Montreal Road

1200 Montréal Road
Ottawa, Ontario, Canada K1A 0R6

Tel: 613-993-9101

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By Road, from the OTTAWA International Airport

1. From the airport take the AIRPORT PARKWAY to RIVERSIDE DR EAST
2. Follow RIVERSIDE DR EAST to HIGHWAY 417 EAST
3. Take HIGHWAY 417 EAST, past the ST-LAURENT BLVD exit, where HIGHWAY 417 splits, continue LEFT on HIGHWAY 174 (ROCKLAND)
4. Exit HIGHWAY 174 on BLAIR RD NORTH
5. Proceed on BLAIR RD NORTH, cross OGILVIE RD, and continue on to the traffic lights at the intersection of BLAIR and MONTREAL RD
6. Turn left onto MONTREAL RD and take the first immediate right onto the ramp leading down to the traffic circle. Stop at Building M-1 on the north side of the traffic circle. Ask the commissionaires in M-1 for directions to the NRC building, institute or staff member you seek.

By Road, from MONTRÉAL

1. Take MÉTROPOLITAIN 40 WEST and follow signs for OTTAWA and HIGHWAY 417 WEST
2. Follow 417 WEST to reach OTTAWA
3. Exit at HIGHWAY 174 EAST (ROCKLAND) when entering OTTAWA
4. Follow 174 EAST and exit at BLAIR RD NORTH (first exit after entering 174 EAST)
5. Follow BLAIR RD NORTH, cross OGILVIE RD, and continue on to the traffic lights at the intersection of BLAIR and MONTREAL RD
6. Turn left onto MONTREAL RD and take the first immediate right onto the ramp leading down to the traffic circle. Stop at Building M-1 on the north side of the traffic circle. Ask the commissionaires in M-1 for directions to the NRC building, institute or staff member you seek.


1 Sussex Facilities
2 Montreal Road Facilities
3 Uplands Facilities
4 NRC-CSTT
N
GATINEAU
OTTAWA
QUÉBEC
ONTARIO
Outaouais
Aylmer
Taché
Rockcliffe
Montréal
Aviation
Blair
Vanier
Sussex
Wellington
Bank
Island Park
Ottawa River
Carling
Fisher
Prince of Wales
Bronson
Walkley
Heron
Hawthorne
Hunt Club
Baseline
Riverside
Conroy
Airport
Uplands
Lester
Davidson
Albion
Hunt Club (W)
Merivale
Woodroffe
Greenbank
Fallowfield
Leitrim
50
5
148
34
174
417
19
38
31
73
416
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NRC Institute
Trans Canada HWY
Major HWY
Secondary HWY
Airport
Train Station
Ferry
Bus Station
Metro


N
Howlett
Blair
Leggett
2
Montréal
17B
Montréal
Macallum
Mackenzie
Lathe
Ballard
17B
Blair
Aviation
Bathgate
St. Laurent
Ogilvie
174
417
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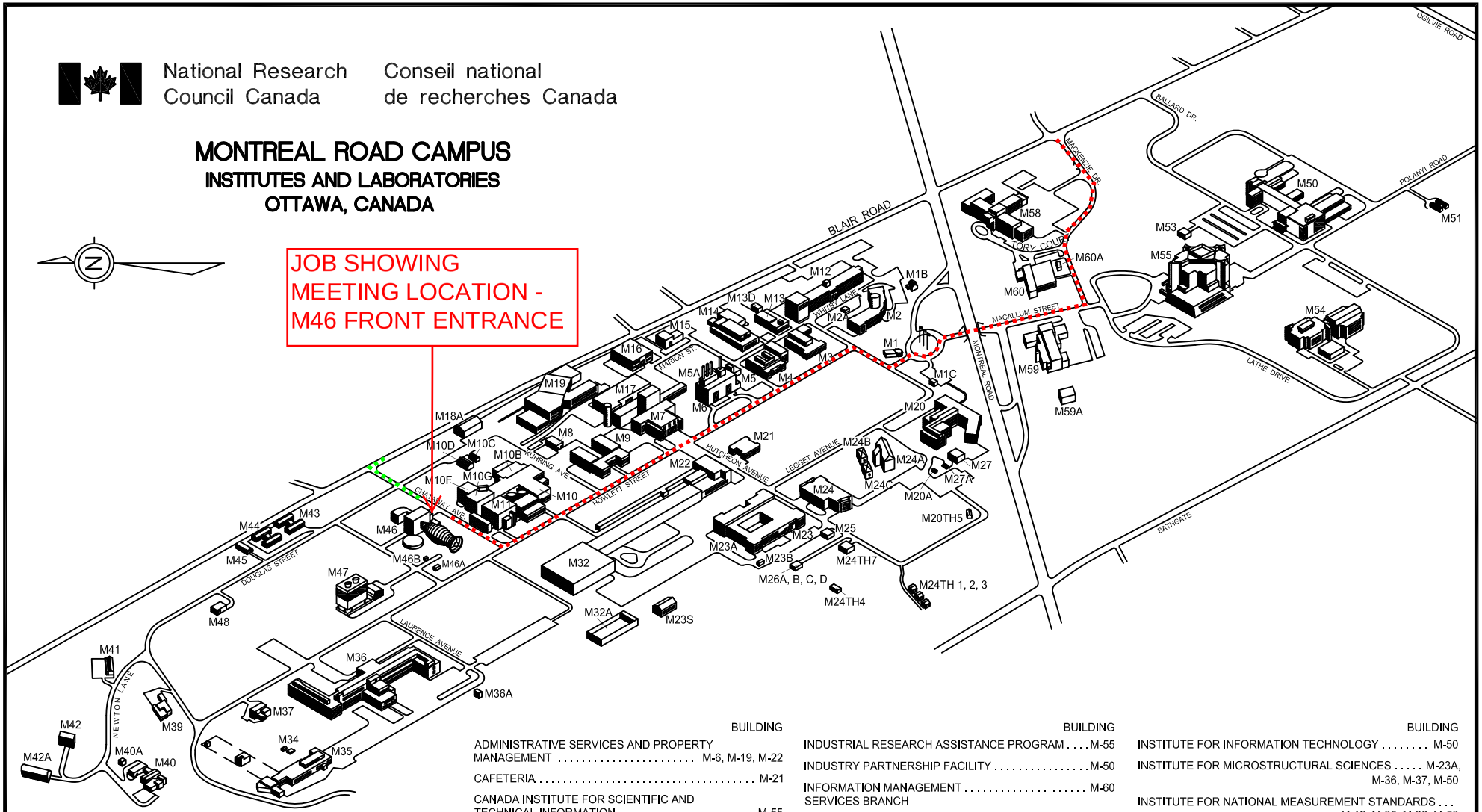
NRC Institute
Major HWY
Airport
Ferry
Metro
Trans Canada HWY
Secondary HWY
Train Station
Bus Station

National Research Council Canada | Conseil national de recherches Canada

MONTREAL ROAD CAMPUS
INSTITUTES AND LABORATORIES
OTTAWA, CANADA

JOB SHOWING
MEETING LOCATION -
M46 FRONT ENTRANCE



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Updated: July 2008

National Research Council Canada	Conseil national de recherches Canada
Administrative Services & Property management Branch (ASPM)	Direction des services administratif et gestion de l'immobilier (SAGI)

Construction Tender Form

Project Identification **M-46 Sound Barrier Wall**

Tender No.: **15-22095**

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 Her Majesty the Queen in Right of Canada (hereinafter referred to as "Her 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.

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 servives 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 Her Majesty to forfeit the security deposit.

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

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)

1.10 Execution of Tender

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

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

BUY AND SELL NOTICE

M-46 Sound Barrier Wall

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

The NRC M46 Wind Tunnel requires Noise Barrier Walls to be constructed to attenuate noise produced when the M46 Wind Tunnel is operating.
Two ground-mounted and free-standing Noise Barrier Walls need to be designed and built – one 48 feet in height at the wind tunnel intake and one 32 feet in height at the wind tunnel exhaust.
The Noise Barrier Walls shall be made up of mineral wool-filled acoustic panels with specific acoustic properties that have been pre-determined by NRC.

Mandatory Technical Qualifications Requirements

The bidding contractor shall have experience in designing and building Noise Barrier Walls. At the bidding stage, the bidder shall provide the following in a separate envelope.

1) A list of five (5) noise barrier wall projects, one of which was a free-standing wall that was at least sixteen (16) feet in height. For each project, identify the following:

    - The name of the client.
    - The project location.
    - The approximate project dollar value.
    - The year the project was completed.
    - The height of the wall

2) A letter of reference from a client of one of the listed noise barrier wall projects.

3) A lab report from an ASTM E90 lab test that demonstrates that the acoustic panels to be supplied are STC 37 or greater.

4) A lab report from an ASTM C423 lab test that demonstrates that the acoustic panels to be supplied have the Absorption Coefficients of table 1 or better.

Frequency (Hz)	125	250	500	1k	2k	4k
Absorption Coefficient	0.85	0.89	1.13	1.1	1.03	0.76

Table 1 - Minimum required Absorption Coefficients for panels.

Note:
If ALL the requirements detailed above are not included in the technical qualification submission envelope, the contractor's bid will be considered non-compliant and the second envelope will remain sealed and be returned to the respective contractor, unopened.

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 proponents that intend to bid must attend.

The site visits will be held on September 29th and October 1st , 2015 at **9:00** . Meet Janik Leroux at Building M-46, Main Entrance, 1200 Montreal Road Campus , 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. TENDER CLOSING DATE

Tender closing date is October 14h , 2015 at 14:00.

4. TENDER RESULTS

Following the Tender closing, the tender results will be sent by facsimile 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: http://ssi-iss.tpsgc-pwgsc.gc.ca/msi-ism/msi-ism-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.

6.0 WSIB (WORKPLACE SAFETY AND INSURANCE BOARD)

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

7.0 OFFICE OF THE PROCUREMENT OMBUDSMAN

1 Dispute Resolution Services
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, on request or consent of the parties to participate in an alternative dispute resolution process to resolve any dispute between the parties respecting the interpretation or application of a term and condition of this contract and their consent to bear the cost of such process, provide to the parties a proposal for an alternative dispute resolution process to resolve their dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.

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 supplier or the contractor or the name of the entity awarded this contract*] respecting administration of this 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, and the interpretation and application of the terms and conditions and the scope of the work of this contract are not in dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.

3 The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent avenue for suppliers to raise complaints regarding the award of contracts under $25,000 for goods and under $100,000 for services. You have the option of raising issues or concerns regarding the solicitation, or the award resulting from it, with the OPO by contacting them by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca. You can also obtain more information on the OPO services available to you at their website at www.opo-boa.gc.ca.

The Departmental Representative or his designate for this project is: **Janik Leroux**
Telephone: **613 993-9149**

Contracting Authority for this project is: **Marc Bédard marc.bedard@nrc-cnrc.gc.ca**
Telephone**: 613 993-2274**

INSTRUCTIONS TO BIDDERS

Article 1 – Receipt of Tender

1a) Tenders must be received not later than the specified tender closing time. Tenders received after this time are invalid and shall not be considered, regardless of any reason for their late arrival.

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 letter or printed telecommunication provided that such amendments are received not later than the specified tender closing time.

1d) Any amendments to the tender which are transmitted by telefax must be signed and must clearly identify the tenderer.

All such amendments are to be addressed to:
National Research Council of Canada
Marc Bedard, Senior Contracting Officer
Building M-22
Montreal Road, Ottawa, Ontario
K1A 0R6

Fax: (613) 991-3297

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 coloured 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 the tenderer.

4) Tenders must be based on the plans, specifications and tender documents provided.

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 in sealed envelopes to:
National Research Council Canada
Administrative Services and Property Management Branch
1200 Montreal Road
Building M-22
Ottawa, ON
K1A 0R6

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) a certified cheque payable to the Receiver General for Canada and drawn on a member of the Canadian Payments Association or a local cooperative credit society that is a member of a central cooperative credit society having membership in the Canadian Payments Association; **OR**

ii) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**

iii) 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.

2a) 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 Security must be in the ORIGINAL form. Fax or photocopies and NOT acceptable. FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.

2b) If the tender is not accepted, the Bid Security submitted pursuant to Article 8 shall be returned to the tenderer.

3a) 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 amout 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.

3b) Should it not be possible to obtain a Labour Material Payment Bond as required under 3(a) above, on making application thereof to at least two acceptable Bonding Companies, an additional Security Deposit of a straight 10% of the amount payable under the contract must be furnished.

3c) Where a tender has been accompanied by a Security Deposit, as described in 1(b) above, the amount of the Security Deposit required under 3(a) above may be reduced by the amount of the Security Deposit which accompanied the tender.

3d) 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-22, Montreal Road, Ottawa, Ontario, K1A 0R6.

Article 6 – Interest On Security Deposits

1) Tenderers are notified that they must make their own arrangements with their bankers as to the interest, if any, on the amount of the certified cheque accompanying their tender. The Council will not pay interest on said cheque pending the awarding of the contract nor be responsible for the payments of interest under any arrangement made by the tenderers.

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.

2) 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-22, 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 does not bind itself to accept the lowest or any tender.

Article 12 – Harmonized Sales Tax

1) The Harmonized Sales Tax (HST) which in 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 × net book value at date of import × number of months in Ontario × 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 × 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)

Manufacturing for Own Use

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)

Contracts with the Federal Government

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.

Exemptions

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.

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

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

A r t i c l e s o f A g r e e m e n t

These Articles of Agreement made in duplicate this day of .

Between

Her Majesty the Queen, in right of Canada (referred to in the contract documents as " Her 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 Her 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

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.

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, Her 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 Her 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 Her 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:

A5 Unit Price Table

(23/01/2002)

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

Column 1 Item	**Column 2** Class of Labour Plant Or Material	**Column 3** Unit of Measurement	**Column 4** Estimated Total Quantity	**Column 5** Price per Unit	**Column 6** 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.

Articles of Agreement

Signed on behalf of Her 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_____
Position

Seal

of

on the_____

day of_____

Division 01 – General Requirements

END OF SECTION

1. SCOPE OF WORK

.1 Work under this contract covers the installation of sound barrier wall at the Council's Building M-46 of the National Research Council.

2. COMPLETION

.1 All work is to be completed by Jan. 7th, 2016.

3. GENERAL

.1 The word "provide" in this Specification means to supply and install.

4. SPECIFIED ACCEPTABLE & ALTERNATIVE EQUIPMENT & MATERIALS

.1 Materials and equipment scheduled and/or specified in the statement of 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.

5. 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.

6. 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.

7. 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.

8. SUB-TRADES

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

9. PERSONNEL SECURITY AND IDENTIFICATION

.1 All persons employed by the contractor, or by any subcontractor 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.

10. 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.

11. 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 5 days before the scheduled completion date, arrange to do an interim inspection with the Departmental Representative.

12. 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 assume responsibility for recording and distributing minutes.

13. SHOP DRAWINGS

.1 Submit to Departmental Representative for review, shop drawings, product data and samples specified within 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 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 electronic copy of all shop drawings and product data and sample~~s~~ 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.

14. 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.

15. 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.

16. 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 Make good any damage and clean up dirt, debris, etc., resulting from contractor's use of existing roads.

17. 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.

18. 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.

19. 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.

20. SANITARY FACILITIES

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

21. 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.

22. 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.

23. 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.

24. PROTECTION AND WARNING NOTICES

.1 Provide all materials required to protect existing equipment.

.2 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.

.3 Protect the buildings, roads, lawns, services, etc. from damage which might occur as a result of this work.

.4 Plan and co-ordinate the work to protect the buildings from the leakage of water, dust, etc.

.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.

25. 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.

26. 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.

27. 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.

28. 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.

29. 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 ^{o}C (50 ^{o}F) or higher where specified as soon as finishing work is commenced and maintain until acceptance by the Departmental Representative. 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.

30. 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.

31. 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.

32. 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.

33. 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.

34. DRAINAGE

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

35. 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.

36. 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.

37. 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.

38. 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.

39. 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.

40. 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.

41. 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.

42. 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.

43. 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

44. 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.

45. MAINTENANCE MANUALS

.1 Provide three (3) bilingual copies of maintenance manuals or two English and two French maintenance manuals 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:

.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 subcontractors 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 subcontractors 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:

FROM AN NRC PHONE	**333**
FROM ANY OTHER PHONE	**(613) 993-2411**

4. When reporting a fire by phone, give the location of fire, building number and be prepared to verify location.
5. 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:

a. Kettle area - 1-20 lb. ABC Dry Chemical;
b. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.

.3 Provide fire extinguishers equipped as below:

c. Pinned and sealed;
d. With a pressure gauge;
e. With an extinguisher tag signed by a fire extinguisher servicing company.

.4 Carbon Dioxide (C02) 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 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^{o}C (450 ^{o}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 Store all combustible roofing materials at least 3m (10 feet) away from any structure.

.5 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 ^{o}C (100 ^{o}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 and/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

Appendix "I"
NOISE BARRIER WALLS FOR M46 WIND TUNNEL
STATEMENT OF WORK

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Table of Contents for Appendix II

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1. CONTACT

Marc Bedard 613-993-2274

2. BACKGROUND AND PURPOSE

2.1 The National Research Council's M46 Wind Tunnel requires Noise Barrier Walls to be constructed to mitigate the noise produced when the Wind Tunnel is operating. Two Barrier Walls will be constructed – one at the wind tunnel intake and one at the wind tunnel exhaust (See Figure 1).

Figure 1 - NRC Propulsion Wind Tunnel – Barrier Walls (shown in red).

3. REFERENCE DRAWINGS

Drawing Title	Drawing Number
Barrier Wall Locations	SP-M46-PWT-03-0250 Sheet 1
Barrier Wall Concept Sketches	SP-M46-PWT-03-0250 Sheet 2
Existing Underground Services	SP-M46-PWT-03-0250 Sheet 3

4. REFERENCE DOCUMENTS

Document Title	Document Number
Geotechnical Report, M46	08-1121-0099

5. REFERENCE STANDARDS

The design, supply, installation and construction of the Barrier Walls shall conform to all applicable industrial codes, standards and specifications, including, but not limited to, those listed below. Each publication shall be the latest revision and addenda consistent with the latest national and provincial codes approved for use on the project, including supplements.

Whenever a conflict exists among the referenced codes, standards and specifications including this one, the more stringent shall apply unless specifically noted otherwise in the project documents.

Document Title	Governing Body	Document Number
Ontario Building Code	Government of Ontario	-
Ontario Fire Code	Government of Ontario	-
The laws covering Ontario Occupational Health & Safety (OH&S)	Government of Ontario	-
National Building Code of Canada (NBC) including User's Guide	National Research Council of Canada (NRC)	-
National Fire Code of Canada (NFC)	National Research Council of Canada (NRC)	-
Canadian Highway Bridge Design Code	Canadian Standards Association (CSA)	S6-06
Concrete materials and methods of concrete construction	CSA	A23.1
Test methods and standard practices for concrete	CSA	A23.2

Document Title	Governing Body	Document Number
Design of Concrete Structures	CSA	A23.3
Guidelines for use of Admixtures in Concrete	CSA	A266.4
Guidelines for use of Super plasticizing Admixtures	CSA	A266.5
Qualification Code for Concrete Testing Laboratories	CSA	A283
Cementitious materials compendium	CSA	A3000
Cementitious materials for use in concrete	CSA	A3001
Cold-Drawn Steel Wire for Concrete Reinforcement	CSA	G30.3
Welded Steel Wire Fabric for Concrete Reinforce	CSA	G30.5
Carbon steel bars for concrete reinforcement	CSA	G30.18
Falsework for Construction Purposes	CSA	S269.1
Concrete Formwork	CSA	S269.3
Certification of companies for fusion welding of steel	CSA	W47.1
Welding of Reinforcing Bars in Reinforced Concrete Construction	CSA	W186
Design of steel structures	CSA	S16
Standard for Certification of Barrier Walls February 2000	CSA	Z107.9
Standard Specification for Steel Wire, Plain, for Concrete Reinforcement	American Society for Testing and Materials (ASTM)	A82/A82M
Standard Specification for Zinc (Hot-Dipped Galvanized) Coating of Iron and Steel Products	ASTM	A123
Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete	ASTM	A185/A185M

Document Title	Governing Body	Document Number
Standard Specification for Carbon Steel Bolts and Studs; 60,000 PSI Tensile Strength	ASTM	A307
Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength	ASTM	A325
Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use	ASTM	A449
Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement	ASTM	A496/A496M
Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete	ASTM	A497/A497M
Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement	ASTM	A615/A615M
Standard Specification for (Hot-Dipped Galvanized) Coating for Coils and Cut Lengths	ASTM	A653, Class G-90
Standard Specification for Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges	ASTM	A709
Standard Specification for Structural Steel Shapes	ASTM	A992
Standard Practice for Making and Curing Concrete Test Specimens in the Field	ASTM	C31/C31M
Standard Specification for Concrete Aggregates	ASTM	C33/C33M
Standard Test Method for Compressive Strength of Cylindrical Concrete specimens	ASTM	C39/C39M
Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	ASTM	C42/42M

Document Title	Governing Body	Document Number
Standard Specification for Ready-Mixed Concrete	ASTM	C 94/C 94M
Standard Test Method for Slump of Hydraulic-Cement Concrete	ASTM	C143/C143M
Standard Specification for Portland Cement	ASTM	C150/C150M
Standard Practice for Sampling Freshly Mixed Concrete	ASTM	C172/C172M
Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)	ASTM	C227
Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method	ASTM	C231/C231M
Standard Specification for Air-Entraining Admixtures for Concrete	ASTM	C260/C260M
Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (chemical Method)	ASTM	C289
Standard Guide for Petrographic Examination of Aggregates for Concrete	ASTM	C295/C295M
Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland- Cement Concrete	ASTM	C311
Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method	ASTM	C423
Standard Specification for Chemical Admixture for Concrete	ASTM	C494/C494M
Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete	ASTM	C618
Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete	ASTM	C1017/C1017

Document Title	Governing Body	Document Number
Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation	ASTM	C1077
Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12400 ft-lbf/ft3 (600kN-m/m3))	ASTM	D698
Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction	ASTM	D1752
Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types, for Portland Cement Concrete Pavements	ASTM	D7116
Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions	ASTM	E90
Standard Specification for Anchor Bolts, Steel, 36, 55,and 105-ksi Yield Strength	ASTM	F1554
Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless	ASTM	A53/A53M
Standard Specification for Welded and Seamless Steel Pipe Piles	ASTM	A252
Standard Specification for High-Strength Low-Alloy Structural Steel, up to50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance	ASTM	A588 /A588M
Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement	ASTM	A615 / A615M
Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorous Steel, H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for use in Marine Environments	ASTM	A690 / A690M

Document Title	Governing Body	Document Number
Standard Specification for Structural Steel Shapes	ASTM	A992 / A992M
Material Specification for Structural Steel	ASTM	S16-09
Structural Welding Code – Steel	American Welding Society (AWS)	AWS D1.1 / D1.1M
Structural Welding Code – Reinforcing Steel	AWS	AWS D1.4 / D1.4M
Specification For Carbon Steel Electrodes For Shielded Metal Arc Welding	AWS	AWS A5.1 / A5.1M
Grade X52 Specification for Line Pipe	American National Standards Institute (ANSI)	ANSI/API 5L Grade X52
CISC Handbook of Steel Construction	Canadian Institute of Steel Construction (CISC)	-
Canadian Foundation Engineering Manual	Canadian Geotechnical Society	
Steel Construction Manual	American Institute of Steel Construction (AISI)	-
North American Standard for Cold-Formed Steel Framing – Product Data	AISI	AISI/S201

6. ABBREVIATIONS

“	inches
AASHTO	American Association of State Highway and Transportation Officials
A	amps (electrical current)
ARO	after receipt of order
CWB	Canadian Welding Bureau
ga	gauge, gage
m	meters

m3	cubic meters
mm	millimeters
MPa	megapascals
MTR	Material Test Report
NBCC	National Building Code of Canada
NRC	National Research Council
OBC	Ontario Building Code
OSHA	Occupational Safety and Health Administration
PPE	Personal Protection Equipment
psi	pounds per square inch
QA/QC	Quality Assurance / Quality Control
should	a recommendation
SSPC	The Society for Protective Coatings
will	a statement of intent
VAC	volts (alternating current)
Yd3	cubic yards

7. DEFINITIONS

7.1 The term “Contract” is defined as the legal agreement associated with performing the scope of work herein.

7.2 The term “Contractor” is defined as the entity, erector, fabricator, supplier that supplies the material or services including all subcontractors. The winning bidder of the tendering process associated with the scope of work herein.

7.3 The term “NRC” is defined as an employee of the National Research Council that is associated with this project or their suitable designate.

7.4 The term “Fillcrete”is defined as a low strength flow-able fill concrete with 28-day compressive strength of 2.0-5.0 MPa.

7.4.1 The term “Works” is defined as the concrete works, i.e. the specified footings, columns, piles, sockets, etc.

8. SCHEDULE

8.1 The Contractor will complete the associated work on or before January 7th, 2016.

9. SCOPE OF WORK

9.1 General Overview

9.1.1 The scope of work includes the supply of all labor, materials, equipment and incidentals necessary to design and construct the two Barrier Walls specified herein. This work includes but is not limited to:

9.1.1.1 Design/Build/Install the Concrete Footings for the two (2) Barrier Walls specified herein.

9.1.1.2 Design/Build/Install the Steel Support Structure for the two (2) Barrier Walls specified herein.

9.1.1.3 Design/Build/Install the Acoustic Panels for the two (2) Barrier Walls specified herein.

9.1.2 A general concept of the Barrier Walls for the Wind Tunnel Intake is shown in Figure 2 to Figure 5.

9.1.3 A general concept of the Barrier Walls for the Wind Tunnel Exhaust is shown in Figure 6 to Figure 9.

9.1.4 Detailed dimensions of the Barrier Wall locations and heights are given in NRC drawing # SP-M46-PWT-03-00250.

9.1.5 Deleted.

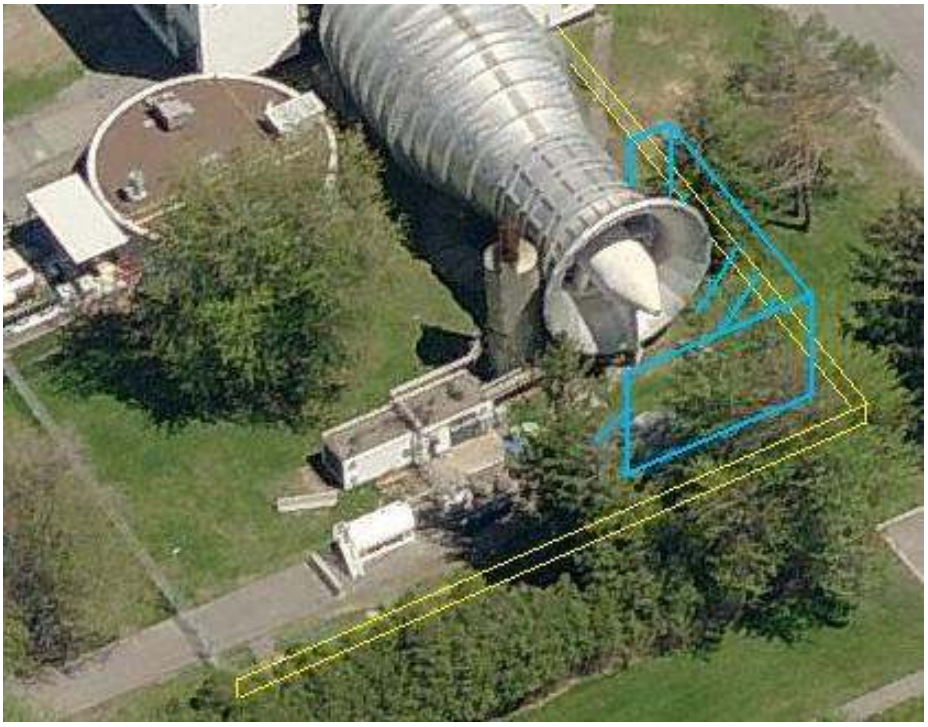


Figure 2 – M46 Wind Tunnel Intake Barrier Wall – Concept View 1.

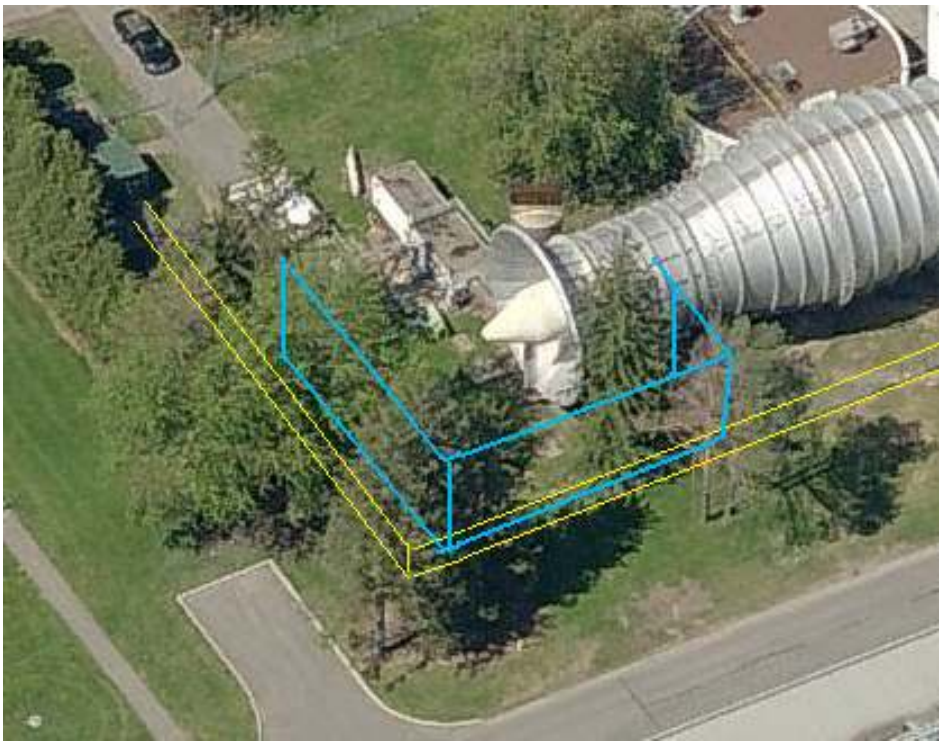


Figure 3 – M46 Wind Tunnel Intake Barrier Wall – Concept View 2.

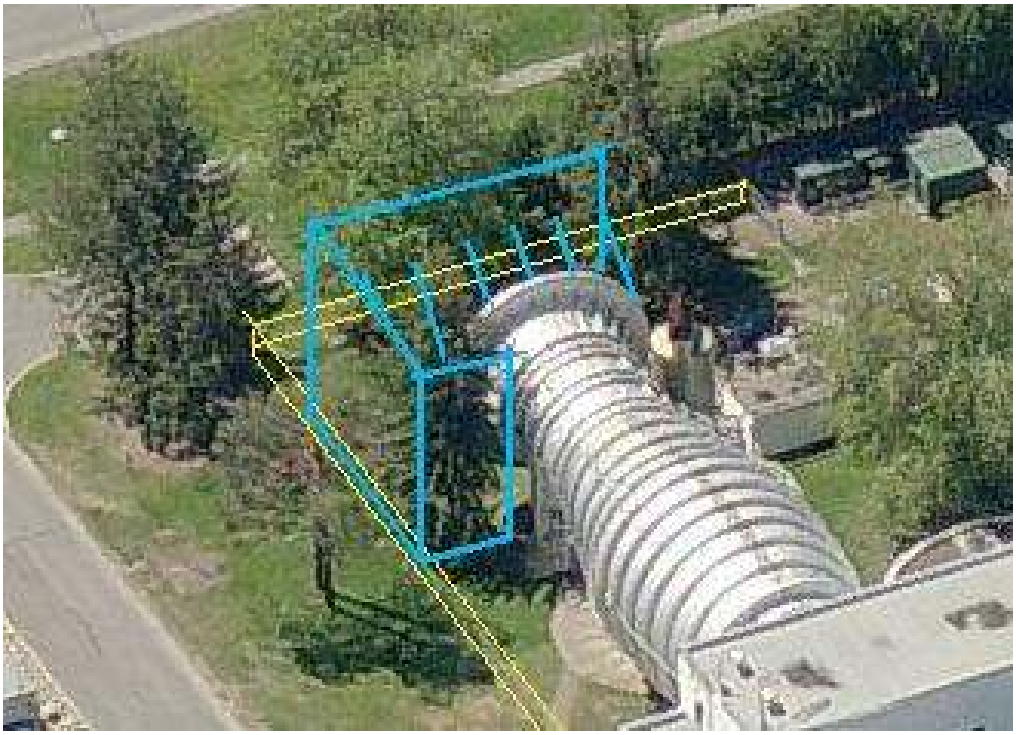


Figure 4– M46 Wind Tunnel Intake Barrier Wall – Concept View 3.

Figure 5– M46 Wind Tunnel Intake Barrier Wall – Concept View 4.

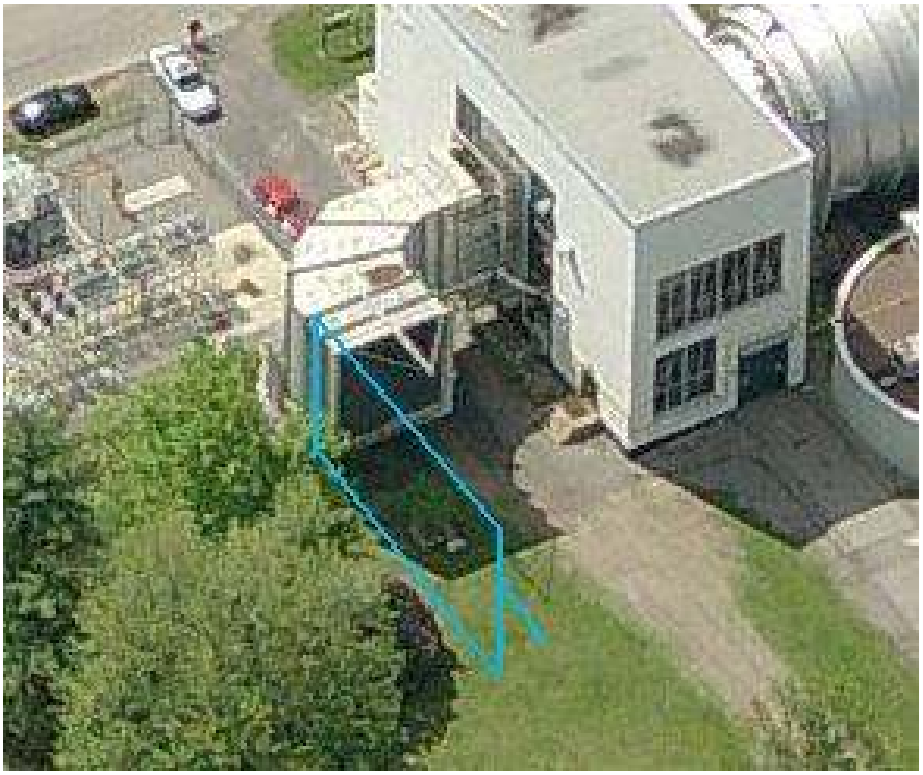


Figure 6– M46 Wind Tunnel Exhaust Barrier Wall – Concept View 1.

Figure 7– M46 Wind Tunnel Exhaust Barrier Wall – Concept View 2.

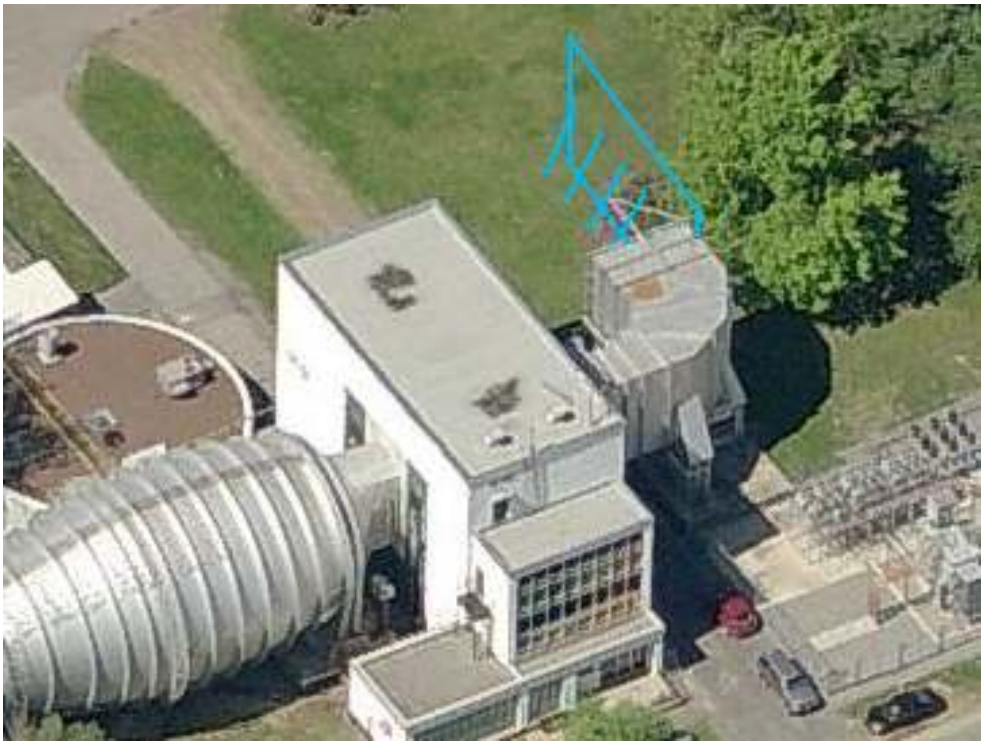


Figure 8– M46 Wind Tunnel Exhaust Barrier Wall – Concept View 3.

Figure 9– M46 Wind Tunnel Exhaust Barrier Wall – Concept View 4.

9.1.6 The Barrier Walls will function and perform as specified herein when subjected to typical year-round weather and seismic conditions that would be expected at the installation location.

9.1.7 The Barrier Walls will have a 25 Year life without failure when operated and maintained as per the operation and maintenance instructions.

9.1.8 The Contractor will prepare Barrier Wall drawings to be reviewed and approved by NRC. These drawings will include general arrangement details such as the size of structural members, the details of the structural foundations and supports, typical panel construction details, and the typical panel to panel and panel to structural member connections. All drawings will accurately represent, in detail, the Barrier Walls which are to be supplied under the Contract. These drawings will be delivered to NRC at least two (2) weeks prior to the commencement of construction.

9.1.9 The Contractor is responsible for obtaining all necessary permits when applicable.

9.1.10 The Barrier Walls will be built from non-combustible materials.

9.1.11 Good finish and appearance will be considered an important requirement including:

9.1.11.1 All visible welds will be ground to be uniform in appearance, and all welding splatter will be removed.

9.1.11.2 Galvanizing finish will be uniform and free from scratches or visible blemishes.

9.1.12 The Contractor will inform NRC of any failure to conform to specified requirements. Nonconforming product will not be released from the Contractor without formal authority from NRC.

9.1.13 The Contractor will provide all materials, tools and equipment (including rigging hardware, manlifts and cranes) to complete this scope of work unless otherwise stated.

9.1.14 The Contractor will use touch-up paint where required to repair any blemishing that occurs during the installation and a suitable supply of touch-up paint will be provided post-installation.

9.1.15 To avoid excessive drilling into the bedrock and due to the limited depth the bedrock, it is expected that the Barrier Walls will be designed with support legs. See concept sketches in SP-M46-PWT-03-0250 Sheet 2.

9.1.16 Barrier Wall support legs shall be located on the side of the wall where the intake and exhaust flow field is located. See figures 2 to 9 and NRC drawing # SP-M46-PWT-03-00250 Sheet 3.

9.1.17 If any existing fencing needs to be removed (either temporarily or permanently) to facilitate the execution of the work stated herein, it shall be replaced as necessary to ensure the original area is still contained and secure as it previously was.

9.2 **Design/Build/Install Concrete Footings**

9.2.1 Site Grading and Preparation

9.2.1.1 Excavation, grading and berm construction associated with the Barrier Wall installation should be completed within 25mm (1”) below the bottom of the Barrier Wall prior to construction of the Barrier Wall footings.

9.2.1.2 Provision must be made to place approved void-forming material for frost uplift protection (trenching or localized lower grade).

9.2.1.3 Once the wall has been installed, final grading shall be completed to the bottom of the wall ensuring there are no visible gaps between the bottom of the wall and the final grade.

9.2.1.4 At no time shall the grade be higher on one side of the wall than the other, other than in instances where a retaining wall panel has been designed into the system.

9.2.1.5 Barrier Wall footing locations shall be staked out in the locations stipulated on the approved drawings.

9.2.1.6 Underground utilities (below grade services) shall be staked within 5 m of the Barrier Wall foundation locations. A different clearance buffer may be deemed necessary upon approval of the final design.

9.2.1.7 The Contractor shall obtain approval from NRC before commencing any excavation work. Approval requires that the Contractor demonstrate that all applicable underground services will not interfere with the installed piles and/or foundations and the installation work (digging) will not disrupt or damage any of the underground services.

9.2.1.8 The Contractor shall ensure that ground conditions at the pile driving site are adequate to support their equipment.

9.2.1.9 The Contractor shall ensure that proper clearance is available from above ground and overhead obstructions to install piling at the required locations and to operate his equipment safely in respect to their own and other personnel and equipment in the area.

9.2.2 Footings

9.2.2.1 Foundations to be completed as per site specific design approved by a Licensed Professional Engineer in the Province of Ontario with reference to site specific conditions given herein. All inspections must be done by the Professional Engineer or a suitable designate to be approved by NRC.

9.2.2.2 Materials excavated from the caisson holes shall be disposed of at the Contractor's expense.

9.2.2.3 The concrete in the foundations should be cured for a minimum of 3 days before any construction loads are applied to it via the steel posts or otherwise.

9.2.2.4 The tops of all footings are to be shaped and levelled to provide full contact level seating of the bottom panels and the remaining surface shall be domed to allow the shedding of water.

9.2.2.5 Concrete in caissons shall be cast directly against undisturbed soil unless otherwise directed by design engineer.

9.2.2.6 Footings in bedrock shall be backfilled entirely with concrete. The excavation above the top of rock shall be formed to the required dimensions.

9.2.3 Concrete Standards

9.2.3.1 Submittals

9.2.3.1.1 The Contractor shall submit to NRC for review and approval three sets of shop drawings, showing all material types and grades as well as all dimensions necessary for the fabrication and placing of the structural steel and accessories, at least 14 days prior to the start of fabrication.

9.2.3.1.2 At least 14 days prior to concrete mixing and placing, the Contractor shall submit to NRC for review and approval the following data:

- Aggregate source information and certified copies of satisfactory test results in accordance with local applicable authority (CSA or certified testing laboratory)
- Product data of cementitious materials and chemical admixtures.
- Certified test results of compatibility between the chemical admixtures and cementitious materials.
- Proposed concrete mix design and certified test results of trial or previously used mix designs, including but not to be limited to, slump, wet density, air content and strengths at 7, and 28 days.
- Proposed concrete mixing, delivery, placing, finishing and curing methods and equipment information.
- Proposed concrete curing and protection procedures for cold and hot weather concreting.
- The manufacturer’s product data and installation procedures for joint sealant, epoxy bonding agent, form parting agent (form oil), curing compound, and other products to be used in concrete construction.
- Proposed curing method of mass pours concrete, during hydration/ heat generation, shall maintain “temperature differential’ as per applicable codes and standards (e.g. CSA A23.1, ACI 207.1R)

9.2.3.1.3 The Contractor shall submit to NRC for approval all proposed repair materials and procedures at least 24 hours prior to the commencement of any repair work to the concrete.

9.2.3.1.4 The aggregate source and ingredients of concrete shall not be changed during the course of the job without the prior written approval of NRC.

9.2.3.1.5 The Contractor shall submit to NRC for approval a QA/QC Program covering all concrete construction activities.

9.2.4 Materials

9.2.4.1 Cement

- Cement shall conform to the requirements of CSA A3000 (ASTM C150/C150M).
- Unless otherwise indicated on the design drawings, cement for above grade structures shall be general use hydraulic cement Type GU, Portland cement Type 10 (Type I).
- High sulphate resistant hydraulic cement Type HS, Portland cement Type 50 (Type V) shall be used for all concrete in contact with ground, including concrete piles, foundations, slabs on grade, and grade beams, unless geotechnical investigation of the site has indicated that other type(s) of cementitious materials may be used.
- High sulphate resistant hydraulic cement Type HS, Portland cement Type 50 (Type V) shall also be used for all concrete in direct contact with sulphur, or subject to attack from adjacent sources of sulphur.
- Cements other than Type GU, Type 10 (Type I) and Type HS, Type 50 (Type V), including blended hydraulic cements, fly ash and other pozzolans (supplementary cementing materials) shall be approved by NRC before use.

9.2.4.2 Aggregate

- All aggregate shall conform to the requirements of CSA A23.1 (ASTM C33/C33M). Aggregate shall consist of clean, hard, strong, durable particles, free of coatings, chemicals and other deleterious materials that could adversely affect the bond with the cement paste, strength or durability of the concrete.
- Fine aggregate shall consist of clean, washed, natural or crushed sand.
- Coarse aggregate shall consist of washed gravel or washed crushed rock.
- The maximum aggregate size shall meet the requirements of CSA A23.1 (ASTM C33/C33M). In general, the maximum aggregate size shall not exceed ¾ inches (20 mm) in diameter unless otherwise specified in the project documents or approved by NRC.
- Aggregates shall not react with alkali hydroxides in the concrete, causing excessive expansion and/or cracking of the concrete. Evaluation of the potential for alkali-aggregate reactivity shall be made before using as per applicable codes and standards (e.g. CSA A23.1 and ASTM C227).

- Concrete aggregate shall not be delivered to the mixing plant until the aggregate source has been approved by NRC.

9.2.4.3 Water

- Water for mixing concrete shall be clean and free of oil, acid, alkali, organic matter, sulphates, chlorides, and other substances that may adversely affect concrete strength or durability.
- The maximum water to cementing materials ratio shall conform to A23.1 but in no case shall exceed 0.50.

9.2.4.4 Admixtures

- All admixtures for use in concrete shall be approved by NRC prior to use.
- The selection of admixtures for use in concrete shall be based on an appropriate evaluation of its effects, which show it to be suitable for use in the particular concrete mix.
- Unless otherwise specified, admixture use shall be limited to the following:
  - Water reduction
  - Set control
  - Air entrainment, and
  - Appropriate combinations of the above
- Water reducing and set control admixtures shall conform to CSA A266.4 and A266.5 (ASTM C494/C494M)
- Concrete subject to cyclic freezing and thawing shall contain an air entraining admixture conforming to CSA A266.4 (ASTM C260/C260M).
- Where two or more chemical admixtures are used in the same batch, they shall be compatible products from the same manufacturer.

9.2.4.5 Fly Ash

- Fly Ash shall conform to CSA A3001 (ASTM C5618). CSA A3001 Class F Class CI (ASTM C618 Class F and Class C) fly ash may be substituted for Portland cement. Fly ash may be used to reduce costs, to reduce the temperature rise due to hydration heat in fresh concrete, to improve workability and durability. The recommended replacement shall not exceeded 20 percent of the total weight of the cementitious material. ACI 232.2R provides a discussion of the properties of fly ash and its proper use in the production of Portland cement concrete.

9.2.4.6 Reinforcement

- Reinforcement shall be billet steel deformed bars in accordance with CSA G30.18, grade 400 (ASTM A615, grade 60). All reinforcement shall be new material, free from loose rust and mill scale, oil, grease and all other coatings that might impair the bond between steel and concrete.
- Welded wire fabric or cold-drawn wire for concrete reinforcement shall conform to the

requirements of CSA G30.3 and G30.5 (ASTM A185).

9.2.4.7 Formwork

- Forms for above grade concrete shall be made of plywood, metal, or “Sonotube” type preformed cylinders, selected to provide the required finish specified on the project drawings.
- Earth cuts made in rock or firm soil that will not spall or slough may be used as forms for concrete that will not be exposed to view or weather after construction.

9.2.4.8 Anchor Bolts

- Anchor bolts shall be new materials, free from loose rust, mill scale, oil, grease and all other coatings that may impair bonding between the anchor bolt and concrete.
- Anchor bolts shall be fabricated from Grade 36 solid bar conforming to ASTM F1554 or ASTM A307, grade “A” unless noted otherwise and approved by NRC. High strength anchor bolts (ASTM F1554 Grade 105) may be used once approved by NRC as per applicable codes and standards (e.g. CSA S16).
- All anchor bolts shall have either a head or nut for anchoring. When nuts are used, they shall be tack welded to the bolt.
- Anchor bolts shall be left unpainted to ensure a good bond with the concrete.
- Use of high strength anchor bolts shall require approval of the Owner. High strength anchor bolts shall not be used unless the concrete strength exceeds 4300 psi (30 MPa). Additional lateral reinforcement in the anchor bolt area shall be provided for high strength anchor bolts. High strength anchor bolts (ASTM F1554 grade 105) may be used once approved by NRC as per applicable codes and standards e.g. CSA S16.
- If required by design, anchor bolt location tolerance shall be +/- 1.5 mm (1/16”) from the centre of the specified location.
- Anchor bolts shall be located and held in place using a steel template for a minimum of 24 hours after concrete has been placed.
- Anchor bolt groups shall be within 6 mm (1/4”) of specified locations in all directions.
- Maximum accumulation of 6 mm (1/4”) per 30 m (100 ft) along the line of multiple anchor groups but not to exceed a total of 25 mm (1”).
- Ensure anchor bolt sleeves are completely filled with grout after equipment installation, unless noted otherwise on Engineering Drawings.

9.2.4.9 Compressible Fill Material (Void Form)

- Compressible fill materials used to accommodate frost expansion or swelling of soils underneath foundations shall be of adequate strength and thickness to support the loading during concrete placement and to accommodate the anticipated amount of soil swelling after construction. The material property shall be such that the original thickness is regained once the soil swelling/frost pressure is released.

9.2.5 Concrete Properties

9.2.5.1 Proportioning of Concrete

9.2.5.1.1 Concrete mix proportions shall be selected:

- To provide workable concrete consistent with the placement and finishing requirements of the work.
- To provide durable concrete that will satisfactorily withstand the destructive environments to which it may be exposed.
- To provide the specified strength with sufficient margin to comply with the project requirements.
- To produce the most economical concrete consistent with the project specifications and in accordance with the CSA A23.1.

9.2.5.1.2 The proportions of water, cement, and aggregates, as approved by NRC, shall be carefully maintained. Deviations from the approved proportions shall not be made without the approval of NRC.

9.2.5.2 Strength

9.2.5.2.1 The specified compressive strength (f'c) shall not be less than 4300 psi (30 MPa) at 28 days, unless otherwise approved by NRC. The concrete strength requirements may be different based on the requirements of exposure classes. Selections of exposure classes requiring concrete strength different than 4300 psi (30 MPa) shall be approved by NRC.

9.2.5.2.2 Fillcrete concrete may be used in lieu of backfill material or as per project requirements.

9.2.5.2.3 Higher strength concrete may be used for special design applications and shall only be used with written approval of NRC.

9.2.5.3 Workability and Slump

9.2.5.3.1 Concrete shall have sufficient workability to allow it to be placed and consolidated in the forms without excessive vibration.

9.2.5.3.2 Concrete slump shall be 3" ± 1" (75 mm ± 25 mm) for all concrete, unless otherwise noted on the design drawings or approved by NRC.

9.2.5.3.3 Concrete that has been rejected for failing to meet the slump requirements shall not be salvaged for use in the work. Increased mixing time, addition of water or dry materials, or similar modifications to a rejected batch for the purpose of conforming to the slump limits shall not be permitted.

9.2.5.4 Air Entrainment

9.2.5.4.1 The amount of entrained air shall be 5% - 8% for concrete exposed to freezing and thawing cycles, and air content is not required for concrete not exposed to freezing and thawing cycles.

9.2.5.5 Reinforcement

9.2.5.5.1 General

9.2.5.5.1.1 General reinforcement construction details and workmanship, including bar bends, lap splices and installation shall be in accordance with CSA A23.1 (ACI SP-66).

9.2.5.5.1.2 The minimum concrete cover over reinforcement shall meet the requirements of CSA A23.3 (ACI 318), unless otherwise noted on the project drawings.

9.2.5.5.1.3 Reinforcement shall be free from oil or grease, loose rust and mill scale, or other loose coatings that may adversely affect its bonding capacity.

9.2.5.5.1.4 Reinforcement shall be accurately placed in accordance with the drawings, and shall be adequately secured and held in position with non-metallic chairs and spacers.

9.2.5.5.1.5 Splices in reinforcement shall be made and located only as called for on the drawings, unless otherwise approved by NRC.

9.2.5.5.1.6 Unless specifically noted in the project documents, welding, heating or flame cutting of reinforcement shall not be permitted without the approval of NRC.

9.2.5.5.1.7 Field bending of reinforcement shall not be permitted without the approval of NRC.

9.2.5.5.1.8 Where conduit, piping inserts, sleeves or other embedded inserts interfere with placing of the reinforcement, proper adjustment shall be made as directed by NRC before concrete is poured. Reinforcement shall not be cut to clear obstructions without prior approval of NRC.

9.2.5.5.2 Welding Of Reinforcement

9.2.5.5.2.1 Firms undertaking welding of reinforcement or steel hardware as called for on the project documents shall be currently certified by the Canadian Welding Bureau and shall meet the requirements of CSA W47.1 and CSA W186 (AWS D1.1 and AWS D1.4).

9.2.5.5.2.2 The Contractor shall use proper type of reinforcement steel and/or suitable CSA (AWS) approved welding procedures for the welding of reinforcement to reinforcement or reinforcement to steel hardware, to ensure that the design weld size and strength are achieved.

9.2.5.5.2.3 Tack welding of reinforcement of cage assembly or securing of reinforcement shall be permitted only when specified in the project documents or when NRC has given written approval. In no case shall stirrups be welded to tensile reinforcement.

9.2.5.6 Production, Delivery, Placing & Consolidation of Concrete

9.2.5.6.1 Production and Delivery of Concrete

9.2.5.6.1.1 The equipment and procedures for production and delivery of concrete shall conform to the requirements of CSA A23.1 (ACI 304R).

9.2.5.6.2 Placement of Concrete

9.2.5.6.2.1 Placement of concrete shall conform to CSA A23.1 (ACI 305 and ACI 306).

9.2.5.6.2.2 All concrete placed shall not exceed the maximum 2 hour time limit from the time of initial mixing to the time of complete discharge and placing in accordance with CSA A23.1.

9.2.5.6.2.3 The Contractor shall provide a minimum 24 hour notice prior to the start of concrete placement to allow NRC time to inspect the formwork and reinforcement. Concrete shall not be placed until NRC has approved inspection of foundations, forms, reinforcing steel, embedded parts, methods of curing and protecting the concrete.

9.2.5.6.2.4 All debris, mud, water, snow and ice shall be removed from inside the forms prior to placing concrete.

9.2.5.6.2.5 Concrete shall be deposited as close as practical to its final position. Convey concrete from the mixer to the place of deposit using methods that will ensure the required quality of concrete. Equipment for conveying concrete shall be of such size and design as required to ensure a continuous flow of concrete at the delivery point without segregation.

9.2.5.6.2.6 Concrete shall be placed in such a manner as to prevent segregation, and shall not be dropped freely more than 5 feet (1.5 m) unless authorized by NRC in writing.

9.2.5.6.2.7 Placement of concrete shall be conducted so that the concrete is plastic at all times, and flows readily into the forms and the spaces between reinforcement. Once placement of concrete has started, every effort shall be made to carry it on as a continuous, uninterrupted operation until the scheduled pour is completed.

9.2.5.6.2.8 Concrete shall not be placed during rain or snow unless properly protected. Protection shall be maintained until the concrete has hardened sufficiently so that it will not be damaged.

9.2.5.6.2.9 Concrete shall not be placed into standing or running water on subgrade or in foundation excavations unless specifically called for on the drawings, or approved by NRC. Concrete placed into water shall be specifically designed and proportioned for underwater use, and shall be placed with equipment and procedures specially designed for underwater concreting (tremie).

9.2.5.6.3 Consolidation of Concrete

9.2.5.6.3.1 Concrete shall be compacted and consolidated thoroughly and uniformly during placement, using hand-tamping tools, vibrators or finishing machines to obtain a dense, homogenous structure free of cold joints, fill planes, voids and honeycombs. Formed surfaces shall be smooth and free of large air and water pockets. The concrete shall be well bonded to all reinforcing steel, hardware anchors, waterstops and other embedded items.

9.2.5.6.3.2 Internal vibrators shall be used wherever practical to consolidate the concrete. Use of external vibration shall not be permitted without the prior approval of NRC.

9.2.5.6.3.3 Vibration shall be applied systematically and at such spacing that the zones of influence overlap, and the depth of penetration enters into the upper area of the previously placed concrete lift by approximately 6 inches (150 mm).

9.2.5.6.3.4 Vibrators shall be inserted into the concrete in as nearly a vertical plane as possible, and shall be slowly withdrawn vertically to facilitate the removal of trapped air bubbles.

9.2.5.6.3.5 Vibration shall be applied at any one position until the concrete is consolidated, but not such that segregation of the concrete occurs.

9.2.5.6.3.6 Vibration shall only be used for consolidation of the concrete. It shall not be used to move concrete.

9.2.5.7 Curing & Protection of Concrete

9.2.5.7.1 Concrete shall be cured and protected in accordance with CSA A23.1 (ACI 305R and ACI 306R).

9.2.5.7.2 Curing compounds shall not be used on any surface against which additional concrete or materials are to be bonded.

9.2.5.7.3 Unless otherwise specified in the project documents, curing shall be maintained for a minimum of 5 days (or 70% of 28-day strength) for all concrete members.

9.2.5.7.4 The maximum temperature differential between concrete surface and ambient temperature shall conform to CSA A23.1 and/or ACI 305R and ACI 306R.

9.2.5.8 Testing and Inspection

9.2.5.8.1 Unless otherwise specified in the project documents, the Contractor shall retain an Independent Testing Agency approved by NRC to conduct testing of concrete. The Independent Testing Agency shall be currently certified per CSA or AMRL (AASHTO Material Reference Laboratory)).

9.2.5.8.2 All concrete testing and inspection shall be in accordance with CSA A23.1 and CSA A23.2 (ASTM C1077 and ACI 311.4R)

9.2.5.8.3 At NRC's request, the Contractor shall test the approved ready-mixed concrete supplier's proposed materials for compliance with the project specifications.

9.2.5.8.4 At NRC's request, the Contractor shall review and check test the approved ready-mixed concrete supplier's proposed mix design.

9.2.5.8.5 When the total quantity for a given class of concrete is less than 25 yd3(20 m3), the strength tests may be waived by NRC if satisfied that adequate evidence of satisfactory strength is provided.

9.2.5.8.6 A minimum of three (3) standard concrete test cylinders shall be taken for each test. Cylinders shall be taken, cured, stored and tested in accordance with CSA A23.1 and CSA A23.2 (ASTM C172/C172M and C39/C39M). One cylinder shall be tested at 7 days, and 2 at 28 days.

9.2.5.8.7 The compressive strength shall be taken as the average of the two cylinders tested at 28 days. Failure to meet the specified concrete strengths may require additional measures to increase concrete strength, additional curing measures, and/or further testing as specified by NRC, and may be grounds for rejection of the building or structure.

9.2.5.8.8 When field-cured test specimens are required for determining early stripping of forms or any other purposes, additional test cylinders shall be made in accordance with CSA test method A23.2 (ASTM C31).

9.2.5.8.9 A slump test shall be made every time a set of compressive strength samples are taken, in accordance with CSA A23.2 (ASTM C143).

9.2.5.8.10 Failure to meet the specified slump requirements may require additional measures be taken, as specified by NRC, before the concrete is used in the Works, and may be grounds for rejection of the affected concrete load or batch.

9.2.5.8.11 Air tests shall be made on every load or batch of concrete in accordance with CSA A23.2 (ASTM C231) until the results of 3 consecutive tests have all met the specified air content requirements.

9.2.5.8.12 After a satisfactory control of air content as specified in project specifications is achieved, the frequency of air content tests may be reduced to one test every time a set of compressive strength samples are taken.

9.2.5.8.13 Failure to meet the specified air content requirements may require additional measures to be taken, as specified by NRC, before the concrete is used in the Works, and may be grounds for rejection of the affected concrete load or batch.

9.2.5.8.14 Whenever an air test falls outside the specified limits, the testing frequency shall revert to one test per load or batch until satisfactory control is established.

9.2.5.9 Quality Control / Quality Assurance

9.2.5.9.1 Quality Control of all Concrete Construction activities is the direct responsibility of the Contractor.

9.2.5.9.2 Contractor shall submit to NRC for approval a Quality Control Program covering all concrete construction activities.

9.2.5.9.3 Contractor's Quality Control Program shall be monitored by NRC.

9.2.5.9.4 Testing Agency shall perform all testing of concrete at site, as part of the Quality Assurance activities, with the exception of concrete sample breaks which are performed in an accredited laboratory.

9.2.5.10 Environmental Laws

9.2.5.10.1 Environmental laws in individual jurisdictions may impose requirements in addition to these standards and specifications mentioned in this standard. Ensure these environmental laws are followed.

9.2.5.10.2 The Contractor shall be responsible for the removal and disposal of all garbage, debris, leftover and waste materials at locations approved by NRC.

9.3 **Design/Build/Install Steel Support Structure**

9.3.1 General

9.3.1.1 All individual components shall be designed to be capable of being assembled on-site to conform to the finished structure as indicated by the shop drawings and specifications.

9.3.1.2 The Barrier Wall structure (excluding footings) shall be designed to be unassembled if required and noise wall panels shall be designed to facilitate ease of onsite replacement.

9.3.2 Steel Posts

9.3.2.1 Steel posts shall be hot rolled wide flange structural sections in accordance with shapes, sizes, details and method of connection as shown on shop drawings.

9.3.2.2 All structural steel work shall conform to CSA Standard S 16 and steel shall be of grade G40.21-M 350W.

9.3.2.3 All structural steel work shall be hot dipped galvanized after fabrication in accordance with CSA Standard G164-M or ASTM A123.

9.3.2.4 All welds shall conform to CSA W59.1 and CSA W47.1

9.3.2.5 Posts to be installed plumb to within +/- 10mm (3/8”) over the height of the post.

9.3.2.6 Posts to be located to the lines and grades as specified on the drawings.

9.3.2.7 In the case of embedded posts, a concrete plug of at least 250 mm shall be poured into the bottom of the augured hole, at least 4 hours prior to inserting the steel post.

9.3.2.8 Galvanized post surfaces which are abraded shall be cleaned and painted with a zinc-rich paint approved by NRC.

9.3.3 Post Footings

9.3.3.1 The site specific type, depth, size and shape of the footings shall be determined in accordance with applicable local bridge codes (CAN/CSA-S6-06) based on the determined soil parameters along with the alignment of the Barrier Wall.

9.3.3.2 Concrete in post footings shall be 30MPa.

9.3.3.3 Depth and diameter of footing shafts shall be calculated by various acceptable methods to ensure that the serviceability limit-state requirement is met.

9.3.4 Anchor Bolts

9.3.4.1 Anchor bolts shall meet requirements specified on manufacturer's shop drawings.

9.3.4.2 Anchor bolt installation shall be in compliance with Section 9.2.4.8 of this standard

9.3.5 Structural Steel Standard

9.3.5.1 Submittals

9.3.5.1.1 The Contractor shall submit, as a minimum but not limited to, the following items to NRC for approval before commencing the work:

- Welder's certificate of conformance with CSA W47.1 (AWS D1.1)
- Detailed design of posts, struts and other structural members and details, including splices, gusset plates, bolted connections, and all pertinent fabrication and erection details.
- Mill Test Certificates for steel sections and plates.
- Request for approval of field splices.

9.3.5.2 The following items shall also be submitted to NRC by the Contractor:

- A complete drawing showing the constructed structures and elevations, and marked "As Built", at the end of the installation work.
- Record of field welding of pile splices and welding inspection report, which shall be prepared by, or under the direct supervision of a Canadian Welding Bureau (CWB) certified welding inspector.

9.3.5.3 Materials

9.3.5.3.1 Use only materials that are new and free from defects that may impair the strength or durability and with valid Mill Certificates, heat numbers and MTR.

9.3.5.3.2 Steel sections shall conform to CSA G40.21, Grade 350W or 300W.

9.3.5.3.3 The welding electrodes shall conform to CSA W48, E49XX

9.3.5.3.4 In general an additional thickness of 1/16 inch (1.5 mm) shall be provided above the minimum design required thickness as corrosion allowance for loaded steel sections, unless galvanized steel or other approved corrosion protection measures are used. For very corrosive environments, corrosion allowance shall be as per the recommendation of corrosion study reports.

9.3.5.4 Survey Work

9.3.5.4.1 Contractor shall be responsible for establishing the lines, levels and locations of structural elements and connections with respect to the design drawings and the existing base lines and benchmarks (to be given by NRC to the Contractor upon award of the contract).

9.3.5.4.2 The structures shall be finished to the alignment and elevations within the tolerances specified in the project documents.

9.3.5.4.3 Contractor shall be responsible for the protection of survey monuments (if any) and shall repair any damage caused, during the course of the work, to such monuments.

9.3.5.5 Fabrication

9.3.5.5.1 Size, nominal diameter and wall thickness shall be as indicated on drawings. Whenever possible, fabricate full-length sections to eliminate splicing during installation.

9.3.5.5.2 Shop splicing shall be performed using complete joint preparation groove welds as per requirements of CSA W59 (AWS D1.1).

9.3.5.5.3 Welding shall conform to CSA W59 (AWS D1.1). Welders must be qualified under the provisions of CSA W47.1 (AWS D1.1).

9.3.5.5.4 Permissible variations in dimensions, mass, material thickness, and out-of-roundness shall conform to the appropriate specifications listed in this standard.

9.3.5.5.5 CSA W48 (AWS A5.1) series welding electrodes shall be used for welding splices and connections.

9.3.5.6 Steel Coatings

9.3.5.6.1 All steel components to be coated as outlined in 9.3.2.

9.3.5.7 Installation

9.3.5.7.1 Field Extension

9.3.5.7.1.1 Field extensions, if required, may be added during installation, subject to the following requirements:

- All field extension of steel members to be approved in writing by NRC prior to start of extension work.
- Surfaces to be spliced shall be cut and ground square to ensure full bearing of spliced parts, before welding preparation.
- Welding shall be done in such a way as to prevent and minimize distortion. It is recommended

that tack welds to opposite points be made first and the main welding done to opposite sections afterward.

- Complete full penetration welds shall be used.
- All fields welding shall meet the requirements of CSA W59 and CSA W47.1 (AWS D1.1).
- All fields welding shall be inspected by a CWB (AWS) certified welding inspector.
- Contractor is to take all possible safety measures before 'site welding' to be approved by NRC. Protection against possible presence of Methane gas & fire caused by welding spark shall be taken to avoid personal injury to worker/s and damage to property and equipment.

9.3.5.7.2 Quality Control

9.3.5.7.2.1 Quality Control of all Steel Construction activities is the direct responsibility of the Contractor.

9.3.5.7.2.2 Contractor shall submit to Owner for approval a Quality Control Program covering all steel construction activities.

9.3.5.7.2.3 Contractor's Quality Control Program shall be monitored by NRC.

9.4 **Design/Build/Install Acoustic Panels**

9.4.1 Acoustic Properties

9.4.1.1 The Barrier Wall Acoustic panels shall be designed/built by an experienced acoustic panel supplier.

9.4.1.2 The Barrier Wall Acoustic Panels shall be double-walled and absorptive on one side with a perforated pattern.

9.4.1.3 The Barrier Wall Acoustic Panels shall be filled with acoustic mineral wool.

9.4.1.4 The Barrier Wall Acoustic Panels shall be designed to facilitate ease of onsite replacement.

9.4.1.5 The Acoustic Panels to be supplied and installed in the Barrier Wall shall be certified to a Sound Transmission Class rating greater than or equal to 37. A lab report from an ASTM E90 lab test shall demonstrate this.

9.4.1.6 The Acoustic Panels to be supplied and installed in the Barrier Wall shall be certified to meet the minimum absorption coefficient values (vs. frequency) of Table 1. A lab report from an ASTM C423 lab test shall demonstrate this.

Frequency (Hz)	125	250	500	1k	2k	4k
Absorption Coefficient	0.85	0.89	1.13	1.1	1.03	0.76

Table 1. Minimum Required Absorption Coefficients for Panel.

9.4.1.7 Deleted.

9.4.2 Construction

9.4.2.1 Panels shall be fabricated from cold-formed sheet steel.

9.4.2.2 Panel face trays shall be made of a minimum 22 gauge perforated cold-formed steel with 3/16" diameter perforations in a 3/8" staggered pattern (or a similar pattern with minimum 23% open area).

9.4.2.3 Panel back trays shall be made of a minimum 18 gauge non-perforated cold-formed steel.

9.4.2.4 Panel face and back trays shall slide together, mesh fully, and be free from foreign material with no visible gaps. Sheet metal screws shall not be permitted to connect the double wall panel (face and back trays).

9.4.2.5 Panels shall be fully assembled and ready for installation prior to shipping.

9.4.2.6 Individual panels shall have a minimum thickness of 3-3/4".

9.4.2.7 Notwithstanding the material type and minimum nominal dimensions given in 9.4.2, the panels shall be designed, constructed, and reinforced in conjunction with the steel support structure (Section 9.3) to withstand the prevailing wind pressures as per NBCC, with appropriate factors of safety in accordance with CISC Handbook of Steel Construction.

9.4.2.8 The contractor shall demonstrate that the panels have a flame spread index of rating of 15 or less and a smoke development index rating of 0 in accordance to ASTM E-84.

9.4.2.9 Acoustical mineral rock wool in panels shall have the following properties:

- Must be a non-combustible, chemically inert material which does not rot or sustain vermin.
- Must be non-hygroscopic and absorb less than 1% water.
- Must provide the acoustical properties required herein when combined with panels.

9.4.2.10 If applicable, panels are to be installed with the tongue portion facing upwards and assembled tight to the lower panel

9.4.2.11 If applicable, the tongue and groove joints shall mesh fully and be free from foreign material and there should be no visible gaps

9.4.2.12 Once the entire elevation is completed, a panel retention device shall be installed according to manufacturer's recommendations.

9.4.2.13 A typical acceptable mineral wool panel is shown in Figure 10.

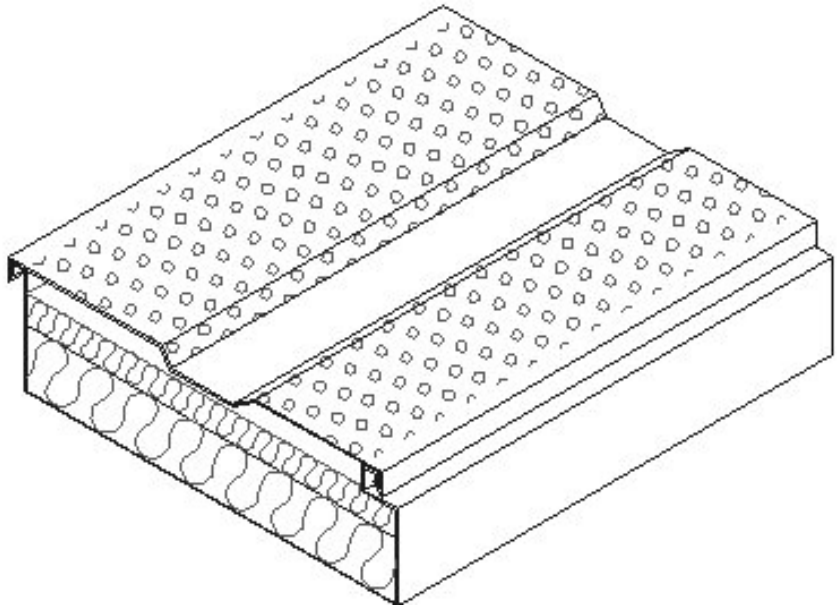


Figure 10. Typical mineral-wool-filled acoustic panel

9.4.3 Finishing

9.4.3.1 The perforated side of all noise panels shall be galvanized as per section 9.4.3.2 and the non-perforated side of the noise panels shall be power coated as per section 9.4.3.3.

9.4.3.2 For the galvanized finishing scheme, panels shall be galvanized in accordance with ASTM A653, Class G-90.

9.4.3.3 For the powder coating finishing scheme, panels shall be powder coated white as follows:

- Adhesion per ASTM D 3359: no failure with 1/16" squares
- Flexibility per ASTM D 522: pass a 1/8" Mandrel Bend.
- Hardness per ASTM D 3363: 2H
- Reverse Impact per ASTM D2794: 140 Dir./140 Rev
- Specular Gloss per ASTM D 523: 80+ at 60 degrees

9.5 **Key Interfaces and Constraints**

9.5.1 Detailed dimensions of the Barrier Wall locations and heights are given in NRC drawing # SP-M46-PWT-03-00250.

9.5.2 The Barrier Walls will interface only with the existing ground around the tunnel. The profile of the Barrier Wall shall be installed to match the ground profile up to the maximum grade specified on the shop drawings. The Contractor is responsible to adapt the design/build of the walls to the existing ground as necessary to meet the requirements specified herein. A geotechnical report for the general area around the M46 Wind Tunnel is located in Reference Document # 08-1121-0099.

9.5.3 To accommodate ground profiles greater than the maximum grade, the Barrier Wall shall be stepped in accordance with manufacturer's recommendations.

9.5.4 The Barrier Walls shall be designed and built to not impede or disrupt any natural water drainage in the area.

9.5.5 The Barrier Walls shall be designed and built to not impede or disrupt any landscape maintenance in the area.

9.5.6 The Barrier Walls shall be designed and built to not significantly interfere with the existing tree growth in the area. It is expected that tree trimming will be required but not tree removal. The contractor shall be responsible for all tree trimming where necessary.

9.5.7 The Barrier Walls shall be designed and built to not interfere with any existing underground services. A reference drawing of all existing underground services in the location of the wall is given in Reference Drawing # SP-M46-PWT-03-00250, sheet 3.

9.5.8 A mandatory site visit, during the bidding stage, is required so that the Bidder can become familiar with and verify the existing interfaces. After the Contract is awarded, the Contractor will be responsible to measure and inspect the existing ground and accurately locate the underground services as required to facilitate the requirements specified herein.

9.5.9 The contractor shall be responsible to repair any ruts, or holes left in the grounds by vehicles, heavy machinery or other equipment.

9.6 **Commissioning and Acceptance Testing**

9.6.1 The Contractor will provide qualified support to supervise the complete build of the Barrier Walls. A trained engineer or equivalent mechanic will be on site to provide, as a minimum:

- Supervision of the final adjustments
- Final check-out of the panels and all hardware and accessories.

- Inspection of all panel-to-panel and panel-to-structural members.
- Inspection of the final erection and fit of all assemblies and components

9.6.2 Acceptance of Site Verification of Conditions: General Contractor shall inspect, accept and certify in writing to the Barrier Wall subcontractor that site conditions meet specifications for the following items prior to installation of the Barrier Wall.

- Verify sub-grade preparation and elevations conform to the specified requirement.
- Verify location, alignment, and elevations of Barrier Wall foundations.
- Verify location, alignment and elevations of any services within work area.
- The contractor shall verify that all Barrier Walls may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right of way limitations, utilities, etc.
- In the event of a discrepancy, the Contractor shall notify NRC. The Contractor shall not proceed with the Barrier Wall installation in areas of discrepancies until said discrepancies have been resolved. All costs associated with unresolved discrepancies shall be the responsibility of NRC.

9.6.3 Do not proceed with installation of the Barrier Wall until sub-grade soil conditions are corrected by General Contractor or designated subcontractor.

9.6.4 Field Quality Control

- Centerline of the Barrier Wall shall not be more than 10mm (3/8”) from indicated plan location.
- Posts should be installed plumb within 10mm (3/8”) of required location.
- Panels to be stacked on top of each other with a vertical tolerance of +/- 4 mm (5/32”).

9.7 **Shipping**

9.7.1 Where necessary, the Contractor will deliver the Barrier Wall components undamaged with protective wrapping and packaging.

9.7.2 Where necessary, NRC will store all components and accessories in a clean and dry location prior to the build.

9.7.3 The Contractor shall comply with all manufacturer’s ordering instructions and lead-time requirements to avoid construction delays.

9.7.4 The Contractor shall deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.

9.7.5 Coordinate deliveries and overall construction work to minimize interference with normal use of buildings adjacent to the project.

9.7.6 Unload units at job site in such a manner that no damage occurs to materials.

9.8 **Documentation**

9.8.1 The Contractor shall submit to the Contract Administrator two (2) copies of all shop drawings for the Barrier Walls at least one (1) week prior to the commencement of construction. The shop drawings shall show full details of the Barrier-Wall-related items, erection procedures and if applicable, connections to structures. All shop drawings shall bear the seal and signature of a Professional Engineer licensed to practice in the province of Ontario. Shop drawings to include:

- Barrier Wall Elevation
- Typical Assembly Elevation
- Typical Base Plate Details
- Typical Details
- Foundation Details
- Tables and Notes

9.8.2 The Contractor will issue 3 copies of the operational/maintenance literature for the Barrier Walls. The literature will include, as a minimum - general operation requirements, a pre-operational inspection checklist, a post-operational inspection checklist, a critical spare parts list and a preventative maintenance schedule. This will be due 1 week after the Barrier Walls are built.

9.9 **Quality Control**

9.9.1 Barrier Wall Design/Build Qualifications:

- Design of the Barrier Walls shall be performed by Engineer licensed to practice in the Province of Ontario and in accordance with local code requirements.
- Contractor shall conform to all local and provincial licensing and bonding requirements.

- Contractor shall be thoroughly trained and experienced in the construction of noise attenuation products.

- Contractor shall be trained by the manufacturer to install materials according to their recommendations.

10. SAFETY

10.1.1 All work on-site will conform to the applicable Ontario Health and Safety Regulations.

10.1.2 When applicable, the following safety practices will be closely observed and will be strictly adhered to at all times:

- Personal fall protection;

- Lockout-tag out;

- Ladders/scaffolds;

- Work overhead / temporary barriers;

- Hot work practices;

- Housekeeping;

- Rigging and hoisting;

- General PPE use – safety glasses and safety boots

10.1.3 All work on-site will conform to the applicable Ontario Health and Safety Regulations.

10.1.4 The construction area shall be safety-barricaded as required by all applicable codes.

11. SITE CONDITIONS

11.1.1 Power Supply – Delivery to Work Area.

- The contractor shall have access to a power distribution panel featuring an array of duplex 120 VAC /20 A circuits.

- Any additional power requirements (i.e.: for welding) shall be provided by the contractor. (i.e.: with either gas or diesel powered generators. If using generators, they shall remain outside of the building while operating and shall be electrically bonded to earth. No “floating ground” system shall be permitted.)

11.1.2 Waste and construction by-products

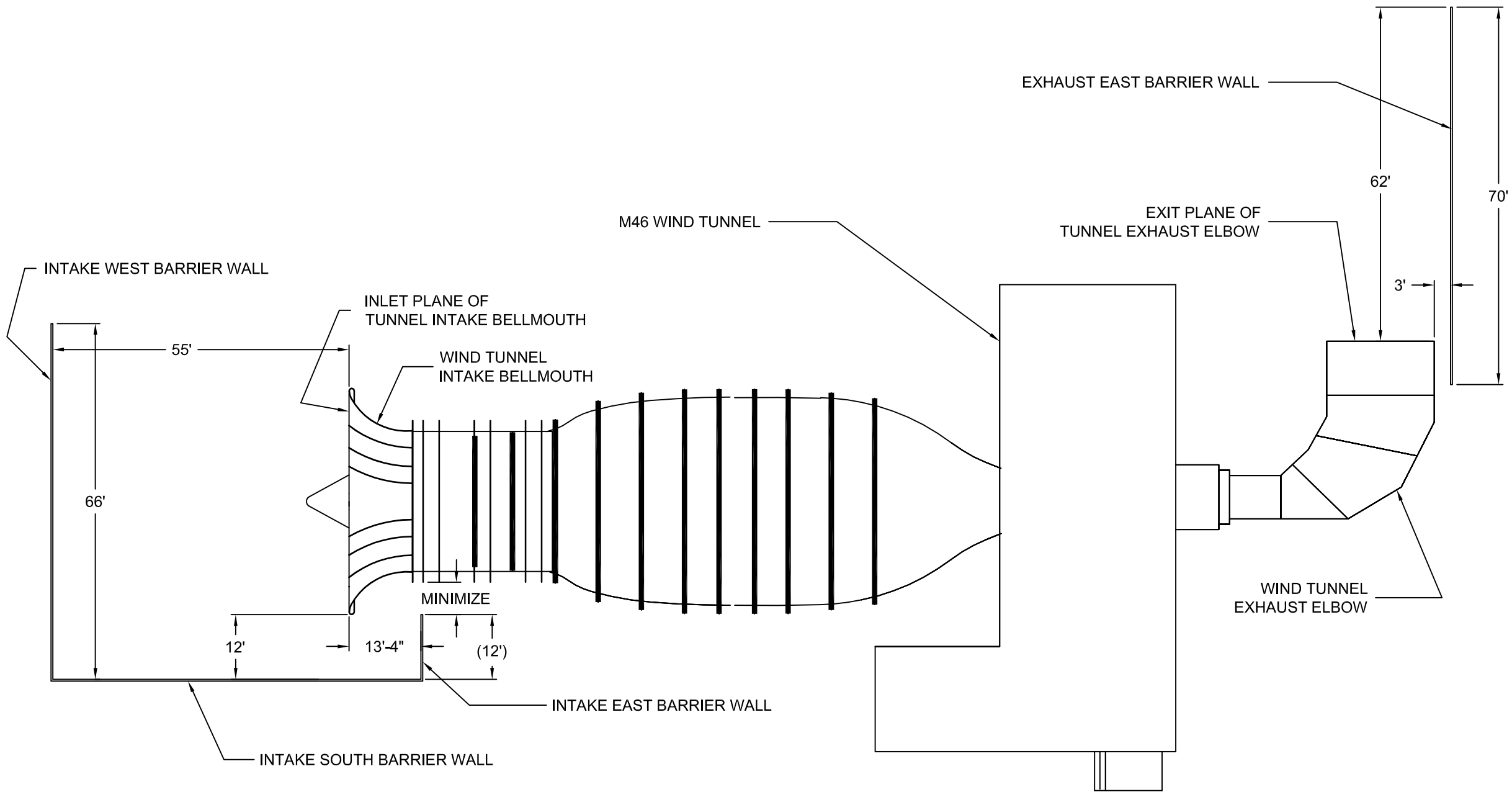
- The contractor shall provide their own waste disposal.

- All hazardous materials brought to site by the contractor shall be handled appropriately, and removed completely before the contractor leaves the site at the end of the project.

- The contractor shall also dispose of, or recycle, any waste materials produced by the project.

11.1.3 Landscaping

- The grounds around the site are grassy / sandy areas with generally very good drainage. The contractor shall be responsible to repair any ruts, or holes left in the grounds by their vehicles, rented machinery or equipment.



BARRIER WALL LOCATIONS

National Research Council Canada / Conseil National de recherches Canada

NRC-CNRC

AERODYNAMICS LABORATORY

OTTAWA CANADA

Notes

– The wall design shown on plans is conceptual. Final design may vary subject to NRC approval

Rev	Date	Description	By

Drawing Title
M46 PWT,
NOISE BARRIER WALL

Reference Number
IMC-0209

Parent Drawing(s)

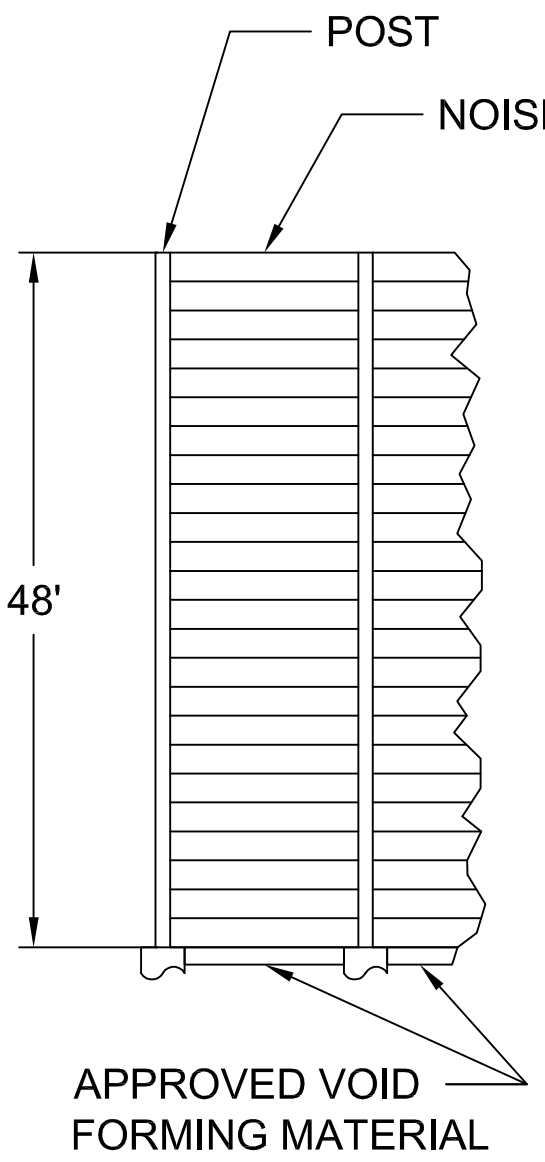
In the Absence of a 'For Production' or 'As Built' stamp on the first sheet, this copy is uncontrolled.

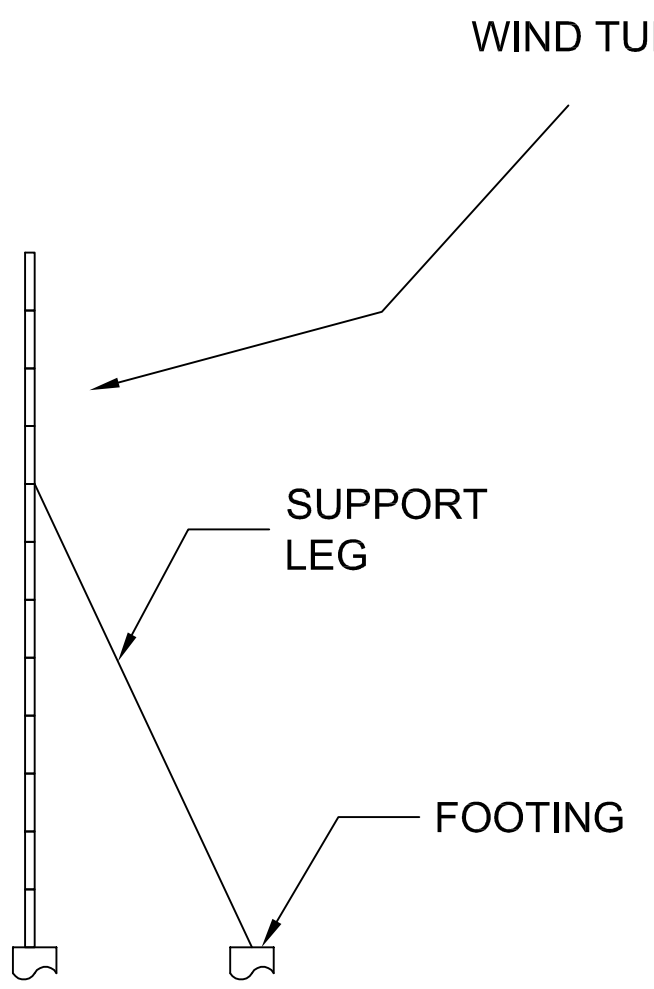
User assumes responsibility for determining this drawing's current status.

Drafter: J. MARSHALL	Initials	Date: 16 SEPT 2015
Designer	Initials	Date
Checked By	Initials	Date
Approved By	Initials	Date
Client	Initials	Date

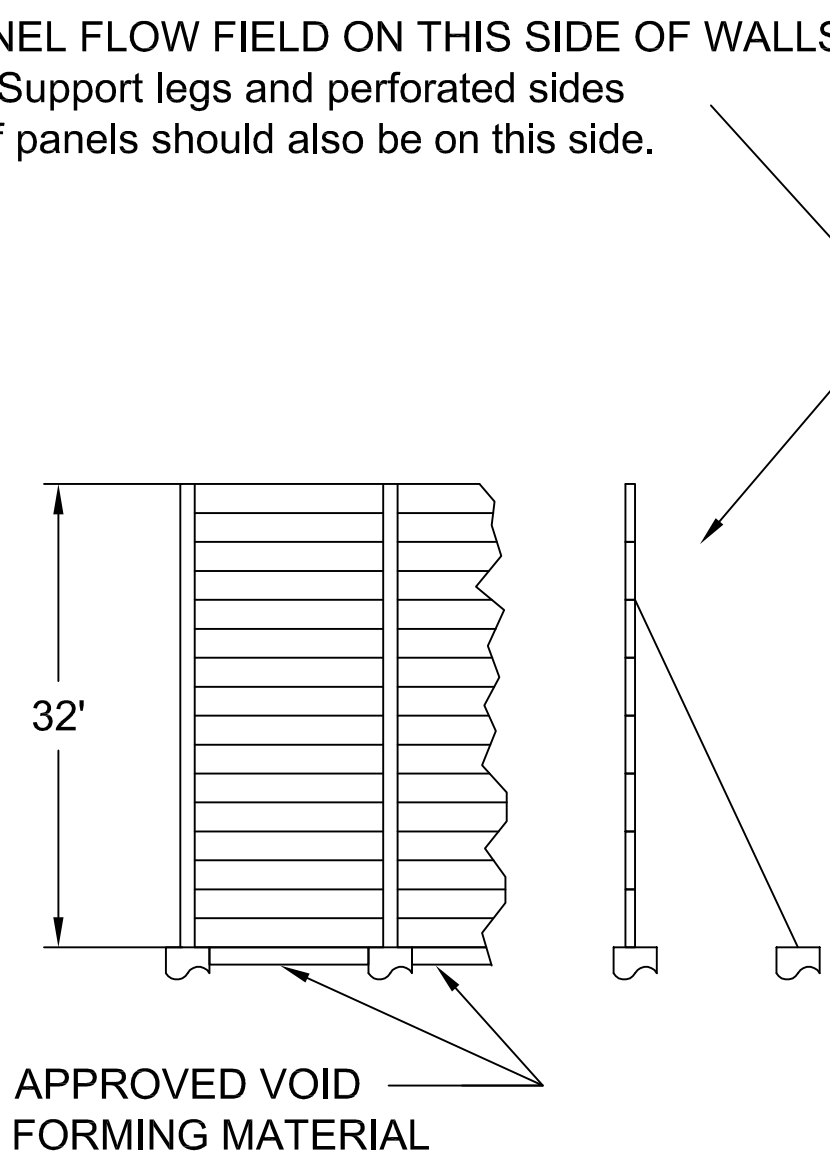
Drawing No.	Rev. No.
SP-M46-PWT-03-00250	–

Scale	Weight	Sheet
–	N/A	1 OF 3





TYPICAL INTAKE WALL



TYPICAL EXHAUST WALL

CONCEPT SKETCHES

National Research Council Canada / Conseil National de recherches Canada
NRC-CNRC

AL AERODYNAMICS LABORATORY
OTTAWA CANADA

Notes

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Drawing Title
M46 PWT,
NOISE BARRIER WALL

Reference Number

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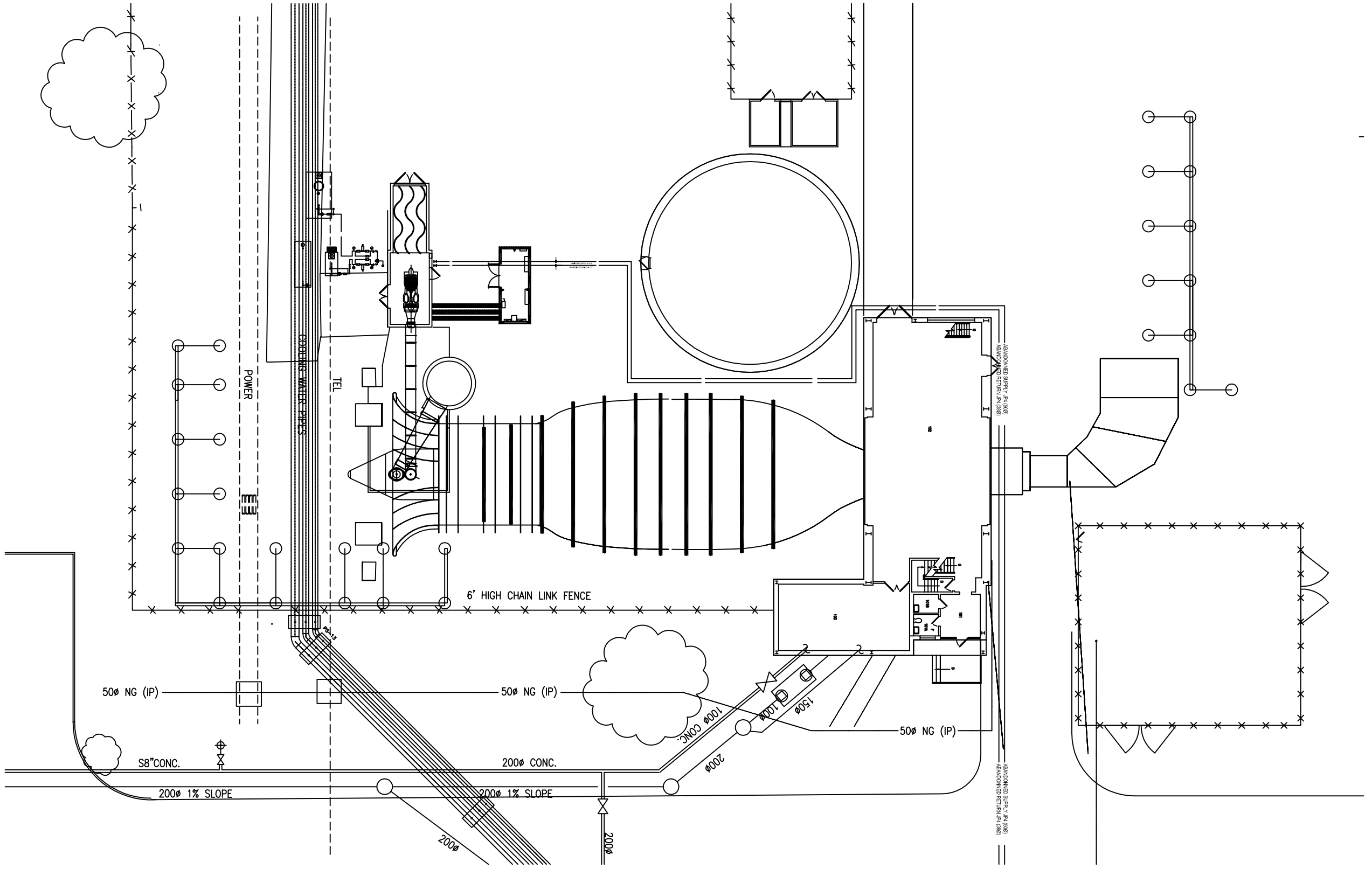
Designer	Initials	Date
Checked By	Initials	Date
Approved By	Initials	Date
Client	Initials	Date

Drawing No.	Rev. No.
SP-M46-PWT-03-00250	–

Scale	Weight	Sheet
–	N/A	2 OF 3



EXISTING UNDERGROUND SERVICES

National Research Council Canada / Conseil National de recherches Canada
NRC-CNRC

AERODYNAMICS LABORATORY
OTTAWA CANADA

Notes

– The wall design shown on plans is conceptual. Final design may vary subject to NRC approval

Rev	Date	Description	By

Drawing Title
M46 PWT,
NOISE BARRIER WALL

Reference Number
IMC-0209

Parent Drawing(s)

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	Initials	Date
Drafter J. MARSHALL.		16 SEPT 2015
Designer		
Checked By		
Approved By		
Client		

Drawing No.	Rev. No.
SP-M46-PWT-03-00250	–

Scale	Weight	Sheet
–	N/A	3 OF 3

July 2008

LIMITED REPORT ON

Geotechnical Considerations NRC CO, H2 and N2 Docking and Piping Facility NRC Montreal Road Campus Blair Road Ottawa, Ontario

Submitted to:
National Research Council Canada
Building M-19
120 Montreal Road
Ottawa, Ontario
K1A 0R6

REPORT

A world of capabilities delivered locally

Report Number: 08-1121-0099

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July 23, 2008 Project No. 08-1121-0099

Mr. Bruno Vallieres, Administrative Services and Property Branch
National Research Council Canada
Building M-19
120 Montreal Road
Ottawa, Ontario
K1A 0R6

RE: NRC CO, H2 AND N2
DOCKING AND PIPING FACILITY
NRC MONTREAL ROAD CAMPUS
BLAIR ROAD
OTTAWA, ONTARIO

Dear Mr. Vallieres

Please find attached our limited report on geotechnical considerations for the proposed Docking and Piping Facility to be constructed at the NRC Montreal Road Campus, Blair Road, Ontario.

We trust that this limited report is sufficient for your present requirements. If you have any questions concerning this limited report or, if we can be of further assistance, please let us know.

Yours truly,

GOLDER ASSOCIATES LTD.

M.W. St-Louis, P.Eng.
Senior Geotechnical Engineer

T.J. Nicholas, P.Eng.
Principal

MSTL/TJN/ch

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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

Table of Contents

1.0 INTRODUCTION

This limited report addresses geotechnical consideration related to the site of the Docking and Piping Facility to be located on the NRC Montreal Road Campus, Blair Road, Ottawa (see Figure 1, Key Plan). Geotechnical studies had been prepared by McRostie Genest St-Louis (MGS) in 2002 and 2005 (reference reports SF-4553B and SF-4932). The results of the pertinent subsurface information from the above studies are included in this report for completeness.

The purpose of this assignment was to review the general soil and groundwater conditions in the area of the proposed duct bank routes for the docking and piping facility by means of an additional four (4) boreholes (08-1 to 08-4 inclusive) and fourteen (14) test pits (08-5 to 08-17 inclusive and 08-15A) and, based on an interpretation of factual information including that from past subsurface records obtained, to provide engineering guidelines on the geotechnical design aspects of the project, including construction considerations which could influence design decisions.

The reader is referred to the "Important Information and Limitations of this Report", which follows the text but forms and integral part of this document.

2.0 DESCRIPTION OF PROJECT

Plans are being prepared to construct a docking and piping facility at the NRC Montreal Road Campus (see Figure 1, Key Plan). The project will include duct banks within about 2.5 metres of the existing ground surface, foundations for a nitrogen tank that will be about 12 metres in height and 3 metres in diameter supported on three (3) legs, and 3 blast walls to be in compliance with NFP 55 requirements in the docking facility.

Geological mapping indicates that the bedrock underlying this site is sedimentary in nature and consists of limestone of the Bobcaygeon formation.

The site also falls within the Western Québec Seismic Zone (WQSZ) according to Geological Survey of Canada. The WQSZ constitutes a large area that extends from Montréal to Témiscaming, and which encompasses the Ottawa area. Within the WQSZ, recent seismic activity has been concentrated in two (2) subzones; one along the Ottawa River and another more active subzone along the Montréal-Maniwaki axis. Historical seismicity within the WQSZ from 1900 to 2000 includes the 1935 Témiscaming event which had a magnitude (i.e., a measure of the intensity of the earthquake) of 6.2 and in 1944, a Cornwall-Massena event had a magnitude of 5.6. In comparison with other seismically active areas in the world (i.e., California, Japan and New Zealand), the frequency of earthquake activity within the WQSZ is significantly lower but there still exists the potential for significant earthquake events to be generated.

Under the 2006 Ontario Building Code (OBC), a seismic hazard with a 2% probability of exceedance in 50 years has been retained for design. For the subject site, the reference (Site Class C) peak horizontal ground acceleration (PGA) is 0.42g (g = acceleration by gravity) (Adams and Halchuck, 2003).

3.0 PROCEDURE

The field work for this investigation was carried out on June 18, 2008 (test pits) and on July 3 and 4, 2008 (boreholes). At that time fourteen (14) test pits (numbered 08-5 to 08-17 inclusive and 08-15A) and four (4) boreholes (numbered 08-1 to 08-4 inclusive) were put down at the approximate locations shown on the Site Plan, Figure 2.

The test pits were excavated by a rubber tired backhoe. The test pits were advanced to depths of between 0.4 and 2.2 metres below the existing ground surface.

The boreholes were advanced using a track-mounted CME 45 hollow-stem auger drill rig supplied and operated by Marathon Drilling Company Ltd. of Ottawa, Ontario. The boreholes were advanced to depths of between 2.8 and 3.5 metres below the existing ground surface.

Within the boreholes, standard penetration tests (SPT) were carried out at regular intervals of depth and samples of the soils encountered were recovered using drive open sampling equipment. All four (4) boreholes were advanced through the overburden and into the underlying limestone bedrock. In all boreholes, the limestone bedrock was proven for a depth of between 1.5 and 1.7 metres by rotary core drilling in NQ size.

The field work was supervised by an experienced technician from our staff who directed the drilling operations, logged the test pits, the boreholes and samples, directed the in-situ testing and took custody of the soil samples and rock cores.

On completion of the drilling operations, the soil samples and rock cores were transported to our laboratory.

A standpipe was installed in boreholes 08-1 and 08-3 to determine the stabilized groundwater conditions at the site. The groundwater level in the standpipe was measure on July 9, 2008.

The borehole and test pit locations were selected by the National Research Council. Subsequently, the locations and ground surface elevations for the test pits and boreholes for this subsurface investigation were surveyed by Stantec Geomatics Ltd. The ground surface elevations supplied to Golder Associates are understood to be referenced to Geodetic datum.

4.0 SUBSURFACE CONDITIONS

4.1 General

The subsurface conditions encountered during the present 2008 investigation are shown on the Record of Borehole and Record of Test Pit sheets in Appendix A.

The subsurface information from previous studies was compiled as part of the present study and is included in Appendix B.

The subsurface conditions at this site can be generalized as consisting of surficial deposits of topsoil and fill material underlain by glacial till in turn underlain by limestone bedrock. The depth to bedrock is variable at this site.

The following sections provide a more detailed summary of the subsurface conditions encountered within the boreholes and test pits from the present and previous investigations.

4.2 Fill Material and Topsoil

Fill material and/or topsoil were encountered at the existing ground surface and found to range in thickness between 100 millimetres to about 2.15 metres (see Test Pit 08-15). The fill material generally consists of sand, gravel, topsoil, cobbles, boulders and rock blocks but at some locations also contains wood, brick, and concrete. In test pit 08-15, tires were found within the fill.

4.3 Glacial Till

A deposit of glacial till is often found between the surficial layer of fill and/or topsoil and the bedrock surface. The glacial till consists of a heterogeneous mixture of gravel, cobbles and boulders in a matrix of silty sand with a trace of some clay. There are a few locations where no glacial till was encountered and where the fill material and/or topsoil veneers the limestone bedrock.

4.4 Limestone Bedrock

Limestone bedrock underlies the fill material and the glacial till at all boreholes put down as part of the present subsurface investigation.

The bedrock surface varies from elevation 97.5 to 99.3 metres which is about 1.0 to 2.0 metres below the existing ground surface. In borehole 08-1 and 08-3, the upper layer of bedrock was weathered and was sampled using drive open soil sampling equipment over depths of 0.3 and 0.1 metres, respectively. Below this upper bedrock layer, the degree of weathering is moderate to slight.

The Total Core Recovery (TCR) varies from about 88 to 100 percent of the length drilled. The Solid Core Recovery (SCR), the percentage of core that is completely circular in section, ranges fro 67 to 98 percent. The Rock Quality Designation (RQD), the percent length of intact core longer than 100 millimetres, varies between 50 and 77 percent

4.5 Groundwater

The groundwater levels in the two (2) boreholes with standpipes sealed into the underlying limestone bedrock (boreholes 08-1 and 08-3) were measured on July 9, 2008. At that time, groundwater levels varied from about 2.5 to 2.6 metres below the existing ground surface (i.e. about elevations 97.1 to 97.7 metres).

It should be noted that groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

5.0 PROPOSED DOCKING AND PIPING FACILITY

5.1 General

This section of the report provides limited engineering guidelines on the geotechnical aspects of the project for the service duct banks, the foundations for the nitrogen tower and the blast wall foundations portion of the project and based on our interpretation of subsurface information and project requirements and is subject to the limitations in the "Important Information and Limitations of This Report" attachment which follows the text of this report.

The professional services retained for this project include only the geotechnical aspects of subsurface conditions at the site. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off site sources are outside the terms of reference for this project and have not been investigated nor addressed.

5.2 Excavations and Site Servicing

Excavations for the installation of site services (duct banks) will be through fill materials, topsoil, glacial till and at some locations will extend into bedrock.

No unusual problems are anticipated in trenching in the overburden using conventional hydraulic excavating equipment, although significant cobble and boulder removal could be required in the glacial till. Furthermore, large rock blocks should also be expected to be present in fill materials. Old concrete foundation walls and basement floor slabs may also be found at some locations as it is understood that buildings were demolished before the construction of the NRC Montreal Road Campus.

It is expected that the bedrock removal for the project will be carried out using drill and blast techniques. Should bedrock removal be carried out by drilling and blasting, special care will be required to prevent overblasting and fracturing of the bedrock below foundation levels.

The blasting should be controlled to limit the peak particle velocities at all adjacent structures such that blast induced damage will be avoided. This will require blast designs by a specialist in this field.

A pre-blast survey should be carried out on all surrounding structures. Selected existing interior and exterior cracks in the structure should be identified during the pre-blast survey and should be monitored for lateral or shear movements by means of glass telltales and/or movement telltales.

The contractor should be limited to only small controlled shots. The following frequency dependent vibration limits at the nearest structures and services are suggested

Frequency Range (Hz)	Vibration Limits (millimeters/second)
<10	5
10 to 40	5 to 50 (sliding scale)
>40	50

These limits should be practical and achievable for most of this project. In areas in close proximity to structures and services, limestone bedrock removal should be accomplished using mechanical methods such as hoe-ramming in conjunction with closely spaced line drilling to establish the limit of the excavation.

5.3 Foundations

It is considered that the proposed nitrogen tank structure and the three (3) blast walls will be founded on spread footings placed on limestone bedrock or by caissons extending into the limestone bedrock layers underlying the site.

For footing design purposes, footings placed directly on limestone bedrock, below any upper weathered zones, may be sized using an Ultimate Limit States (ULS) factored bearing resistance of 1000 kilopascals. Provided that the bedrock surface is properly cleaned of soil or any loose rock fragments at the time of construction, the settlement of footings sized using the above factored bearing resistance should be negligible, therefore, Serviceability Limit States (SLS) need not be considered.

Caissons, as an alternative foundation scheme, could be designed based on a rock socket to concrete bond value of 500 kilopascals (SLS); end bearing should be ignored. In addition, the bond (adhesion) in the upper weathered or fractured zone should also be ignored.

An advantage to the rock socketed caissons is their ability to be reinforced for both downward loading and uplift resistance.

5.4 Rock Anchors

If required, rock anchors could be provided to resist uplift loads on footing type foundations.

The anchors could consist of either grouted or mechanical anchors.

For a group of anchors or for a line of closely spaced anchors, the resistance must consider the potential overlap between the rock masses mobilized by individual anchors. Further guidance, at the final design stage, should be provided for assessing the resistance of a single anchor and the effect of a group of anchors.

5.5 Frost Protection

All exterior foundation elements in unheated areas should be provided with a minimum of 1.5 metres of earth cover for frost protection purposes. Isolated foundations or foundations in unheated areas which are adjacent to any surface cleared of snow cover during winter months should be provided with a minimum of 1.8 metres of earth cover.

For footings founded on competent bedrock, the requirement for 1.5 or 1.8 metres of earth cover could be waived where it could be shown by check drilling during construction that the bedrock below footing level does not contain any joints filled with frost-susceptible soil.

5.6 Duct Bank Route

The concrete encased duct bank should be made to bear on the bedrock surface or within the bedrock over the entire route for this project in order to prevent conditions of differential support and potential settlement where soil supported.

Excavation of the limestone bedrock would be required at some locations where bedrock is shallow. Lean concrete infill would be required in localized areas where the bedrock surface is somewhat deeper.

5.7 Seismic Site Response Classification

The 2006 OBC contains an updated seismic analysis and design methodology which uses a seismic site response classification system defined by the shear stiffness of the upper 30 metres of ground of interest. Seismic response is now defined by uniform hazard spectra (UHS) corresponding to design earthquake with a probability of exceedance of 2% in 50 years. There are six site classes (from A to F), decreasing in soil stiffness from A (hard rock) to E (soft soil); Site Class F denotes problematic soils for which a site-specific evaluation is required. The site class is used to obtain soil factors (F_a and F_v) used to modify the UHS to account for the effects of site-specific soil conditions on the seismic response of the site to the design earthquake.

To support a site class designation, a shear wave velocity of 700 metres per second was assigned to the limestone bedrock, based on actual measurements in similar bedrock formations. Interpreting the data available indicates that a Site Class C designation would be appropriate. It may be possible to achieve a higher Site Class designation by obtaining site specific shear wave velocities.

5.8 Corrosion and Cement Type

As part of several studies performed by McRostie Genest St.-Louis (MGS) at the NRC Montreal Road Campus over the years, groundwater samples were collected and submitted for chemical analysis related to potential corrosion of buried ferrous elements and sulphate attack on buried concrete elements.

There has not been a history of potential problems with corrosion of exposed ferrous elements or sulphate attack on buried concrete elements.

Based on the past performance of older existing foundations exposed at the time of recent additions to the NRC Montreal Road Campus, concrete made with Type GU Portland cement should be acceptable for substructures.

6.0 ADDITIONAL CONSIDERATIONS

All foundation areas and duct bank trenches should be inspected by experienced geotechnical personnel prior to concreting to ensure that the limestone bedrock having adequate bearing capacity has been reached and that the bearing surfaces have been properly prepared including the removal of fractured bedrock by overblasting.

At the time of writing this report, only conceptual details of the proposed docking and piping facility were available.

We trust that this limited report that only cover the geotechnical aspects within the latter is sufficient for your present requirements. If you have any questions concerning this report or require additional geotechnical recommendations, please call us.

Report Signature Page

GOLDER ASSOCIATES LTD.

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Principal

MSTL/TJN/sr

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IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT (cont'd)

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. 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 professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

SPECIAL NOTE
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT

Golder Associates
Ottawa, Ontario

SCALE	1:25,000
DATE	14 July '08
DESIGN	J.E.M.
CADD	J.E.M.
CHECK	
REVIEW	

FILE No. 0811210099-01.dwg
PROJECT No. 08-1121-0099 REV. 0

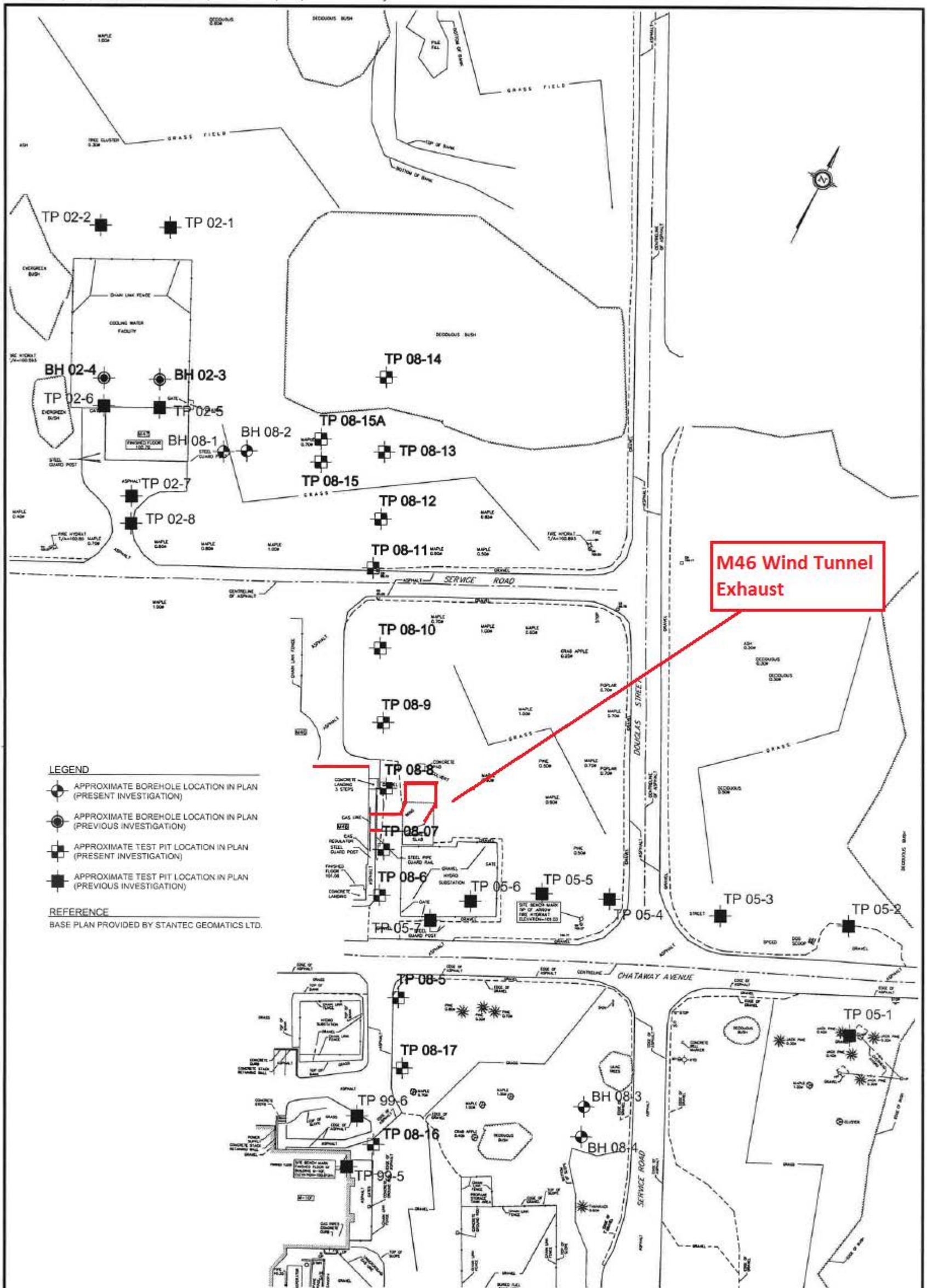
TITLE

KEY PLAN

GEOTECHNICAL INVESTIGATION - NRC CO, H_2 & N_2
DOCKING FACILITY, MONTREAL ROAD, OTTAWA, ONTARIO

FIGURE 1

FILENAME: N:\Active\2008\1121 - Geotechnical\08-1121-0099\ACAD\0811210099-01.dwg
Drawing file: 0811210099-01.dwg Jul 14, 2008 - 2:28pm



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SCALE	1:750
DATE	Jul. 14, 2008
DESIGN	M.ST-L
CAD	J.E.M.
CHECK	
REVIEW	

FILE No. 0811210099-02.dwg
PROJECT No. 08-1121-0099 REV.

TITLE

SITE PLAN

GEOTECHNICAL INVESTIGATION - NRC CO, H_2 & N_2 DOCKING FACILITY
MONTREAL ROAD, OTTAWA, ONTARIO

FIGURE 2

APPENDIX A

Abbreviations and Symbols
Record of Borehole and Test Pit Sheets

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open Sampler for a distance of 300 mm (12 in.)
DD- Diamond Drilling

Dynamic Penetration Resistance; N_d:
The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive Uncased a 50 mm (2 in.) diameter, 60^0 cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH:	Sampler advanced by hydraulic pressure
PM:	Sampler advanced by manual pressure
WH:	Sampler advanced by static weight of hammer
WR:	Sampler advanced by weight of sampler and rod

Peizo-Cone Penetration Test (CPT):
An electronic cone penetrometer with a 60^0 conical tip and a projected end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded Electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm Or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	$C_{u2}S_u$ Kpa	Psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	Over 200	Over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limited
w_l	liquid limit
C	consolidaiton (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, G_s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	modified Proctor compaction test
SPC	standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane test (LV-laboratory vane test)
γ	unit weight

Note:
1. Tests which are anisotropically consolidated prior shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	= 3.1416
ln x, natural logarithm of x	
$\log_{10}$ x or log x, logarithm of x to base 10	
g	Acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma'$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma''-u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1\sigma_2\sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1+\sigma_2+\sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma'=\gamma-\gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R= p_s/p_w$) formerly (G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is p. Unit weight symbol is γ where γ=pg(i.e. mass density x acceleration due to gravity)

(a) Index Properties (cont'd.)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity Index=(w_l-w_p)
w_s	shrinkage limit
I_L	liquidity index=($w-w_p$)/I_p
I_c	consistency index=(w_l-w)/I_p
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index-(e_{max}-e)/(e_{max}-e_{min}) (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	çompression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_a	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	Overconsolidation ratio=σ'_p/σ'_{vo}

(d) Shear Strength

$\tau_p\tau_r$	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction=tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength (ϕ=0 analysis)
p	mean total stress ($\sigma_1+\sigma_3$)/2
p'	mean effective stress ($\sigma'_1+\sigma'_3$)/2
q	($\sigma_1-\sigma_3$)/2 or ($\sigma'_1-\sigma_3$)/2
q_u	compressive strength ($\sigma_1-\sigma_3$)
S_t	sensitivity

Notes: 1. $\tau=c'\sigma'\tan\phi'$

2. Shear strength=(Compressive strength)/2

PROJECT: 08-1121-0099

RECORD OF BOREHOLE: BH 08-1

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: 4 July 2008

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		100.26									
0	Power Auger 200 mm Diam. (Hollow Stem)	Brown sand and gravel, some cobbles and boulders (FILL)		0.00									Native Backfill and Silica Sand
				99.44	1A	DO	31						
1		Grey brown SILTY SAND, some gravel		99.25		DO	50 31						
		Weathered Grey LIMESTONE BEDROCK		1.01									
2	Rotary Drill NQ Core				2	NQ RC	DD	TCR (%) 100; SCR (%) 83; RQD (%) 50					Bentonite Seal; Silica Sand; Slot Screen
				97.43									
3		End of Borehole		2.83									W.L. in screen at elev. 97.73 m on July 9, 2008
4													
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: J.D.

CHECKED: TyS

BOREHOLE 0811210099.GPJ HYDROGEO.GDT 14/7/08

PROJECT: 08-1121-0099

RECORD OF BOREHOLE: BH 08-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: July 3, 2008

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		100.26							
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL and GLACIAL TILL, with cobbles and boulders		0.00	1	GRAB	-				
					2	NQ RC	DD				
1				99.16	3	50 DO	30				
	Rotary Drill NQ Core	Weathered Grey LIMESTONE BEDROCK		1.10	4	NQ RC	DD	T.C.R. (%) 92; S.C.R. (%) 82; R.Q.D. (%) 77			
2					5	NQ RC	DD	T.C.R. (%) 88; S.C.R. (%) 67; R.Q.D. (%) 52			
				97.49							
		End of Borehole		2.77							
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: J.D.

CHECKED:

BOREHOLE 0811210099.GPJ HYDROGEO.GDT 7/22/08

PROJECT: 08-1121-0099

RECORD OF BOREHOLE: BH 08-3

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: July 3, 2008

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, Q - ●; rem V. ⊕, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		Ground Surface		99.67							
	Power Auger 200 mm Diam. (Hollow Stem)	Loose brown sand and gravel, some cobbles and boulders (FILL)		0.00							
				98.71	1	50 DO	13				
1		Compact grey brown SILTY SAND, some gravel, cobbles, boulders, trace clay (GLACIAL TILL)		0.90	1A	50 DO	13				Native Backfill and Silica Sand
				98.15							
	Rotary Drill NQ Core	Weathered grey LIMESTONE BEDROCK, some mud seams		1.52	2	50 DO	30				
2								TCR (%) 100	SCR (%) 98	RQD (%) 73	Bentonite Seal
					3	NQ RC	DD				Silica Sand
3											Slot Screen
				90.20							
		End of Borehole		3.47							
4											W.L. in screen at elev. 97.05 m on July 9, 2008
5											
6											
7											
8											
9											
10											

BOREHOLE 0811210099.GPJ HYDROGEO.GDT 7/22/08

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: J.D.

CHECKED:

PROJECT: 08-1121-0099

RECORD OF BOREHOLE: BH 08-4

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: 3 July 2008

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		99.44							
0	Power Auger 200 mm Diam. (Hollow Stem)	Loose brown sand and gravel, some cobbles and boulders (FILL)		0.00							
				98.59							
1		Compact grey brown SILTY SAND, some gravel, cobbles, boulders, trace clay (GLACIAL TILL)		0.85	1A 1	GRAB 50 DO	- 12				
					2	50 DO	60				
				97.49							
2	Rotary Drill NQ Core	Weathered grey LIMESTONE BEDROCK, some mud seams		1.95							
					3	NQ RC	DD	T.C.R. (%) 100 S.C.R. (%) 94 R.Q.D. (%) 71			
3				95.97							
		End of Borehole		3.47							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: J.D.

CHECKED:

BOREHOLE 0811210099.GPJ HYDROGEO.GDT 14/7/08

TABLE 1

RECORD OF TEST PITS

Test Pit Number	Depth (Metres)	Description
TP 08-5	0.00 – 0.30	FILL – Brown SAND, GRAVEL and TOPSOIL
(Elevation	0.30 – 1.55	Brown SANDY TILL
100.55 m)	1.55	End of test pit. Refusal on BEDROCK.
TP 08-6	0.00 – 0.20	FILL – Crushed Limestone
(Elevation	0.20 – 0.35	Light brown fine SAND
100.44 m)	0.35 – 1.52	Medium dense brown SANDY TILL
	1.52	End of test pit. Refusal on BEDROCK.
TP 08-7	0.00 – 0.20	FILL – Crushed LIMESTONE
(Elevation	0.20 – 1.30	FILL – Brown SAND, BOULDERS, GRAVEL, pieces of WOOD and BRICK
100.39 m)	1.30 – 1.90	Brown SANDY TILL
	1.90	End of test pit. Refusal on BEDROCK.
TP 08-8	0.00 – 0.25	FILL – Crushed LIMESTONE
(Elevation	0.25 – 0.80	FILL – Brown SAND, GRAVEL, and pieces of BRICK
100.31 m)	0.80 – 1.50	Brown SANDY TILL
	1.50	End of test pit. Refusal on BEDROCK.
TP 08-9	0.00 – 1.00	FILL – Black TOPSOIL, SAND, GRAVEL, and BRICK
(Elevation	1.00	End of test pit. Refusal on BEDROCK.
100.11 m)		
TP 08-10	0.00 – 0.30	Black TOPSOIL
(Elevation	0.30 – 0.70	Brown SANDY TILL
99.89 m)	0.70	End of test pit. Refusal on BEDROCK.
TP 08-11	0.00 – 0.60	FILL – SAND, GRAVEL and BRICK
(Elevation	0.60 – 1.00	WEATHERED BEDROCK
99.77 m)	1.00	End of test pit. Refusal on BEDROCK.

TABLE 1 (continued)

TP 08-12	0.00 – 0.30	Black TOPSOIL and pieces of WEATHERED ROCK
(Elevation	0.30 – 0.50	WEATHERED BEDROCK
100.06 m)	0.50	End of test pit. Refusal on BEDROCK.
TP 08-13	0.00 – 0.15	Black TOPSOIL
(Elevation	0.15 – 0.65	Brown SANDY TILL
100.21 m)	0.65 – 0.80	WEATHERED BEDROCK
	0.80	End of test pit. Refusal on BEDROCK.
TP 08-14	0.00 – 0.30	Black TOPSOIL
(Elevation	0.30 – 0.45	WEATHERED BEDROCK
100.53 m)	0.45	End of test pit. Refusal on BEDROCK.
TP 08-15	0.00 – 0.30	Black TOPSOIL
(Elevation	0.30 – 2.15	FILL – SAND, GRAVEL, pieces of CONCRETE, BRICK,
100.18 m)		TIRES
	2.15	End of test pit. Refusal on BEDROCK.
TP 08-15A	0.00 – 0.20	Black TOPSOIL
(Elevation	0.20 – 0.35	WEATHERED BEDROCK
100.18 m)	0.35	End of test pit. Refusal on BEDROCK.
TP 08-16	0.00 – 0.60	FILL – Crushed LIMESTONE
(Elev.	0.60 – 1.70	Light brown SANDY TILL
100.67 m)	1.70	End of test pit. Refusal on BEDROCK.
TP 08-17	0.00 – 0.30	FILL – Crushed LIMESTONE
(Elev.	0.30 – 0.80	Dark brown SAND and GRAVEL
100.77 m)	0.80 – 2.20	Light brown SANDY TILL
	2.20	End of test pit. Refusal on BEDROCK.

APPENDIX B

Boreholes and Test Pits from Previous Studies

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m)geodetic: Floor at	TEST PIT NO: 05-1
	building M-10 at door No. 11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 97.54 m

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL and ROOTS		
				97.24		97.0
				medium dense sandy TILL		
	no water seepage					
1.0				Bottom of test pit on possible rock 96.74		96.0
2.0						95.0
3.0						94.0
4.0						

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 0.8 m
REVIEWED BY: E.S.	COMPLETE: 05/09/02
Fig. No: 2	Page 1 of 1

05/09/20 08:02AM (STD-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m) geodetic: Floor at	TEST PIT NO: 05–2
	building M–10, at door No.11	PROJECT NO: E–8890
START DATE: 05/09/02		ELEVATION: 98.02 m

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			FILL – crushed limestone		98.0
				97.67 medium dense sandy TILL		
	no water seepage			Bottom of test pit on possible rock 97.42		
1.0						97.0
2.0						96.0
3.0						95.0
4.0						

McROSTIE GENEST ST–LOUIS Ottawa, Canada	LOGGED BY: JML	COMPLETION DEPTH: 0.6 m
	REVIEWED BY: E.S.	COMPLETE: 05/09/02
	Fig. No: 3	Page 1 of 1

05/09/20 08:02AM (STD-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m) geodetic; Floor of	TEST PIT NO: 05-3
	building M-10 at door No.11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 99.43 m

SAMPLE TYPE ■ REMOULDED ⧸ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▥ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL		
				99.23		99.0
				medium dense sandy TILL		
	no water seepage					
				Bottom of test pit on possible rock 98.63		
1.0						98.0
2.0						97.0
3.0						96.0
4.0						

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 0.8 m
REVIEWED BY: E.S.	COMPLETE: 05/09/02
Fig. No: 4	Page 1 of 1

05/09/20 08:02AM (STD-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m)geodetic: Floor of	TEST PIT NO: 05-4
	building M-10 at door No. 11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 100.34 m

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL		
				100.14		100.0
				medium dense sandy TILL		
1.0						99.0
	no water seepage			Bottom of test pit on possible rock 98.94		
2.0						98.0
3.0						97.0
4.0						

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 1.4 m
REVIEWED BY: E.S.	COMPLETE: 05/09/02
Fig. No: 5	Page 1 of 1

05/09/20 08:02AM (STD-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m)geodetic; Floor of	TEST PIT NO: 05-5
	building M-10 at door No.11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 100.41 m

SAMPLE TYPE ■ REMOULDED ⧸ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▥ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL		
				100.16		100.0
				medium dense sandy TILL		
1.0						
	no water seepage					
				Bottom of test pit on possible rock 99.06		99.0
2.0						
						98.0
3.0						
						97.0
4.0						

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 1.35 m
REVIEWED BY: E.S.	COMPLETE: 05/09/02
Fig. No: 6	Page 1 of 1

05/09/20 08:02AM (STO-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m) geodetic: Floor of	TEST PIT NO: 05-6
	building M-10 at door No.11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 100.31 m

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▥ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL		100.0
				100.01		
1.0				medium dense sandy TILL		99.0
	no water seepage					
2.0				Bottom of test pit on possible rock 98.51		98.0
3.0						97.0
4.0						

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 1.8 m
REVIEWED BY: E.S.	COMPLETE: 05/09/02
Fig. No: 7	Page 1 of 1

05/09/20 08:02AM (STD-SHTP)

NRC – NEW ELECTRICAL SUB-STATION	B.M.(ELEV 100.20m)geodetic; Floor of	TEST PIT NO: 05-7
	building M-10 at door No.11	PROJECT NO: E-8890
START DATE: 05/09/02		ELEVATION: 100.37 m

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(m)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(m)
0.0	sides stable			TOPSOIL		
				100.07		100.0
1.0				medium dense sandy TILL		99.0
	no water seepage					
				Bottom of test pit on possible rock 98.87		
2.0						98.0
3.0						97.0
4.0						

McROSTIE GENEST ST-LOUIS Ottawa, Canada	LOGGED BY: JML	COMPLETION DEPTH: 1.5 m
	REVIEWED BY: E.S.	COMPLETE: 05/09/02
	Fig. No: 8	Page 1 of 1

05/09/20 08:03AM (STD-SHTP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-1
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 327.61 ft

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(ft)
0.0	sides stable			TOPSOIL		327.0
				327.19 FILL pieces of broken rock in sand & gravel		
1.0						326.0
2.0				325.86 clayey SAND		325.0
3.0						324.0
4.0						323.0
5.0				medium dense sandy TILL 323.03		322.0
	no water seepage			Bottom of pit on probable rock 322.11		
6.0						321.0
7.0						320.0
8.0						319.0
9.0						318.0
10.0						317.0
11.0						316.0
12.0						

McROSTIE GENEST ST-LOUIS Ottawa, Canada	LOGGED BY: JML	COMPLETION DEPTH: 5.5 ft
	REVIEWED BY: E.S.	COMPLETE: 02/04/22
	Fig. No: 2	Page 1 of 1

02/04/30 11:12AM (ST-SHIMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-2
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 327.16 ft

SAMPLE TYPE: REMOULDED | SHELBY TUBE | SPLIT-SPOON | PROBING | NO RECOVERY | CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	VANE Cu (kPa) 80 160 240 320 / VANE Cu REMOULDED (kPa) 80 160 240 320 / PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(ft)
0.0	sides stable			TOPSOIL 326.83		327.0
1.0						326.0
2.0				FILL large pieces of broken rock up to 2.5'x2.5'x 1.0' in sand and gravel with pieces of tin and steel rebar		325.0
3.0						324.0
4.0	no water seepage			Bottom of pit on probable rock 323.16		323.0
5.0						322.0
6.0						321.0
7.0						320.0
8.0						319.0
9.0						318.0
10.0						317.0
11.0						316.0
12.0						315.0

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 4 ft
REVIEWED BY: E.S.	COMPLETE: 02/04/22
Fig. No: 3	Page 1 of 1

02/04/30 09:53AM (ST-SHIMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	BOREHOLE NO: 02-3
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/26		ELEVATION: 328.76 ft

SAMPLE TYPE: REMOULDED-AUGER | SHELBY TUBE | SPLIT-SPOON | NW-CASING | NO RECOVERY | NQ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	% CORE RECOVERY	SOIL / ROCK DESCRIPTION	ELEVATION(ft)
0.0					FILL topsoil, sand and gravel	328.0
1.0						
2.0	3/6" 12/2"		1		FILL 327.26 topsoil, sand, gravel and wood	327.0
3.0	split barrel refusal				326.09	326.0
4.0				85	LIMESTONE	325.0
5.0						324.0
6.0					323.34 LIMESTONE	323.0
7.0						322.0
8.0	WL			83	Water level April 29/02 elev 320.34'	321.0
9.0						320.0
10.0						319.0
11.0					318.34 LIMESTONE	318.0
12.0						317.0
13.0				98		316.0
14.0						315.0
15.0						314.0
16.0					313.34 LIMESTONE	313.0
17.0				100		312.0
18.0						311.0
19.0					Bottom of hole 310.34	310.0
20.0						309.0
21.0						308.0
22.0						307.0
23.0						306.0
24.0						305.0
25.0						304.0

VANE Cu (kPa) 80 160 240 320
▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320
PLASTIC M.C. LIQUID
20 40 60 80

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 18.42 ft
REVIEWED BY: E.S.	COMPLETE: 02/04/26
Fig. No: 4	Page 1 of 1

02/05/01 02:02PM (NQ-IMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	BOREHOLE NO: 02-4
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/26		ELEVATION: 328.41 ft

SAMPLE TYPE: REMOULDED-AUGER | SHELBY TUBE | SPLIT-SPOON | NW-CASING | NO RECOVERY | NQ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	% CORE RECOVERY	SOIL / ROCK DESCRIPTION	ELEVATION(ft)
0.0					TOPSOIL	328.0
1.0	6/6" 20/6"		1		topsoil, sand and gravel	327.0
2.0	split barrel refusal				FILL 327.41	326.0
3.0					topsoil, sand, gravel sandy TILL 326.41	325.0
4.0						324.0
5.0				100	LIMESTONE 324.16	323.0
6.0					323.16 LIMESTONE	322.0
7.0	WL					321.0
8.0				80	Water level April 29/02 elev 320.99'	320.0
9.0						319.0
10.0					318.16	318.0
11.0					LIMESTONE	317.0
12.0						316.0
13.0				100		315.0
14.0						314.0
15.0					313.16	313.0
16.0					LIMESTONE	312.0
17.0				100		311.0
18.0					Bottom of hole 310.33	310.0
19.0						309.0
20.0						308.0
21.0						307.0
22.0						306.0
23.0						305.0
24.0						304.0
25.0						

VANE Cu (kPa) 80 160 240 320
▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320
PLASTIC M.C. LIQUID
20 40 60 80

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 18.08 ft
REVIEWED BY: E.S.	COMPLETE: 02/04/26
Fig. No: 5	Page 1 of 1

02/05/01 01:43PM (NQ-IMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-5
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 328.93 ft

SAMPLE TYPE ■ REMOULDED ⧸ SHELBY TUBE ⊠ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(ft)
0.0	sides stable			FILL large pieces of broken rock up to (2.5'x2.5'x1.0') in sand and gravel		328.0
1.0						
2.0						327.0
3.0	no water seepage			medium dense sandy TILL 326.43		326.0
4.0				Bottom of pit on probable rock 325.76		325.0
5.0						324.0
6.0						323.0
7.0						322.0
8.0						321.0
9.0						320.0
10.0						319.0
11.0						318.0
12.0						317.0

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 3.25 ft
REVIEWED BY: E.S	COMPLETE: 02/04/22
Fig. No: 6	Page 1 of 1

02/04/30 11:12AM (ST-SHIMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-6
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 328.77 ft

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▥ NO RECOVERY ▮ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	ELEVATION(ft)
0.0	sides stable			TOPSOIL	
				328.19	328.0
1.0				FILL rock blocks in sand and gravel	
				326.77	327.0
2.0				medium dense sandy TILL	
3.0	no water seepage			Bottom of pit on 325.77 probable rock	326.0
4.0					325.0
5.0					324.0
6.0					323.0
7.0					322.0
8.0					321.0
9.0					320.0
10.0					319.0
11.0					318.0
12.0					317.0

■ VANE Cu (kPa) ■ 80 160 240 320
▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320
PLASTIC M.C. LIQUID 20 40 60 80

McROSTIE GENEST ST-LOUIS Ottawa, Canada	LOGGED BY: JML	COMPLETION DEPTH: 3 ft
	REVIEWED BY: E.S.	COMPLETE: 02/04/22
	Fig. No: 7	Page 1 of 1

02/04/30 09:53AM (ST-SHIMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-7
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 328.36 ft

SAMPLE TYPE ■ REMOULDED ⁄ SHELBY TUBE ☒ SPLIT-SPOON ▤ PROBING ▯▯ NO RECOVERY ▮ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(ft)
0.0	sides stable			FILL topsoil with a trace of brick		328.0
1.0				327.69 FILL large pieces of broken rock up to (2.5'x2.5'x1.0') in sand and gravel with traces of concrete and metal		327.0
2.0						326.0
3.0						325.0
4.0						324.0
5.0						323.0
6.0	no water seepage			Bottom of pit on probable rock 322.36		322.0
7.0						321.0
8.0						320.0
9.0						319.0
10.0						318.0
11.0						317.0
12.0						316.0

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 6 ft
REVIEWED BY: E.S.	COMPLETE: 02/04/22
Fig. No: 8	Page 1 of 1

02/04/30 09:53AM (ST-SHIMP)

MONTREAL RD. NRC M-10 & COOLING TOWER	B.M.(ELEV 328.75FT.)geodetic: Floor of	TEST PIT NO: 02-8
NATIONAL RESEARCH COUNCIL CANADA	bldg. M-10 at door No. 11	PROJECT NO: E-8230
START DATE: 02/04/22		ELEVATION: 328.08 ft

SAMPLE TYPE ■ REMOULDED ▨ SHELBY TUBE ▩ SPLIT-SPOON ▤ PROBING ▯ NO RECOVERY ▮ CORE

DEPTH(ft)	SMALL PEN. SPT (kPa) (N)	SAMPLE TYPE	SAMPLE NO	SOIL DESCRIPTION	■ VANE Cu (kPa) ■ 80 160 240 320 ▲ VANE Cu REMOULDED (kPa) ▲ 80 160 240 320 PLASTIC M.C. LIQUID 20 40 60 80	ELEVATION(ft)
0.0	sides stable			TOPSOIL		328.0
				327.41		
1.0				FILL large pieces of broken rock up to (2.5'x2.5'x1.0') in sandy soil and traces of brick		327.0
2.0						326.0
3.0				medium dense sandy TILL 325.08		325.0
4.0	no water seepage			Bottom of pit on probable rock 324.08		324.0
5.0						323.0
6.0						322.0
7.0						321.0
8.0						320.0
9.0						319.0
10.0						318.0
11.0						317.0
12.0						316.0

McROSTIE GENEST ST-LOUIS
Ottawa, Canada

LOGGED BY: JML	COMPLETION DEPTH: 4 ft
REVIEWED BY: E.S.	COMPLETE: 02/04/22
Fig. No: 9	Page 1 of 1

02/04/30 09:54AM (ST-SHIMP)

McROSTIE GENEST ST-LOUIS & Associates Ltd. Consulting Engineers OTTAWA, CANADA	TEST PIT RECORD	Test Pit No. 99-6
	Date :	JUNE 11, 1999

N.R.C. BLDG. M-10 ADDITION
MONTREAL ROAD

ELEV. 329.23	DEPTH in feet	DESCRIPTION	REMARKS
		TOPSOIL	sides stable
328.41	0.82		
328.23	-- 1 --	BOULDERS up to 1.6' O in dense sandy TILL	
327.23	-- 2 --		
326.23	-- 3 --		
325.62	3.61	Bottom of pit on probable rock	no water seepage

Plate No.
8

McROSTIE GENEST ST-LOUIS & Associates Ltd. Consulting Engineers OTTAWA, CANADA	TEST PIT RECORD	Test Pit No. 99-5
	Date :	JUNE 11, 1999

N.R.C. BLDG. M-10 ADDITION
MONTREAL ROAD

ELEV. 328.54	DEPTH in feet	DESCRIPTION	REMARKS
			sides stable
		FILL crushed limestone	
327.54	-- 1 --		
327.23	1.31		
		dense sandy TILL	
326.54	-- 2 --		
325.54	-- 3 --		
325.26	3.28		no water seepage
		Bottom of pit on probable rock	

Plate No.
7

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 be 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 Nothwithstanding 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 that 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.

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 or 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 "superintendant" 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 ths 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 o 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 proved 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 GC303.3 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, ar 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 wiring 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 that

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 n 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

IC 1 Proof of Insurance
IC 2 Risk Management
IC 3 Payment of Deductible
IC 4 Insurance Coverage

GENERAL INSUANCE COVERAGES

GCI 1 Insured
GIC 2 Period of Insurance
GIC 3 Proof of Insurance
GIC 4 Notification

COMMERCIAL GENERAL LIABILITY

CGL 1 Scope of Policy
CGL 2 Coverages/Provisions
CGL 3 Additional Exposures
CGL 4 Insurance Proceeds
CGL 5 Deductible

BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS

BR 1 Scope of Policy
BR 2 Property Insured
BR 3 Insurance Proceeds
BR 4 Amount of Insurance
BR 5 Deductible
BR 6 Subrogation
BR 7 Exclusion Qualifications

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 Contactor.

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 INSUANCE 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

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 CS2.12 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 a t 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.

Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat	
Security Classification / Classification de sécurité	UNCLAS

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
National Research Council	ASPM/SAGI

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

M46 PWT, NOISE BARRIER WALLS

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 ☒	**NATO / OTAN** ☐	**Foreign / Étranger** ☐
7. b) Release restrictions / Restrictions relatives à la diffusion		
No release restrictions / Aucune restriction relative à la diffusion ☒	All NATO countries / Tous les pays de l'OTAN ☐	No release restrictions / Aucune restriction relative à la diffusion ☐
Not releasable / À ne pas diffuser ☐		
Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays : ☐	Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays : ☐	Restricted to: / Limité à : Specify country(ies): / Préciser le(s) pays : ☐
7. c) Level of information / Niveau d'information		
PROTECTED A / PROTÉGÉ A ☐	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ ☐	PROTECTED A / PROTÉGÉ A ☐
PROTECTED B / PROTÉGÉ B ☐	NATO RESTRICTED / NATO DIFFUSION RESTREINTE ☐	PROTECTED B / PROTÉGÉ B ☐
PROTECTED C / PROTÉGÉ C ☐	NATO CONFIDENTIAL / NATO CONFIDENTIEL ☐	PROTECTED C / PROTÉGÉ C ☐
CONFIDENTIAL / CONFIDENTIEL ☐	NATO SECRET / NATO SECRET ☐	CONFIDENTIAL / CONFIDENTIEL ☐
SECRET / SECRET ☐	COSMIC TOP SECRET / COSMIC TRÈS SECRET ☐	SECRET / SECRET ☐
TOP SECRET / TRÈS SECRET ☐		TOP SECRET / TRÈS SECRET ☐
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐

Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat	
Security Classification / Classification de sécurité	UNCLAS

PART A *(continued)* / PARTIE A *(suite)*

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets? — ☒ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?
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? — ☒ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

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

☒ RELIABILITY STATUS / COTE DE FIABILITÉ	☐ CONFIDENTIAL / CONFIDENTIEL	☐ SECRET / SECRET	☐ TOP SECRET / TRÈS SECRET
☐ TOP SECRET– SIGINT / TRÈS SECRET – SIGINT	☐ NATO CONFIDENTIAL / NATO CONFIDENTIEL	☐ NATO SECRET / NATO SECRET	☐ COSMIC TOP SECRET / COSMIC TRÈS SECRET
☐ SITE ACCESS / ACCÈS AUX EMPLACEMENTS			

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? — ☒ No / Non ☐ Yes / Oui
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?
If Yes, will unscreened personnel be escorted? — ☒ No / Non ☐ Yes / Oui
Dans l'affirmative, le personnel en question sera-t-il escorté?

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? — ☒ No / Non ☐ Yes / Oui
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

11. b) Will the supplier be required to safeguard COMSEC information or assets? — ☒ No / Non ☐ Yes / Oui
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

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? — ☒ No / Non ☐ Yes / Oui
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

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? — ☒ No / Non ☐ Yes / Oui
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?

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency? — ☒ No / Non ☐ Yes / Oui
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?

Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat	
Security Classification / Classification de sécurité	UNCLAS

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 A	PROTECTED / PROTÉGÉ B	PROTECTED / PROTÉGÉ C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRES SECRET
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?
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

☒ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifier 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?
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

☒ No / Non ☐ Yes / 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, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat	
Security Classification / Classification de sécurité	UNCLAS

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	
Denis Labelle	***Construction Project Manager***		
Telephone No. - N° de téléphone	**Facsimile No. - N° de télécopieur**	**E-mail address - Adresse courriel**	**Date**
613-993-4923		denis.labelle@nrc-cnrc.gc.ca	September 11, 2015

14. Organization Security Authority / Responsable de la sécurité de l'organisme

Name (print) - Nom (en lettres moulées)	Title – Titre	Signature	
CHARLOTTE CARRIER	**Group Leader, Security Operations**		
Telephone No. - N° de téléphone	**Facsimile No. - N° de télécopieur**	**E-mail address - Adresse courriel**	**Date**
(613) 993-8956	(613) 990-0946	**Charlotte.carrier@nrc-cnrc.gc.ca**	September 11, 2015

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?
☒ No / Non ☐ Yes / Oui

16. Procurement Officer / Agent d'approvisionnement

Name (print) - Nom (en lettres moulées)	Title – Titre	Signature	
Marc Bédard	***Senior Contracting Officer***		
Telephone No. - N° de téléphone	**Facsimile No. - N° de télécopieur**	**E-mail address - Adresse courriel**	**Date**
(613) 993-2274		marc.bedard@nrc-cnrc.gc.ca	21/9/15

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**