| | |
|---|---|
| **NCC Tender File #** | NG319 |
| **Project Description** | HVAC System Upgrades – Boilers Replacement |
| **Site Visit** | **A NON MANDATORY site visit will be held on Thursday July 2, 2015 at 10 am Ottawa Time.** The meeting place will be at 541 Acacia Ave., Ottawa, ON.<br><br>All costs incurred by the Bidder to attend the site visit will be at their expense. The NCC will not reimburse any Bidder for expenses related to the site visit.<br><br>To confirm your attendance at the site visit and to gain access to the grounds, please communicate with NCC Corporate Security at **613-239-5222 or** securityscreening@ncc-ccn.ca at least 24 hours prior to the site visit. |
| **Closing date and time** | Thursday July 9, 2015 at 3:00 p.m. Ottawa time |

# INVITATION TO TENDER & ACCEPTANCE FORM

| | | |
|---|---|---|
| **RETURN TENDERS TO:** | National Capital Commission<br>40 Elgin Street, 3rd Floor, Service Centre<br>Ottawa, ON K1P 1C7 | **NCC Tender Number**<br>**NG319** |
| **TENDER CLOSING DATE AND TIME:** | Thursday July 9, 2015<br>at 3:00 p.m., Ottawa time | **NCC Contract Number** |

**DESCRIPTION OF WORK:** HVAC System Upgrades – Boilers Replacement

## 1. BUSINESS NAME AND ADDRESS OF BIDDER

**Name:** _____

**Address:** _____

_____

**Telephone number:** _____ **Fax number:** _____

**E-mail address:** _____

## 2. THE OFFER

The Bidder offers to the National Capital Commission (NCC) to perform and complete the work for the above mentioned project in accordance with the tender documents for the total tender amount (to be expressed in numbers only) of:

| | | |
|---|---|---|
| Lump sum price for all Mechanical Work | $ | _____ |
| Lump sum price for all Electrical Work | $ | _____ |
| Lump sum price for all Miscellaneous Work | $ | _____ |
| **Sub Total** | $ | _____ |
| OHST – 13% | $ | _____ |
| **TOTAL** | **$** | _____ |

## 3. TENDER VALIDITY PERIOD

The TENDER shall not be withdrawn for a period of 60 days following the date and time of tender closing.

## 4. CONTRACT DOCUMENTS

1. The following are the contract documents:
   - (a) Invitation to Tender & Acceptance Form when signed by the NCC;
   - (b) Duly completed Invitation to Tender & Acceptance Form and any Appendices attached thereto;
   - (c) Drawings and Specifications;
   - (d) General Conditions (GC1 to GC10);
   - (e) Supplementary Conditions, if any;
   - (f) Insurance Terms;
   - (g) Occupational Health and Safety Requirements;
   - (h) Addenda
   - (i) Any amendments issued or any allowable tender revision received before the date and time set for tender closing;
   - (j) Any amendment incorporated by mutual agreement between the NCC and the Contractor before acceptance of the tender; and
   - (k) Any amendment or variation of the contract documents that is made in accordance with the General Conditions;
   - (l) Security Requirements.

2. The language of the contract documents shall be the language of the Invitation to Tender & Acceptance Form submitted.

| NCC Tender Number NG319 | NCC Contract Number |
|---|---|

**5. APPENDICES**

The tender includes Appendix(ces) Nos I and II to the Invitation to Tender & Acceptance Form.

**6. ACCEPTANCE AND CONTRACT**

Upon acceptance of the Contractor's offer by the NCC, a binding Contract shall be formed between the NCC and the Contractor. The documents forming the Contract shall be the contract documents referred to in 4 – CONTRACT DOCUMENTS.

**7. CONSTRUCTION TIME**

The Contractor shall perform and complete the Work within 9 weeks from the date of notification of acceptance of the offer.

**8. TENDER SECURITY**

1. The Bidders shall enclose tender security with its tender in accordance with GI08 TENDER SECURITY REQUIREMENTS.

2. If the security furnished does not comply fully with the requirements referred to in paragraph 1) herein, the tender shall be disqualified.

3. If a security deposit is furnished as tender security, it shall be forfeited in the event that the tender is accepted by the NCC and the Contractor fails to provide Contract Security in accordance with GC9 CONTRACT SECURITY, provided that the NCC may, if it is in the public interest, waive the forfeiture of the security deposit.

**9.** The basis of award is low total cost to the NCC including all taxes.

**10.** I/We acknowledge receipt of the following addenda and have included for the requirement of it/them in my/our tendered price: _____ (Bidder to ender number of addenda issued, if any).

We hereby offer to supply to the NCC in accordance with the terms and conditions set out herein, the construction work listed above and on any attached sheets at the submitted price(s).

| Name and title of person authorized to sign on behalf of Bidder (please print or type) | Signature | Date |
|---|---|---|

Your tender is accepted to supply to the NCC, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the construction services listed herein and on any attached sheets at the price(s) set out therefore.

| Name and title of the person authorized to sign on behalf of the NCC (please print or type) | Signature | Date |
|---|---|---|

| NCC Tender Number NG319 | NCC Contract Number |
|---|---|

**INVOICING**

Send the original invoice and 1 copy to:

**Accounts Payable**
**National Capital Commission**
**202-40 Elgin Street**
**Ottawa, ON K1P 1C7**

Or by email at the following address: **payables@ncc-ccn.ca**

To ensure prompt payment, please prepare your invoice in accordance with the prices quoted. Errors in invoicing can cause delay of payment. Submit your invoice to the address shown above and clearly indicate the Purchase Order number.

| **INVITATION TO TENDER & ACCEPTANCE FORM** | **APPENDIX 1** |
|---|---|

1) The Bidder will subcontract the parts of the work listed below to the subcontractor named for each part. The Bidder agrees not to make changes in the list of subcontractors without the written consent of the NCC Representative. The Bidder understands that for each part of the work identified as Mandatory, if more than one subcontractor is named or no subcontractor is named, or, the Bidder fails to state that the work will be done by its own forces where applicable, the tender will be disqualified.

2) The Bidder certifies that tenders for the part(s) of the Work listed below were received from the following subcontractors:

**NON-MANDATORY REQUIREMENT:**

(a) Any other work not listed below

Type of Work: _____ Sub-contractor: _____

Type of Work: _____ Sub-contractor: _____

Type of Work: _____ Sub-contractor: _____

Type of Work: _____ Sub-contractor: _____

Type of Work: _____ Sub-contractor: _____

Type of Work: _____ Sub-contractor: _____

~~**MANDATORY REQUIREMENT:** The subcontractors performing the work listed below must be identified. Failure to disclose the name of the sub-contractor for any work identified will result in the disqualification of your tender.~~

~~(a) **n/a**~~

~~Sub-contractor: _____~~

~~Address: _____~~

~~(b) **n/a**~~

~~Sub-contractor: _____~~

~~Address: _____~~

~~(c) **n/a**~~

~~Sub-contractor: _____~~

~~Address: _____~~

~~**(d) n/a**~~

~~Sub-contractor: _____~~

~~Address: _____~~

NCC CCN Canada

**APPENDIX II / APPENDICE II**
**PROTECTED "A" when completed**
**PROTÉGÉ « A » lorsque rempli**

☐ New supplier / Nouveau fournisseur ☐ Update / Mise à jour

Supplier No. / N° du fournisseur

For NCC use only / À l'usage de la CCN seulement

## SUPPLIER–DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM
## FOURNISSEUR–FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT

### PART 'A' – IDENTIFICATION / PARTIE 'A' - IDENTIFICATION

| Legal name of entity or individual / Nom légal de l'entité ou du particulier | Operating name of entity or individual (if different from Legal Name) / Nom commercial de l'entité ou du particulier (s'il diffère du nom légal) |
|---|---|
| | |

| | | |
|---|---|---|
| **Former Public Servant in receipt of a PSSA Pension / Ancien fonctionnaire qui reçoit une pension en vertu de la LPFP** | ☐ **Yes / Oui** | ☐ **No / Non** |
| **An entity, incorporated or sole proprietorship, which was created by a Former Public Servant in receipt of a PSSA pension or a partnership made of former public servants in receipt of PSSA pension or where the affected individual has a controlling or major interest in the entity. / Une entité, constituée en société ou à propriétaire unique, créée par un ancien fonctionnaire touchant une pension en vertu de la LPFP, ou un partenariat formé d'anciens fonctionnaires touchant une pension en vertu de la LPFP, où les entités dans lesquelles ils détiennent le contrôle ou un intérêt majoritaire.** | ☐ **Yes / Oui** | ☐ **No / Non** |

| Address / Adresse | Telephone No. / N° de téléphone : | Fax No. / N° de télécopieur : |
|---|---|---|
| _____<br>_____<br>_____<br>Postal code / Code postal | ( ) | ( ) |

### PART 'B' – STATUS OF SUPPLIER / PARTIE 'B' – STATUT DU FOURNISSEUR

(1) Sole proprietor / Propriétaire unique ☐ — If sole proprietor, provide: / Si propriétaire unique, indiquez : Last Name / Nom de famille _____ First name / Prénom _____ Initial / Initiale _____

| (2) Partnership / Société de personnes ☐ | SIN – mandatory for (1) & (2)<br>NAS – obligatoire pour (1) & (2) | Corporation /Société ☐ | Business No. (BN) / N° de l'entreprise (NE) |
|---|---|---|---|
| | | | |

| GST/HST / TPS et TVH | QST / TVQ (Québec) |
|---|---|
| Number / Numéro : _____<br>Not registered / non inscrit ☐ | Number / Numéro : _____<br>Not registered / non inscrit ☐ |

Type of contract / Genre de contrat

Contract for services only / Contrat de services seulement ☐ — Contract for mixed goods & services / Contrat de biens et services ☐ — Contract for goods only /Contrat de biens seulement ☐

Type of goods and/or services offered / Genre de biens et/ou services rendus :

### PART 'C' – FINANCIAL INSTITUTION / PARTIE 'C' – RENSEIGNEMENTS SUR L'INSTITUTION FINANCIÈRE

**Please send a void cheque with this form / Veuillez, s.v.p., envoyer un spécimen de chèque avec ce formulaire**

Branch Number / N° de la succursale _____ Institution No. / N° de l'institution : _____ Account No. / N° de compte : _____

Institution name / Nom de l'institution : _____ Address / Adresse : _____

Postal Code / Code postal : _____

### PART 'D' – DIRECT DEPOSIT PAYMENT NOTIFICATION / PARTIE 'D' – AVIS DE PAIEMENT PAR DÉPÔT DIRECT

E-mail address / Adresse courriel :

### PART 'E' – CERTIFICATION / PARTIE 'E' – CERTIFICATION

I certify that I have examined the information provided above and it is correct and complete, and fully discloses the identification of this supplier.

Where the supplier identified on this form completes part C, he hereby requests and authorizes the National Capital Commission to directly deposit into the bank account identified in part C, all amounts payable to the supplier.

Je déclare avoir examiné les renseignements susmentionnés et j'atteste qu'ils sont exacts et constituent une description complète, claire et véridique de l'identité de ce fournisseur.

Lorsque le fournisseur indiqué sur ce formulaire remplit la partie C, par la présente, il demande et autorise la Commission de la capitale nationale à déposer directement dans le compte bancaire indiqué à la partie C, tous les montants qui lui sont dus.

| Name of authorized person / Nom de la personne autorisée | Title / Titre | Signature | Date |
|---|---|---|---|
| | | | |

Telephone number of contact person / Numéro de téléphone de la personne ressource : ( )

### IMPORTANT

**Please fill in and return to the National Capital Commission with one of <u>your business cheque unsigned and marked « VOID</u> » (for verification purposes).**

Mail or fax to: Procurement Assistant, Procurement Services
National Capital Commission
202-40 Elgin Street
Ottawa, ON K1P 1C7 Fax: (613) 239-5007

**Veuillez remplir ce formulaire et le retourner à la Commission de la capitale nationale avec <u>un spécimen de chèque de votre entreprise non signé et portant la mention « ANNULÉ »</u> (à des fins de vérification).**

Poster ou télécopier à : Assistant à l'approvisionnement
Services de l'approvisionnement
Commission de la capitale nationale
40, rue Elgin, pièce 202
Ottawa (Ontario) K1P 1C7 Télécopieur : (613) 239-5007

**SUPPLIER – DIRECT DEPOSIT PAYMENT AND TAX INFORMATION FORM**

**FOURNISSEUR – FORMULAIRE DE PAIEMENT PAR DÉPÔT DIRECT ET RENSEIGNEMENTS AUX FINS DE L'IMPÔT**

## Supplier Tax Information

Pursuant to paragraph 221(1) (d) of the *Income Tax Act*, NCC must declare form T-1204, contractual payments of government for services, all payments made to suppliers during the calendar year in accordance to related service contracts (including contracts for mixed goods and services).

The paragraph 237(1) of the *Income Tax Act* and the article 235 of the Income Tax Regulations require the supplier to provide all necessary information below to the organization who prepares the fiscal information forms.

Questions: Sylvie Monette, Accounts Payable and Receivable Officer – (613) 239-5678 ext. 5156 or sylvie.monette@ncc-ccn.ca

## Direct deposit payment information

All amounts payable by NCC to the supplier will be deposited directly into the account you identified in part C. A NCC payment advice notice will also be sent to you by e-mail detailing the particularities of the payment to the address identified in part D.

Until we process your completed form, we will still pay you by check.

You must notify the NCC of any changes to your financial institution, branch or account number. You will then have to complete a new form.

The account you identified has to hold Canadian funds at a financial institution in Canada.

## The advantages of direct deposit payment

Direct deposit payment is a convenient, dependable, safe and timesaving way to receive your invoice payment. Direct deposit payment is completely confidential.

There are fewer risks of direct deposit payment being lost, stolen, or damaged as may happen with cheques.

Funds made by direct deposit payment will be available in your bank account on the same day that we would have mailed your cheque.

## Renseignements sur les fournisseurs aux fins de l'impôt

En vertu de l'alinéa 221(1) (d) de la *Loi de l'impôt sur le revenu*, la CCN est tenu de déclarer, à l'aide du formulaire T-1204, Paiements contractuels de services du gouvernement, tous paiements versés aux fournisseurs pendant une année civile en vertu de marchés de services pertinents (y compris les marchés composés à la fois de biens et de services).

Le paragraphe 237 (1) de la *Loi de l'impôt sur le revenu* et l'article 235 du Règlement de l'impôt sur le revenu obligent les fournisseurs à fournir toutes les informations demandées ci-dessous à l'organisme qui prépare les formulaires de renseignements fiscaux.

Questions : Sylvie Monette, Agent aux comptes fournisseurs et comptes clients – (613) 239-5678 poste 5156 ou sylvie.monette@ncc-ccn.ca

## Renseignements sur le paiement par dépôt direct

Tous les montants versés par la CCN au fournisseur seront déposés directement dans le compte identifié à la partie C. Un avis de paiement de la CCN détaillant les particularités du paiement par dépôt direct vous sera envoyé par courriel à l'adresse courriel identifiée à la partie D.

Nous continuerons à vous payer par chèque jusqu'à ce que nous ayons traité votre formulaire.

Vous devez aviser la CCN de tout changement d'institution financière, de succursale ou de numéro de compte. Vous devrez donc remplir un nouveau formulaire.

Le compte que vous désignez doit être un compte en monnaie canadienne, détenu dans une institution financière au Canada.

## Avantages du paiement par dépôt direct

Le paiement par dépôt direct est une méthode pratique, fiable et sécuritaire, qui permet de gagner du temps dans la réception de vos paiements de factures. Le paiement par dépôt direct est entièrement confidentiel.

Avec les paiements par dépôt direct, il y a moins de risques de perte, de vol ou de dommage, comme cela peut se produire dans le cas des chèques.

Les paiements effectués par paiement par dépôt direct sont versés dans votre compte le jour même où nous aurions posté votre chèque.

Revised July 2014 / Révisé juillet 2014

# SPECIAL INSTRUCTIONS TO BIDDERS



## SI01 TENDER DOCUMENTS

1) The following are the tender documents:

   (a) Invitation to Tender & Acceptance Form and any Appendices attached thereto;

   (b) Special Instructions to Bidders; and

   (c) General Instructions to Bidders.

   Submission of a tender constitutes acknowledgement that the Bidder has read and agrees to be bound by these documents.

## SI02 ENQUIRIES DURING THE SOLICITATION PERIOD

1) Enquiries regarding this tender must be submitted in writing to the following: Sr. Contract Officer, Nicole Galipeau, telephone number - 613-239-5678 ext. 5191, facsimile number - 613-239-5007 or e-mail address – nicole.galipeau@ncc-ccn.ca as early as possible within the solicitation period. Except for the approval of alternative materials as described in GI15 of the General Instructions to Bidders, enquiries should be received no later than five (5) calendar days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may result in an answer not being provided.

2) To ensure consistency and quality of the information provided to Bidders, the Sr. Contract Officer shall examine the content of the enquiry and shall decide whether or not to issue an amendment.

3) All enquiries and other communications related to this tender sent throughout the solicitation period are to be directed ONLY to the Sr. Contract Officer named above. Non-compliance with this requirement during the solicitation period can, for that reason alone, result in disqualification of a tender.

## SI03 NON MANDATORY SITE VISIT

1) A NON MANDATORY site visit will be held on Thursday July 2, 2015 at 10 am Ottawa Time. The meeting place will be at 541 Acacia Ave., Ottawa, ON. All costs incurred by the Bidder to attend the site visit will be at their expense. The NCC will not reimburse any Bidder for expenses related to the site visit.

   To confirm your attendance at the site visit and to gain access to the grounds, please communicate with NCC Corporate Security at **613-239-5222 or** securityscreening@ncc-ccn.ca at least 24 hours prior to the site visit.

## SI04 REVISION OF TENDER

1) A tender may be revised by letter or facsimile in accordance with GI10 of the General Instructions to Bidders. The facsimile number for receipt of revisions is 613-239-5012.

## SI05 TENDER RESULTS

1) Following solicitation closing, tender results may be obtained by calling the Sr. Contract Officer, Nicole Galipeau, telephone number 613-239-5678 ext. 5191, facsimile number 613-239-5007 or e-mail address nicole.galipeau@ncc-ccn.ca .

## SI06 NEGOTIATIONS

1) In the event that the lowest compliant tender exceeds the amount of funding the NCC has allocated for the construction phase of the work:

   (a) by 15% or less, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and negotiate, with the Bidder submitting the lowest compliant tender, a corresponding reduction in its tender price.

   (b) by more than 15%, the NCC, at its sole discretion, shall either:

      (i) cancel the invitation to tender; or

      (ii) obtain additional funding and, subject to the provisions of GI11 and GI09 of the General Instructions to Bidders, award the Contract to the Bidder submitting the lowest compliant tender; or

      (iii) revise the scope of the work accordingly and invite those who submitted compliant tenders at the original invitation to tender to re-tender the work.

2) If negotiations or a re-tender are undertaken as is contemplated in subparagraphs 1)(a)(iii) or 1)(b)(iii) above, Bidders shall retain the same subcontractors and suppliers as they carried in their original tenders.

3) If the NCC elects to negotiate a reduction in the tender price as is contemplated in subparagraph 1)(a)(iii) herein and the negotiations fail to reach an agreement, the NCC shall then exercise either of the options referred to subparagraphs 1)(a)(i) or 1)(a)(ii).

## SI07 TENDER VALIDITY PERIOD

1) The NCC reserves the right to seek an extension to the tender validity period prescribed in 3 of the Invitation to Tender & Acceptance Form. Upon notification in writing from the NCC, Bidders shall have the option to either accept or reject the proposed extension.

2) If the extension referred to in paragraph 1) of SI07 is accepted, in writing, by all those who submitted tenders, then the NCC shall continue immediately with the evaluation of the tenders and its approvals processes.

3) If the extension referred to in paragraph 1) of SI07 is not accepted in writing by all those who submitted tenders then the NCC shall, at its sole discretion, either:

(a) continue to evaluate the tenders of those who have accepted the proposed extension and seek the necessary approvals; or

(b) cancel the invitation to tender.

4) The provisions expressed herein do not in any manner limit the NCC's rights in law or under GI11 of the General Instructions to Bidders.

**SI08 CONSTRUCTION DOCUMENTS**

1) The successful contractor will be provided with one paper copy of the sealed and signed plans, the specifications and the amendments upon acceptance of the offer. Additional copies, may be available free of charge upon request by the contractor. If not, obtaining more copies shall be the responsibility of the contractor including costs.

**SI09 PUBLIC TENDER OPENING**

1) A public tender opening will be held on Thursday July 9, 2015 shortly after 3:00pm Ottawa time at 40 Elgin Street, Ottawa, Ontario in Room 306.

## GI01 Completion of Tender

1) The tender shall be:

   (a) submitted on the Invitation to Tender and Acceptance Form provided through the Government Electronic Tendering Service (GETS) or on a clear and legible reproduced copy of such Invitation to Tender and Acceptance Form that must be identical in content and format to the Invitation to Tender and Acceptance Form provided through GETS;

   (b) based on the Tender Documents listed in the Special Instructions to Bidders;

   (c) correctly completed in all respects;

   (d) signed by a duly authorized representative of the Bidder; and

   (e) accompanied by

      (i) tender security as specified in GI08; and

      (ii) any other document or documents specified elsewhere in the solicitation where it is stipulated that said documents are to accompany the tender.

2) Subject to paragraph 6) of GI11, any alteration to the pre-printed or pre-typed sections of the Invitation to Tender and Acceptance Form, or any condition or qualification placed upon the tender shall be cause for disqualification. Alterations, corrections, changes or erasures made to statements or figures entered on the Invitation to Tender and Acceptance Form by the Bidder shall be initialled by the person or persons signing the tender. Initials shall be original(s). Alterations, corrections, changes or erasures that are not initialled shall be deemed void and without effect.

3) Unless otherwise noted elsewhere in the Tender Documents, facsimile copies of tenders are not acceptable.

## GI02 Identity or Legal Capacity of the Bidder

1) In order to confirm the authority of the person or persons signing the tender or to establish the legal capacity under which the Bidder proposes to enter into Contract, any Bidder who carries on business in other than its own personal name shall, if requested by the NCC prior to award of contract, provide satisfactory proof of:

(a) such signing authority; and

(b) the legal capacity under which it carries on business.

Proof of signing authority may be in the form of a certified copy of a resolution naming the signatory(ies) that is (are) authorized to sign this tender on behalf of the corporation or partnership. Proof of legal capacity may be in the form of a copy of the articles of incorporation or the registration of the business name of a sole proprietor or partnership.

**GI03 Goods and Services Tax / Harmonized Sales Tax**

1) The National Capital Commission (NCC) is a Crown Corporation subject to the Goods and Services Tax (GST), the Ontario Provincial Sales Tax (OST) and the Quebec Sales Tax (QST). The rates quoted are exclusive of the GST and the OST/QST. The successful firm will be required to indicate separately, on all invoices or requests for payments, the amount of Goods and Services Sales Tax (GST), the amount of Ontario Sales Tax (OST) and the amount of Quebec Sales Tax (QST), to the extent applicable, that the Commission must pay. These amounts will be paid to the successful Bidder who is required to make the appropriate remittances to Revenue Canada and the respective provincial governments.

Pursuant to paragraph 221 (1)(d) of the Income Tax Act, payments made by Crown Corporations under applicable service contracts (including contracts involving a mix of goods and services) must be reported on a "T1204" slip. To comply with this requirement, the Bidder is required to provide the following information on the "Supplier – Direct Payment and Tax Information Form" (see Appendix 11).

By signing this form, the Bidder/Proponent certifies that he/she has examined the information provided on the form and that it is correct, complete, and fully discloses the identification of the Contractor.

This "Supplier – Direct Payment and Tax Information Form" must be completed and returned to the Commission prior to any contract being awarded to your firm (see Appendix 11).

**GI04 Quebec Sales Tax**

1) See GI03.

**GI05 Capital Developement and Redevelopment Charges**

1) For the purposes of GC1.8 LAWS, PERMITS AND TAXES in the General Conditions of the Contract, only fees or charges directly related to the processing and issuing of building permits shall be included. The Bidder shall not include any monies in the tender amount for special municipal development, redevelopment or other fees or charges which a municipal authority may seek as a prerequisite to the issuance of building permits.

**GI06 Registry and Pre-qualification of Floating Plant**

1) Dredges or other floating plant to be used in the performance of the Work must be on Canadian registry. For dredges or other floating plant that are not of Canadian make or manufacture, the Bidder must obtain a certificate of qualification from Industry Canada, if applicable, and this certificate must accompany the tender. Plant so qualified by Industry Canada may be accepted on this project.

**GI07 Listing of Subcontractors and Suppliers**

1) Notwithstanding any list of Subcontractors that the Bidder shall be required to submit as part of the tender, the Bidder submitting the lowest acceptable tender shall, within 24 hours of receipt of a notice to do so, submit all information requested in the said notice including the names of Subcontractors and Suppliers for the part or parts of the Work listed. Failure to do so may result in the disqualification of its tender.

**GI08 Tender Security Requirements**

1) The Bidder shall submit tender security with the tender in the form of a bid bond or a security deposit in an amount that is equal to not less than 10% of the tender amount including all applicable taxes.

   The maximum amount of tender security required with any tender is $2,000,000.00.

2) A bid bond shall be in an approved form, properly completed, with original signature(s) and issued by an approved company whose bonds are acceptable to the NCC either at the time of solicitation closing or as identified on the list displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027

   The approved form for the bid bond is enclosed at the end of this section.

3) A security deposit shall be an original, properly completed, signed where required and be either:

   (a) a bill of exchange, bank draft or money order payable to the NCC;

   (b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada; or

4) A bill of exchange, bank draft or money order referred to in subparagraph 3)(a) of GI08 shall be certified by or drawn on:

   (a) a corporation or institution that is a member of the Canadian Payments Association;

   (b) a corporation that accepts public deposits and repayment of the deposits is unconditionally guaranteed by Her Majesty in right of a province;

   (c) 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;

   (d) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137 (6)(b) of the *Income Tax Act*; or

   (e) Canada Post Corporation.

5) If a bill of exchange, bank draft or money order is drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in paragraph 4) of GI08, either by letter or by a stamped certification on the bill of exchange, bank draft, or money order.

6) For the purposes of this section, a bill of exchange is an unconditional order in writing signed by the Bidder and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable time, a certain sum of money to, or to the order of, the NCC.

7) Bonds referred to in subparagraph 3)(b) of GI08 shall be provided on the basis of their market value current at the date of solicitation closing, and shall be:

(a) payable to bearer;

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal or as to principal and interest in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

8) As an alternative to a security deposit an irrevocable standby letter of credit is acceptable to the NCC and the amount shall be determined in the same manner as a security deposit referred to above.

9) An irrevocable standby letter of credit referred to in paragraph 8) of GI08 shall:

(a) be an arrangement, however named or described, whereby a financial institution (the "Issuer") acting at the request and on the instructions of a customer (the "Applicant) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(iii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with.

(b) state the face amount which may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC Contract Administrator identified in the letter of credit by his/her office;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language, by a financial institution which is a member of the Canadian Payments Association and is on the letterhead of the Issuer or Confirmer. The format is left to the discretion of the Issuer or Confirmer.

10) Tender security shall lapse or be returned as soon as practical following:

(a) the solicitation closing date, for those Bidders submitting non-compliant tenders; and

(b) the administrative tender review, for those Bidders submitting compliant tenders ranked fourth to last on the schedule of tenders; and

(c) the award of contract, for those Bidders submitting the second and third ranked tenders; and

(d) the receipt of contract security for the successful Bidder; or

(e) the cancellation of the solicitation, for all Bidders.

11) Notwithstanding the provisions of paragraph 10) of GI08 and provided more than three (3) compliant tenders have been received, if one or more of the tenders ranked third to first is withdrawn or rejected for whatever reason, then the NCC reserves the right to hold the security of the next highest ranked compliant tender in order to retain the tender security of at least three (3) valid and compliant tenders.

**GI09 Submission of Tender**

1) The Invitation to Tender and Acceptance Form, duly completed with the bid security, shall be enclosed and sealed in an envelope provided by the Bidder, and shall be addressed and submitted to the office designated on the front page of the Invitation to Tender and Acceptance Form for the receipt of tenders.

2) Unless otherwise specified in the Special Instructions to Bidders:

(a) the tender shall be in Canadian currency;

(b) exchange rate fluctuation protection is not offered; and

(c) any request for exchange rate fluctuation protection shall not be considered.

3) Prior to submitting the tender, the Bidder shall ensure that the following information is clearly printed or typed on the face of the tender envelope:

(a) Solicitation Number;

(b) Name of Bidder.

5) Timely and correct delivery of the tender is the sole responsibility of the Bidder. The tender must be received on or before the date and time set for solicitation closing. Late tenders shall be disqualified.

**GI10 Revision of Tender**

1) A tender submitted in accordance with these instructions may be revised by letter or facsimile (fax number only 613-239-5012 provided the revision is received at the office designated for the receipt of tenders, on or before the date and time set for the closing of the solicitation. The letter or facsimile shall:

(a) be on the Bidder's letterhead or bear a signature that identifies the Bidder;

(b) for the Total Bid Amount, clearly identify the amount of the current revision. The total aggregate sum of all revisions submitted, including the current revision, shall be shown separately; and

(c) for the Price per unit portion of a tender, clearly identify the current revision(s) to the Price(s) per unit and the specific item(s) to which each revision applies. If a revision is to be applied to a specific Item that was previously amended then, in addition to the amount of the current

revision, the total aggregate sum of all revisions submitted, including the current revision, for that Item shall be shown separately.

2) A letter or facsimile submitted to confirm an earlier revision shall be clearly identified as "CONFIRMATION ONLY", for each contemplated change.

3) Failure to comply with any of the above provisions shall result in the rejection of the non-compliant revision(s) only. The tender shall be evaluated based on the original tender submitted and all other compliant revision(s).

**GI11 Acceptance of Tender**

1) The NCC may accept any tender, whether it is the lowest or not, or may reject any or all tenders.

2) Without limiting the generality of paragraph 1) of GI11, the NCC may reject a tender if any of the following circumstances are present:

(a) the Bidder, or any employee or subcontractor included as part of the tender, have been convicted under section 121 ("Frauds on the government" & "Contractor subscribing to election fund"), 124 ("Selling or purchasing office"), 380 (Fraud committed against Her Majesty) or 418 ("Selling defective stores to Her Majesty") of the Criminal Code of Canada, or under paragraph 80(1)(d) (False entry, certificate or return), subsection 80(2) (Fraud against her Majesty) or Section 154.01 (Fraud against her Majesty) of the Financial Administration Act;

(b) the Bidder's bidding privileges are suspended or are in the process of being suspended;

(c) the bidding privileges of any employee or subcontractor included as part of the tender are suspended or are in the process of being suspended, which suspension or pending suspension would render that employee or subcontractor ineligible to tender on the Work, or the portion of the Work the employee or subcontractor is to perform;

(d) with respect to current or prior transactions with the NCC

(i) the Bidder is bankrupt or if, for whatever reason, its activities are rendered inoperable for an extended period;

(ii) evidence, satisfactory to the NCC, of fraud, bribery, fraudulent misrepresentation or failure to comply with any law protecting individuals against any manner of discrimination, has been received with respect to the Bidder, any of its employees or any subcontractor included as part of its tender;

(iii) the NCC has exercised, or intends to exercise, the contractual remedy of taking the work out of the contractor's hands with respect to a contract with the Bidder, any of its employees or any subcontractor included as part of its tender; or

(iv) the NCC determines that the Bidder's performance on other contracts is sufficiently poor to jeopardize the successful completion of the requirement being tendered on.

3). In assessing the Bidder's performance on other contracts pursuant to subparagraph 2)(d)(iv) of GI11, the NCC may consider, but not be limited to, such matters as:

(a) the quality of workmanship in performing the Work;

(b) the timeliness of completion of the Work;

(c) the overall management of the Work and its effect on the level of effort demanded of the NCC and its representative; and
(d) the completeness and effectiveness of the Contractor's safety program during the performance of the Work.

4) Without limiting the generality of paragraphs 1), 2) and 3) of GI11, the NCC may reject any based on an unfavourable assessment of the:

(a) adequacy of the tender price to permit the work to be carried out and, in the case of a tender providing prices per unit, whether each such price reasonably reflects the cost of performing the part of the work to which that price applies;

(b) Bidder's ability to provide the necessary management structure, skilled personnel, experience and equipment to perform competently the work under the Contract; and

(c) Bidder's performance on other contracts.

5) If the NCC intends to reject a tender pursuant to a provision of paragraphs 1), 2), 3) or 4) of GI11, other than subparagraph 2)(b)of GI11, the NCC shall so inform the Bidder and provide the Bidder ten (10) days within which to make representation, prior to making a final decision on the tender rejection.

6) The NCC may waive informalities and minor irregularities in tenders received, if the NCC determines that the variation of the tender from the exact requirements set out in the Tender Documents can be corrected or waived without being prejudicial to other Bidders.

**GI12 Procurement Business Number**

1) Not applicable.

**GI13 Bid Depository**

1) If the solicitation advertisement states that a Bid Depository shall be used, the Bidder shall obtain bids in accordance with local Bid Depository rules and procedures.

**GI14 Compliance with Applicable Laws**

1) By submission of a tender, the Bidder certifies that the Bidder has the legal capacity to enter into a contract and is in possession of all valid licences, permits, registrations, certificates, declarations, filings, or other authorizations necessary to comply with all federal, provincial and municipal laws and regulations applicable to the submission of the tender and entry into any ensuing contract for the performance of the work.

2) For the purpose of validating the certification in paragraph 1) of GI14, a Bidder shall, if requested, provide a copy of every valid licence, permit, registration, certificate, declaration, filing or other authorization listed in the request, and shall provide such documentation within the time limit(s) set out in the said request.

3) Failure to comply with the requirements of paragraph 2) of GI14 shall result in the disqualification of the tender.

**GI15 Approval of Alternative Materials**

1) When materials are specified by trade names or trademarks, or by manufacturers' or suppliers' names, the tender shall be based on use of the named materials. During the solicitation period,

alternative materials may be considered provided full technical data is received in writing by the Contracting Officer at least seven (7) calendar days, unless otherwise noted in the Tender documents, prior to the solicitation closing date. If the alternative materials are approved for the purposes of the tender, an addendum to the tender documents shall be issued.

**GI16 Performance Evaluation**

1) Bidders shall take note that the performance of the Contractor during and upon completion of the work shall be evaluated by the NCC. The evaluation shall be based on the quality of workmanship, timeliness of completion of the work, project management, contract management and management of health and safety. Should the Contractor's performance be considered unsatisfactory, the Contractor's bidding privileges on future work may be suspended indefinitely. Contractor Evaluation Report Form is enclosed at the end of this section.

# BID BOND

Bond Number _____

Amount $ _____

**KNOW ALL MEN BY THESE PRESENTS**, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____ ), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**SIGNED AND SEALED** this _____ day of _____ , _____ . WHEREAS, the Principal has submitted a written tender to the NCC, dated the _____ day of _____ , _____ , for: _____ .

**NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION** are such that if:

(a) The Principal, should his tender be accepted within the period be specified by the NCC, or, if no period be specified, within sixty (60) days after closing date of the tender:

1. does execute within a period specified by the NCC, or, if no period be specified therein, within fourteen (14) days after the prescribed forms are presented to him for signature, execute such further contractual documents, if any, as may be required by the terms of the tender as accepted; and does

2. furnish a Performance Bond and a Labour and Material Payment Bond, each in the amount of 50% of the Contract price and satisfactory to the NCC, or other security acceptable to the NCC; or

(b) the Principal does pay to the NCC the difference between the amount of the Principal's tender and the amount of the Contract entered into by the NCC for the work, supplies and services which were specified in the said tender, if the latter amount be in excess of the former,

then, this obligation shall be void; otherwise it shall remain in full force and effect.

**PROVIDED, HOWEVER**, that the Surety and the Principal shall not be liable to the NCC for an amount greater than the amount specified in the bond.

**PROVIDED FURTHER** that the Surety shall not be subject to any suit or action unless such suit or action is instituted and process therefore served upon the Surety at its Head Office in Canada, within twelve (12) months from the date of this bond.

**IN TESTIMONY WHEREOF**, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and first above written.

**SIGNED, SEALED AND DELIVERED in the presence of:**

Principal _____

Witness _____

Surety _____

Note: Affix Corporate seal if applicable.

NCC CCN Canada

# CONTRACTOR PERFORMANCE EVALUATION REPORT FORM
# FORMULAIRE - RAPPORT D'ÉVALUATION DU RENDEMENT DE L'ENTREPRENEUR

| Date | Contract no. / No du contrat |
|---|---|
| Description of work / Description des travaux | |
| Contractor's business name / Nom de l'entreprise de l'entrepreneur | Contractor's site superintendent / Contremaître de l'entrepreneur |
| Contractor's business address / Adresse de l'entreprise de l'entrepreneur | |

**NCC representative / Représentant de la CCN**

| Name / Nom | Telephone no. / N°. de téléphone | E-mail address / Adresse électronique |
|---|---|---|
| | | |

**Contract information / Information sur le contrat**

| Contract award amount / Montant du marché adjugé | Contract award date / Date de l'adjudication du marché |
|---|---|
| Final amount / Montant final | Actual contract completion date / Date réelle d'achèvement du contrat |
| Number of change orders / Nombre d'ordres de changement | Final certificate date / Date du certificat final |

| Quality of workmanship / Qualité des travaux exécutés | Category / Catégorie | Scale / Échelle | Points / Pointage |
|---|---|---|---|
| This is the rating of the quality of the workmanship. At final completion the quality of the materials and equipment incorporated in the work must meet the requirements set out in the plans and specifications.<br><br>Il s'agit de l'évaluation de la qualité des travaux exécutés. À l'achèvement des travaux, la qualité des matériaux et de l'équipement doit satisfaire les exigences établies dans les plans et devis. | Unacceptable / Inacceptable<br>Not satisfactory / Non-satisfaisant<br>Satisfactory / Satisfaisant<br>Superior / Supérieur | 0 – 5<br>6 – 10<br>11 – 16<br>17 - 20 | |
| **Time / Délai d'exécution** | | | |
| This is the rating of the timeliness of completion considering the actual completion date compared with the original (or amended) contract completion date and allowing for conditions beyond the control of the contractor.<br><br>Il s'agit de l'évaluation du délai d'exécution des travaux en prenant en considération la date actuelle d'achèvement des travaux par rapport à la date originale (ou modifiée) et en tenant compte des conditions indépendantes de la volonté de l'entrepreneur. | Unacceptable / Inacceptable<br>Late / En retard<br>On time / À temps<br>Ahead of schedule / En avance sur le calendrier | 0 – 5<br>6 – 10<br>11 – 16<br>17 - 20 | |
| **Project management / Gestion de projet** | | | |
| This is the rating of how the project, as described in the drawings and specifications, was managed including co-ordination, quality control, effective schedule development and implementation.<br><br>Voici l'évaluation de la façon dont le projet décrit dans les documents contractuels a été géré, y compris la coordination, le contrôle de la qualité, l'élaboration d'un calendrier efficace et la mise en œuvre. | Unacceptable / Inacceptable<br>Not satisfactory / Non-satisfaisant<br>Satisfactory / Satisfaisant<br>Superior / Supérieur<br>Criteria not applicable / Critère non-applicable | 0 – 5<br>6 – 10<br>11 – 16<br>17 - 20 | ☐ N/A / S/O |
| **Contract management / Gestion de contrat** | | | |
| This is the rating of how the contract was administered in accordance with the provisions expressed in the "front end" portion of the documents.<br><br>Voici l'évaluation de la façon dont le contrat a été administré conformément aux dispositions comprises dans la partie « prioritaire » des documents. | Unacceptable / Inacceptable<br>Not satisfactory / Non-satisfaisant<br>Satisfactory / Satisfaisant<br>Superior / Satisfaisant<br>Criteria not applicable / Critère non-applicable | 0 – 5<br>6 – 10<br>11 – 16<br>17 - 20 | ☐ N/A / S/O |
| **Health and safety / Santé et sécurité** | | | |
| This is the rating of the effectiveness of how the occupational health and safety provisions (whether identified in the contract or those of provincial legislation or those otherwise applicable) were managed and administered.<br><br>Voici l'évaluation de l'efficacité avec laquelle les dispositions relatives à la santé et à la sécurité au travail (dans le contrat, dans les règlements provinciaux ou dans tout autre document) ont été gérées et administrées. | Unacceptable / Inacceptable<br>Not satisfactory / Non-satisfaisant<br>Satisfactory / Satisfaisant<br>Superior / Satisfaisant | 0 – 5<br>6 – 10<br>11 – 16<br>17 - 20 | |
| | | **Total points / Pointage total** | **/100** |

**Comments / Commentaires**

| Name / Nom | Title / Titre | Signature | Date |
|---|---|---|---|
| | | | |

**INSTRUCTIONS AND ADDITIONAL INFORMATION (Contractor Performance Evaluation Report)**
**INSTRUCTIONS ET RENSEIGNEMENTS SUPPLÉMENTAIRES (Rapport d'évaluation du rendement de l'entrepreneur)**

## QUALITY OF WORKMANSHIP – QUALITÉ DES TRAVAUX EXÉCUTÉS

The NCC representative is to consider how the workmanship compares with:

- the norms in the area in which the work was carried out
- the contractor's compliance with any quality provisions outlined in the drawings and specification
- the quality of workmanship provided by other contractors on similar projects in the same facility/facilities

Le représentant de la CCN doit évaluer la qualité de l'exécution en fonction de ce qui suit :

- le respect des normes s'appliquant aux travaux réalisés
- la conformité de l'entrepreneur aux exigences de qualité comprises dans les dessins et dans les devis
- la qualité de l'exécution des travaux accomplis par d'autres entrepreneurs dans le cadre de projets similaires réalisés dans la même installation ou dans des installations semblables.

## TIME / DÉLAIS D'EXÉCUTION

For the purpose of evaluation the contractor's time performance, consideration must be given to conditions beyond the contractor's control including NCC / Consultant / Client performance.

Consider conditions beyond the contractor's control, e.g.,

- availability of, and access to the site
- changes in soil or site conditions
- weather extremes
- strikes
- material / equipment supply problems originating from manufacturers/suppliers
- quality of plans and specifications
- major change(s) in scope
- cumulative effect of changes
- was the NCC able to meet its obligations?
- timely decisions, clarifications, approvals, payments in due time
- delays caused by other contractors in the same facility

Afin d'évaluer le rendement de l'entrepreneur en matière de délai d'exécution, on doit prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, y compris le rendement de la CCN, de l'expert-conseil et du client.

Prendre en considération les conditions indépendantes de la volonté de l'entrepreneur, par exemple :

- disponibilité du chantier et accès au chantier
- modifications des conditions du sol ou du chantier
- température
- grèves
- problèmes d'approvisionnement en matériel et en équipement provenant des manufacturiers/fournisseurs
- qualité des plan et devis
- modifications importantes à l'étendue des travaux
- effets cumulatifs des modifications
- la CCN a-t-elle été capable de remplir ses obligations?
- décisions, clarifications, approbations, paiements en temps opportun
- les retards occasionnés par d'autres entrepreneurs travaillant dans la même installation.

The NCC representative's estimate of a reasonable maximum time allowance resulting from conditions beyond the contractor's control is
L'estimation, par le représentant de la CCN, du temps maximum alloué pour les conditions indépendantes de la volonté de l'entrepreneur est ►

The period of delay attributable to the contractor is
La période de retard attribuable à l'entrepreneur est ►

Did the contractor make an effective effort / Est-ce que l'entrepreneur s'est efforcé :

- to meet the schedule / de respecter l'échéancier des travaux ► ☐ Yes / Oui ☐ No / Non
- to clean up deficiencies in a reasonable time / de corriger les vices dans un délai raisonnable ► ☐ Yes / Oui ☐ No / Non

Have you recommended assessments and damages for late completion under the contract?
Avez-vous recommandé des dédommagements pour retard d'exécution aux termes du marché? ► ☐ Yes / Oui ☐ No / Non

## PROJECT MANAGEMENT / GESTION DU PROJET

The extent to which the contractor takes charge of and effectively manages the work has a direct effect on the inputs required of the NCC.

Consideration should be given to: Did the contractor

- employ a knowledgeable site superintendent
- required additional input from the NCC staff above that which is normal for a project of similar size and nature
- promptly commence the work
- provide realistic schedules and updates in accordance with the terms of the contract
- provide a comprehensive work plan and adhere to its milestones
- order material promptly and in such a way as to expedite the progress of the work
- provide shop drawings promptly and were they of sufficient detail

La mesure dans laquelle l'entrepreneur assume efficacement la gestion des travaux a une incidence directe sur les services qu'on attend de la CCN.

Il faut examiner si l'entrepreneur a :

- fait appel aux services d'un surintendant de chantier expérimenté
- demandé au personnel de la CCN une plus grande contribution que ce qui est normal pour un projet de cette importance et de cette nature
- commencé les travaux dans les plus brefs délais
- fourni un calendrier réaliste et des mises à jour conformément aux modalités du contrat
- présenté un plan de travail complet et a respecté les échéances
- commandé le matériel rapidement et de façon à accélérer l'avancement des travaux.
- fourni rapidement des dessins d'atelier comprenant suffisamment de détails

## PROJECT MANAGEMENT (cont'd) / GESTION DU PROJET (suite)

- effectively manage and complete all Division 1 work site activities

- promptly provide reasonable quotations for changes to the original scope of work
- cooperate when issued directions by the NCC representative
- interpret the contract documents accurately
- establish effective quality control procedures
- effectively coordinate and manage the work of its subcontractors

- promptly correct defective work as the project progressed
- promptly clean-up all deficiencies and incomplete work after issuance of the Interim Certificate of Completion
- satisfactorily clean the work site periodically and at the completion of the project

- géré et achevé efficacement toutes les activités sur le chantier de la Division 1
- proposé rapidement des prix raisonnables pour les modifications à l'énoncé des travaux initial
- accepté les directives du représentant de la CCN
- interprété les documents contractuels avec exactitude
- mis en place des procédures de contrôle de la qualité efficaces
- coordonné et géré efficacement les travaux confiés à des sous-traitants
- corrigé promptement le travail défectueux en cours de projet
- corrigé rapidement les travaux non acceptables et terminé les travaux incomplets après réception du certificat provisoire d'achèvement
- nettoyé de façon satisfaisante le chantier périodiquement ainsi qu'à la fin du projet.

## CONTRACT MANAGEMENT / GESTION DU CONTRAT

The effectiveness of the contractor to administer the contract in accordance with the provisions expressed in the "front end" portion of the contract documents.

Consideration should be given to: Did the contractor

- in the time frame specified, provide its contract security, Insurance Certificate fully executed and WSIB form where applicable
- submit progress claims in the correct format, accurately representing the work successfully completed and material delivered to the site but not yet installed for each payment period
- submit a Statutory Declaration correctly completed with each progress claim
- submit an updated Schedule if so specified
- pay subcontractors and suppliers in a timely fashion in accordance with the terms and conditions of its subcontracts
- promptly appoint a competent site superintendent
- notify the NCC representative of all its subcontracting activities

- apply for, obtain and pay for all necessary permits, licenses and certificates
- cooperate with other contractors sent onto the site of the work

- remove a superintendent or unsuitable worker when requested by the NCC representative to do so
- effectively protect the work and the contract documents provided by the NCC
- comply with all warranty provisions up to the date of the Contractor Performance Evaluation Report Form (CPERF)

- effectively manage the site during a suspension or termination of the work to mitigate any additional costs to the NCC

- deal promptly with any claims from creditors

- maintain complete records of the project
- provide information promptly when requested to do so
- expedite and co-operate in the settlement of all disputes

Efficacité avec laquelle l'entrepreneur a administré le contrat conformément aux dispositions continues dans la partie « prioritaire » des documents contractuels.

Il faut examiner si l'entrepreneur a :

- fourni, dans le délai prescrit, une garantie contractuelle, un certificat d'assurance dûment signés et le formulaire de la CSST, le cas échéant
- présenté des réclamations périodiques dans le bon format, en décrivant avec précision les travaux exécutés et le matériel livré sur le chantier mains non encore installé, pour chaque période de paiement
- présenté une déclaration solennelle correctement remplie avec chaque réclamation périodique
- fourni un calendrier à jour, sur demande
- payé rapidement les sous-traitants et les fournisseurs conformément aux conditions des contrats de sous-traitance
- désigné dans les plus brefs délais un surintendant de chantier qualifié
- tenu au courant le représentant de la CCN de toutes les activités de sous-traitance
- demandé, obtenu et payé tous les permis, licences et certificats nécessaires
- collaboré avec les autres entrepreneurs envoyés sur le lieu des travaux
- remplacé un surintendant ou un travailleur inapte à la demande du représentant de la CCN
- protégé efficacement les travaux et les documents relativement aux travaux et au contrat fournis par la CCN
- respecté toutes les dispositions de garantie jusqu'à la date du Formulaire Rapport d'évaluation du rendement de l'entrepreneur (FRERE)
- géré efficacement le chantier pendant une suspension des travaux ou lors de leur achèvement, afin de limiter tout coût supplémentaire pour la CCN
- traité dans les plus brefs délais les demandes de paiement des créanciers
- tenu des dossiers complets sur le projet
- fourni promptement les renseignements demandés
- accélère et coopère dans le règlement des différends

## HEALTH AND SAFETY / SANTÉ ET SÉCURITÉ

The effectiveness to which the contractor managed and administered the occupational health and safety provisions as stipulated in the contract documents and those required by provincial legislation or those that would otherwise be applicable to the site of the work.

Consideration should be given to: Did the contractor

- provide the NCC with a copy of its health and safety program prior to award of contract
- provide the NCC with a copy of its site specific hazardous assessment prior to award of contract
- apply for and obtain the provincial Notice of Project prior to commencement of the work
- apply for and obtain the Building Permit prior to commencement of the work
- provide a competent superintendent who
  - is qualified in health and safety matters because of her/his knowledge, training and experience
  - is familiar with the OH&S Act and its Regulations that apply to the site of the work
  - remedies any potential or actual danger of health and safety to those employed at the work site
- respond in a timely manner to any non-compliance safety issues noted by the NCC or a representative of the authority having jurisdiction
- implement its safety program in a proactive manner

Efficacité avec laquelle l'entrepreneur a géré et administré les dispositions relatives à la santé et à la sécurité au travail telles que stipulées dans les documents contractuels et dans les règlements provinciaux ou ceux s'appliquant normalement au lieu des travaux.

Il faut examiner si l'entrepreneur a :

- fourni à la CCN une copie de son programme en matière de santé et de sécurité avant l'octroi du contrat
- fourni à la CCN une copie de son évaluation des dangers pouvant survenir sur les lieux avant l'octroi du contrat
- demandé et obtenu l'avis de projet provincial avant le début des travaux
- demandé et obtenu le permis de construction avant le début des travaux
- engagé un surintendant qui :
  - est qualifié en matière de santé et de sécurité de par ses connaissances, sa formation et son expérience
  - connaît bien les dispositions de la Loi sur la santé et la sécurité au travail et de son règlement qui s'applique sur le lieu des travaux
  - remédie à tout danger possible ou réel en matière de santé et de sécurité pouvant toucher toutes les personnes travaillant sur le lieu des travaux
- traité rapidement tous les problèmes de non-conformité à la sécurité relevés par la CCN ou par un représentant de l'autorité qui a juridiction
- mis en œuvre son programme de sécurité de façon proactive

## GC1.1 INTERPRETATION

### GC1.1.1 Headings and References

1) The headings in the contract documents, other than those in the drawings and specifications, form no part of the Contract but are inserted for convenience of reference only.

2) A reference made to a part of the Contract by means of numbers preceded by letters is 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.

3) A reference to a paragraph or subparagraph followed by an identifying number, letter or combination thereof is, unless specifically stated otherwise, a reference to the paragraph or subparagraph that forms part of the clause within which the reference is made.

### GC1.1.2 Terminology

1) In the Contract

"Contract" means the contract documents referred to as such therein and every other document specified or referred to in any of them as forming part of the Contract, all as amended by agreement of the parties;

"Contract Amount" means the amount set out in the Contract to be payable to the Contractor for the Work, subject to the terms and conditions of the Contract;

"Contract Security" means any security given by the Contractor to the NCC in accordance with the Contract;

"Contractor" means the person contracting with the NCC to provide or furnish all labour, Material and Plant for the execution of the Work under the Contract, and includes the Contractor's superintendent as designated in writing to the NCC;

"Certificate of Completion" means a certificate issued by the NCC when the Work reaches Completion;

"Certificate of Measurement" means a certificate issued by the NCC certifying the correctness of the final quantities, prices per unit and values of labour, Plant and Material performed, used and supplied by the Contractor for the construction of the part of the Work to which a Unit Price Arrangement applies;

"Certificate of Substantial Performance" means a certificate issued by the NCC when the Work reaches Substantial Performance;

"NCC Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the NCC Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the NCC Representative to the Contractor;

"herein", "hereby", "hereof", "hereunder" and similar expressions refer to the Contract as a whole and not to any particular section or part thereof;

"Lump Sum Arrangement" means that part of the Contract that prescribes a lump sum as payment for performance of the Work to which it relates;

"Material" includes all commodities, articles, machinery, equipment, fixtures and things required to be furnished in accordance with the Contract for incorporation into the Work;

"NCC" means the National Capital Commission;

"Person" also includes, unless there is an express stipulation in the Contract to the contrary, any partnership, proprietorship, firm, joint venture, consortium or corporation;

"Plant" includes all tools, implements, machinery, vehicles, structures, equipment, articles and things that are necessary for the performance of the Contract, other than Material and those tools customarily provided by a tradesperson in practicing a trade;

"Security screening" is a generic term that applies to all types and levels of personnel security screening including Reliability Status, Site Access, and CONFIDENTIAL, SECRET and TOP SECRET security clearances conducted by the NCC;

"Sensitive Information and Assets" means information or assets that have been identified by the NCC as TOP SECRET, SECRET, CONFIDENTIAL or protected;

"Subcontractor" means a person having a direct contract with the Contractor, subject to GC3.6 SUBCONTRACTING, to perform a part or parts of the Work, or to supply Material customized for the Work;

"Superintendent" means the employee or representative of the Contractor designated by the Contractor to act pursuant to GC2.6 SUPERINTENDENT;

"Supplementary Conditions" means the part of the Contract that amends or supplements the General Conditions;

"Supplier" means a person having a direct contract with the Contractor to supply Plant or Material not customized for the Work;

"Unit Price Arrangement" means that part of the Contract that prescribes the product of a price per unit of measurement multiplied by a number of units of measurement for performance of the Work to which it relates;

"Unit Price Table" means the table of prices per unit set out in the Contract;

"Work" means, 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 in accordance with the contract documents; and

"Working Day" means a day other than a Saturday, Sunday, or a statutory holiday that is observed by the construction industry in the area of the place of the Work.

**GC1.1.3 Application of Certain Provisions**

1) Any 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 Lump Sum Arrangement applies.

2) Any provisions of the Contract that are expressly stipulated to be applicable only to a Lump Sum Arrangement are not applicable to any part of the Work to which a Unit Price Arrangement applies.

**GC1.1.4 Substantial Performance**

1) The Work shall be considered to have reached Substantial Performance when:

   (a) the Work or a substantial part thereof has passed inspection and testing and is, in the opinion of the NCC, ready for use by the NCC or is being used for the intended purposes; and

   (b) the Work is, in the opinion of the NCC, capable of completion or correction at a cost of not more than

      (i) 3% of the first $500,000;

      (ii) 2% of the next $500,000; and

      (iii) 1% of the balance

      of the Contract Amount at the time this cost is calculated.

2) Where the Work or a substantial part thereof is ready for use or is being used for the purposes intended and:

   (a) the remainder of the Work or a part thereof cannot be completed by the time specified in the Contract, or as amended in accordance with GC6.5 DELAYS AND EXTENSION OF TIME, for reasons beyond the control of the Contractor; or

   (b) the NCC and the Contractor agree not to complete a part of the Work within the specified time;

the cost of that part of the Work that was either beyond the control of the Contractor to complete or the NCC and the Contractor have agreed not to complete by the time specified, shall be deducted from the value of the Contract referred to in subparagraph 1)(b) of GC1.1.4, and the said cost shall not form part of the cost of the Work remaining to be done in determining Substantial Performance.

**GC1.1.5 Completion**

1) The Work shall be deemed to have reached Completion when all labour, Plant and Material required have been performed, used or supplied, and the Contractor has complied with the Contract and all orders and directions made pursuant thereto, all to the satisfaction of the NCC.

## GC1.2 CONTRACT DOCUMENTS

**GC1.2.1 General**

1) The contract documents are complementary, and what is required by any one shall be as binding as if required by all.

2) References in the contract documents to the singular shall be considered to include the plural as the context requires.

3) Nothing contained in the contract documents shall create a contractual relationship between the NCC and any Subcontractor or Supplier, their subcontractors or suppliers, or their agents or employees.

**GC1.2.2 Order of Precedence**

1) In the event of any discrepancy or conflict in the contents of the following documents, such documents shall take precedence and govern in the following order:

   (a) any amendment or variation of the contract documents that is made in accordance with the General Conditions;

   (b) any amendment issued prior to tender closing;

   (c) Supplementary Conditions;

   (d) General Conditions;

   (e) the duly completed Invitation to Tender and Acceptance Form when accepted;

   (f) drawings and specifications.

   later dates shall govern within each of the above categories of documents.

2) In the event of any discrepancy or conflict in the information contained in the drawings and specifications, the following rules shall apply:

   (a) specifications shall govern over drawings;

   (b) dimensions shown in figures on a drawings shall govern where they differ from dimensions scaled from the same drawing; and

   (c) drawings of larger scale govern over those of smaller scale.

**GC1.2.3 Security and Protection of Documents and Work**

1) The Contractor shall guard and protect all sensitive contract information (TOP SECRET, SECRET, CONFIDENTIAL and PROTECTED) including printed and digital documents, drawings, information, models, copies thereof and processing systems, whether supplied by the NCC or the Contractor, against loss or compromise and damage from any cause.

2) The Contractor shall limit access to sensitive NCC information only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

3) The Contractor shall ensure all contract information indicated in paragraph 1) is guarded and protected by any subcontractors, agents or suppliers and access limited only to those with a "need-to-know" and who have been successfully security screened to at least the level of sensitivity of the information.

4) The Contractor shall keep confidential all information provided to the Contractor by or on behalf of the NCC in connection with the Work, and all information developed by the Contractor as part of the Work, and shall not disclose any such information to any person without the written permission of the NCC, except that the Contractor may disclose to a subcontractor, authorized in accordance with the Contract, information necessary to the performance of a subcontract. This section does not apply to any information that:

   (a) is publicly available from a source other than the Contractor; or

   (b) is or becomes known to the Contractor from a source other than the NCC, except any source that is known to the Contractor to be under an obligation to the NCC not to disclose the information.

5) When the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the Contractor shall, at all times, take all measures reasonably necessary for the safeguarding of the material so identified, including such measures as may be further specified elsewhere in the Contract or provided, in writing, from time to time by the NCC.

6) Without limiting the generality of paragraphs 4) and 5) of GC1.2.3, when the Contract, the Work, or any information referred to in paragraph 4) is identified as TOP SECRET, SECRET, CONFIDENTIAL or PROTECTED by the NCC, the NCC shall be entitled to inspect the Contractor's premises and the premises of its subcontractors or suppliers and any other person at any tier, for security purposes at any time during the term of the Contract, and the Contractor shall comply with, and ensure that any such subcontractors or suppliers comply with all written instructions issued by the NCC dealing with the material so identified, including any requirement that employees of the Contractor and its subcontractors and suppliers and any other person at any tier execute and deliver declarations relating to reliability status, site access security clearances and other procedures.

7) The Contractor shall report any suspected or actual security incidents immediately to the NCC involving loss, compromise or damage of NCC information or assets.

8) The Contractor shall safeguard the Work and the Contract, the specifications, drawings and any other information provided by the NCC to the Contractor, and shall be liable to the NCC for any loss or damage from any causes.

## GC1.3 STATUS OF THE CONTRACTOR

1) The Contractor is engaged under the Contract as an independent contractor.

2) The Contractor, its subcontractors and suppliers and any other person at any tier and their employees are not engaged by the Contract as employees, servants or agents of the NCC.

3) For the purposes of the contract 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, Employment Insurance, Worker's Compensation, provincial health or insurance plans, and Income Tax.

## GC1.4 RIGHTS AND REMEDIES

1) Except as expressly provided in the Contract, the duties and obligations imposed by the Contract and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.

## GC1.5 TIME OF THE ESSENCE

1) Time is of the essence of the Contract.

## GC1.6 INDEMNIFICATION BY CONTRACTOR

1) The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against the NCC charging or claiming that the Work or any part thereof provided or furnished by the Contractor to the NCC infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.

2) The Contractor shall indemnify and save the NCC harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor, its subcontractors and suppliers and any other person at any tier, in performing the Work.

3) For the purposes of paragraph 2) of GC1.6, "activities" means any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

## GC1.7 INDEMNIFICATION BY THE NCC

1) Subject to the Crown Liability and Proceedings Act, the Patent Act, and any other law that affects the NCC's rights, powers, privileges or obligations, the NCC shall indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of the Contractor's activities under the Contract that are directly attributable to:

   (a) a lack of or a defect in the NCC's title to the Work site if owned by the NCC, whether real or alleged; or

   (b) 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 the NCC to the Contractor.

## GC1.8 LAWS, PERMITS AND TAXES

1) The Contractor shall comply with all federal, provincial and municipal laws and regulations applicable to the performance of the Work or any part thereof including, without limitation, all laws concerning health and labour conditions and the protection of the environment, and shall require compliance therewith by all of its subcontractors and suppliers at any tier as if the Work were being performed for an owner other than the NCC. The Contractor shall furnish evidence of compliance with such laws and regulations to the NCC at such times as the NCC may reasonably request.

2) Unless stipulated otherwise in the Contract, the Contractor shall obtain and maintain all permits, certificates, licences, registrations and authorizations required for the lawful performance of the Work.

3) Prior to the commencement of the Work at the site, the Contractor shall 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 an owner other than the NCC.

4) Within 10 days of making a tender pursuant to paragraph 3) of GC1.8, the Contractor shall notify the NCC of the amount properly tendered and whether or not the municipal authority has accepted that amount.

5) If the municipal authority has not accepted the amount tendered, the Contractor shall pay that amount to the NCC within 6 days after the time stipulated in paragraph 4) of GC1.8.

6) For the purposes of this clause, "municipal authority" means any authority that would have jurisdiction respecting permission to perform the Work if the owner were not the NCC.

7) 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.

8) In accordance with the Statutory Declaration referred to in paragraph 4) of GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK, a Contractor who has neither residence nor place of business in the province or territory in which work under the Contract is being performed shall provide the NCC with proof of registration with the provincial sales tax authorities in the said province.

9) 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, and notwithstanding the provision that all Material, Plant and interest of the Contractor in all real property, licences, powers and privileges, become the property of the NCC after the time of purchase in accordance with GC3.10 MATERIAL PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC, the Contractor shall 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.

## GC1.9 WORKERS' COMPENSATION

1) Prior to award of contract, at the time of submitting its first progress claim, at the time of Substantial Performance of the Work, and prior to issuance of the Certificate of Completion, the Contractor shall provide evidence of compliance with workers' compensation legislation applicable to the place of the Work, including payments due thereunder.

2) At any time during the term of the Contract, when requested by the NCC, the Contractor shall provide such evidence of compliance by the Contractor, its subcontractors and any other person at any tier and any other person performing part of the Work who is required to comply with such legislation.

**GC1.10 NATIONAL SECURITY**

1) If the NCC determines that the Work is of a class or kind that involves national security, the NCC may order the Contractor to:

(a) provide the NCC with any information concerning persons employed or to be employed by the Contractor for purposes of the Contract; and

(b) remove any person from the site of the Work if, in the opinion of the NCC, that person may be a risk to the national security;

and the Contractor shall comply with the order.

2) In all contracts with persons who are to be employed in the performance of the Contract, the Contractor shall make provision for the performance of any obligation that may be imposed upon the Contractor under paragraph 1) of GC1.10.

**GC1.11 UNSUITABLE WORKERS**

1) The NCC shall instruct the Contractor to remove from the site of the Work any person employed by the Contractor for purposes of the Contract who, in the opinion of the NCC, is incompetent or is guilty of improper conduct, and the Contractor shall not permit a person who has been removed to return to the site of the Work.

**GC1.12 PUBLIC CEREMONIES AND SIGNS**

1) The Contractor shall not permit any public ceremony in connection with the Work without the prior consent of the NCC.

2) The Contractor shall not erect nor permit the erection of any sign or advertising on the Work or its site without the prior consent of the NCC.

**GC1.13 CONFLICT OF INTEREST**

1) It is a term of the Contract that no individual, for whom the post-employment provisions of the Conflict of Interest and Post-Employment Code for Public Office Holders or the Values and Ethics Code for the Public Service apply, shall derive a direct benefit from the Contract unless that individual is in compliance with the applicable post-employment provisions.

**GC1.14 AGREEMENTS AND AMENDMENTS**

1) The Contract constitutes the entire and sole agreement between the parties with respect to the subject matter of the Contract and supersedes all previous negotiations, communications and other agreements, whether written or oral, relating to it, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions binding on the parties other than those contained in the Contract.

2) The failure of either party at any time to require performance by the other party of any provision hereof shall not affect the right thereafter to enforce such provision. Nor shall the waiver by either

party of any breach of any covenant, term or condition hereof be taken to be held to be a waiver of any further breach of the same covenant, term or condition.

3) The Contract may be amended only as provided for in the Contract.

**GC1.15 SUCCESSION**

1) The Contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and, subject to GC1.16 ASSIGNMENT, permitted assigns.

**GC1.16 ASSIGNMENT**

1) The Contractor shall not make any assignment of the Contract, either in whole or in part, without the written consent of the NCC.

**GC1.17 NO BRIBE**

1) The Contractor represents and covenants that no bribe, gift, benefit, nor other inducement has been nor shall be paid, given, promised or offered directly or indirectly to any official or employee of the NCC or to a member of the family of such a person, with a view to influencing the entry into the Contract or the administration of the Contract.

**GC1.18 CERTIFICATION - CONTINGENCY FEES**

1) In this clause:

(a) "contingency fee" means any payment or other compensation that is contingent upon or is calculated upon the basis of a degree of success in soliciting or obtaining a Government contract or negotiating the whole or any part of its terms;

(b) "employee" means a person with whom the Contractor has an employer/employee relationship; and

(c) "person" includes an individual or a group of individuals, a corporation, a partnership, an organization and an association and, without restricting the generality of the foregoing, includes any individual who is required to file a return with the registrar pursuant to section 5 of the Lobbyists Registration Act R.S.C. 1985 c.44 (4th Supplement) as the same may be amended from time to time.

2) The Contractor certifies that it has not directly or indirectly paid nor agreed to pay and covenants that it shall not directly or indirectly pay nor agree to pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person other than an employee acting in the normal course of the employee's duties.

3) All accounts and records pertaining to payments of fees or other compensation for the solicitation, obtaining or negotiation of the Contract shall be subject to the accounts and audit provisions of the Contract.

4) If the Contractor certifies falsely under this section or is in default of the obligations contained therein, the NCC may either take the Work out of the Contractor's hands in accordance with the provisions of the Contract or recover from the Contractor by way of reduction to the Contract Amount or otherwise, the full amount of the contingency fee.

## GC1.19 INTERNATIONAL SANCTIONS

1) Persons and companies in Canada, and Canadians outside of Canada are bound by economic sanctions imposed by the Government of Canada. As a result, the the NCC cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions.
Details on existing sanctions can be found at:
http://www.dfait-maeci.gc.ca/trade/sanctions-en.asp.

2) It is a condition of the Contract that the Contractor not supply to the NCC any goods or services which are subject to economic sanctions.

3) By law, the Contractor must comply with changes to the regulations imposed during the life of the Contract. During the performance of the Contract should the imposition of sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services cause an impossibility of performance for the Contractor, the Contractor may request that the Contract be terminated in accordance with GC7.3 TERMINATION OF CONTRACT.

# GC2 ADMINISTRATION OF THE CONTRACT



## GC2.1 NCC REPRESENTATIVE'S AUTHORITY

1) The NCC shall designate an NCC Representative and shall notify the Contractor of the name, address and telephone number of the NCC Representative.

2) The NCC Representative shall perform the NCC's duties and functions under the contract.

3) The NCC Representative shall be authorized to issue notices, instructions and directions to the Contractor and to accept on behalf of the NCC any notice, order or other communication from the contractor relating to the Work.

4) The NCC Representative shall, within a reasonable time, review and respond to submissions made by the Contractor in accordance with the requirements of the Contract.

## GC2.2 INTERPRETATION OF CONTRACT

1) If, at any time before the NCC has issued a Certificate of Completion, 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:

   (a) the meaning of anything in the drawings and specifications;

   (b) the meaning to be given to the drawings and specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their wording or intention;

   (c) 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;

   (d) whether or not the labour, Plant or Material performed, used and supplied by the Contractor for performing the Work and carrying out the Contract are adequate to ensure that the Work shall be performed in accordance with the Contract and that the Contract shall be carried out in accordance with its terms;

   (e) what quantity of any of the Work has been completed by the Contractor; or

   (f) the timing and scheduling of the various phases of the performance of the Work as specified in the Contract;

   the question shall be decided, subject to the provisions of GC8 DISPUTE RESOLUTION, by the NCC.

2) The Contractor shall perform the Work in accordance with any decisions of the NCC that are made under paragraph 1) of GC2.2 and in accordance with any consequential directions given by the NCC.

3) If the Contractor fails to comply with any instruction or direction issued by the NCC pursuant to the Contract, the NCC may employ such methods as the NCC deems advisable to do what the Contractor failed to do, and the Contractor shall, on demand, pay the NCC an amount that is equal to the aggregate of all costs, expenses and damages incurred or sustained by the NCC by reason of the Contractor's failure to comply with such instruction or direction, including the cost of any methods employed by the NCC in doing what the Contractor failed to do.

## GC2.3 NOTICES

1) Subject to paragraph 3) of GC2.3, any notice, order or other communication may be given in any manner, and if required to be in writing, shall be addressed to the party to whom it is intended at the address in the Contract or at the last address of which the sender has received written notice in accordance with this section.

2) Any notice, order or other communication given in writing in accordance with paragraph 1) of GC2.3 shall be deemed to have been received by either party:

   (a) if delivered personally, on the day that it was delivered;

   (b) if forwarded by mail, on the earlier of the day it was received or the sixth day after it was mailed; and

   (c) if forwarded by facsimile or electronic mail, 24 hours after it was transmitted.

3) A notice given under GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS, GC7.2 SUSPENSION OF WORK, and GC7.3 TERMINATION OF CONTRACT shall be given in writing and, if delivered personally, shall be delivered, if the Contractor is a sole proprietor, to the Contractor or, if the Contractor is a partnership or corporation, to an officer thereof.

## GC2.4 SITE MEETINGS

1) In consultation with the NCC, the Contractor shall arrange site meetings at regular intervals, with all involved parties who are to attend, in order to ensure, among other things, the proper co-ordination of the Work.

## GC2.5 REVIEW AND INSPECTION OF WORK

1) The NCC shall review the Work to determine if it is proceeding in conformity with the Contract and to record the necessary data to make an assessment of the value of Work completed. The NCC shall measure and record the quantities of labour, Plant and Material performed, used or supplied by the Contractor in performing the Work or any part thereof that is subject to a Unit Price Arrangement and, on request, shall inform the Contractor of those measurements, and permit the Contractor to inspect any records pertaining thereto.

2) The NCC shall reject Work or Material which in the NCC's opinion does not conform to the requirements of the Contract, and shall require inspection or testing of Work, whether or not such Work is fabricated, installed, or completed. If such Work is not in accordance with the requirements of the Contract, the Contractor shall correct the Work and shall pay the NCC, on demand, all reasonable costs and expenses that were incurred by the NCC in having the examination performed.

3) The Contractor shall provide the NCC with access to the Work and its site at all times, and at all times shall provide sufficient, safe, and proper facilities for the review and inspection of the Work by persons authorized by the NCC and any representatives of those authorities having jurisdiction. If parts of the Work are in preparation at locations other than the site of the Work, the NCC shall be given access to such Work whenever it is in progress.

4) The Contractor shall furnish the NCC with such information respecting the performance of the Contract as the NCC may require, and render every possible assistance to enable the NCC to verify that the Work is performed in accordance with the Contract, carry out any other duties and exercise any powers in accordance with the Contract.

5) If Work is designated for tests, inspections, or approvals in the Contract or by the NCC's instructions, or by laws or ordinances of the place of the Work, the Contractor shall give the NCC reasonable notice of when such Work shall be ready for review and inspection. The Contractor shall arrange for and shall give the NCC reasonable notice of the date and time of inspections, tests or approvals.

6) If the Contractor covers, or permits to be covered, Work that has been designated for tests, inspections or approvals before such tests, inspections or approvals are made, completed or given, the Contractor shall, if so directed by the NCC, uncover such Work, have the inspections, tests or approvals satisfactorily made, completed or given and make good the covering of the Work at the Contractor's expense.

## GC2.6 SUPERINTENDENT

1) Prior to commencing the Work, the Contractor shall designate a Superintendent and shall notify the NCC of the name, address and telephone number of the Superintendent. The Contractor shall keep the Superintendent at the Work site during working hours until the Work has reached completion.

2) The Superintendent shall be in full charge of the operations of the Contractor during the performance of the Work and shall be authorized to accept on behalf of the Contractor any notice, order or other communication given to the Superintendent or the Contractor relating to the Work.

3) Upon request of the NCC, the Contractor shall remove any Superintendent who, in the opinion of the NCC, is incompetent or has been guilty of improper conduct, and shall forthwith designate another Superintendent who is acceptable to the NCC.

4) The Contractor shall not substitute a Superintendent without the written consent of the NCC. If a Superintendent is substituted without such consent, the NCC shall be entitled to refuse to issue any documentation or certification relating to progress payments, Substantial Performance or Completion of the Work until the Superintendent has returned to the Work site or another Superintendent who is acceptable to the NCC has been substituted.

## GC2.7 NON-DISCRIMINATION IN HIRING AND EMPLOYMENT OF LABOUR

1) For the purposes of this clause, “persons" include the Contractor, its subcontractors and suppliers at any tier and their respective employees, agents, licensees or invitees and any other individual involved in the performance of the Work or granted access to the Work site. A “person” includes any partnership, proprietorship, firm, joint venture, consortium and corporation.

2) Without restricting the provisions of paragraph 3) of GC2.6, SUPERINTENDENT, the Contractor shall not refuse to employ and shall not discriminate in any manner against any person because:

   (a) of that person's race, national origin, colour, religion, age, sex or marital status;

   (b) of the race, national origin, colour, religion, age, sex, or marital status of any person having any relationship or association with that person; or

   (c) a complaint has been made or information has been given by or in respect of that person relating to an alleged failure by the Contractor to comply with subparagraphs 2)(a) and 2)(b) of GC2.7.

3) Within two Working Days immediately following receipt of a written complaint pursuant to paragraph 2) of GC2.7, the Contractor shall:

(a) cause to have issued a written direction to the person or persons named by the complainant to cease all actions that form the basis of the complaint;

(b) forward a copy of the complaint to the NCC by registered mail or courier service; and

(c) when the Labour Conditions are applicable under the circumstances of the complaint, forward a copy of the complaint to HRSDC - Labour to the attention of the appropriate Director as described in the Labour Conditions ("HRSDC - Labour" means the labour component of the federal Department of Human Resources and Skills Development).

4) Within twenty four (24) hours immediately following receipt of a direction from the NCC to do so, the Contractor shall cause to have removed from the site of the Work and from the performance of Work under the Contract, any person or persons whom the NCC believes to be in breach of the provisions of paragraph 2) of GC2.7.

5) No later than thirty (30) days after receipt of the direction referred to in paragraph 4) of GC2.7, the Contractor shall cause the necessary action to be commenced to remedy the breach described in the direction.

6) If a direction is issued pursuant to paragraph 4) of GC2.7, the NCC may withhold from monies that are due and payable to the Contractor or setoff pursuant to GC5.9 RIGHT OF SETOFF, whichever is applicable, an amount representing the sum of the costs and payment referred to in paragraph 8) of GC2.7.

7) If the Contractor fails to proceed in accordance with paragraph 5) of GC2.7, the NCC shall take the necessary action to have the breach remedied, and shall determine all supplementary costs incurred by the NCC as a result.

8) The NCC may make a payment directly to the complainant from monies that are due and payable to the Contractor upon receipt from the complainant of:

(a) a written award issued pursuant to the federal Commercial Arbitration Act, R.S.C. 1985, c. 17 (2nd Supp.);

(b) a written award issued pursuant to the Canadian Human Rights Act, RS.C. 1985, c. H-6;

(c) a written award issued pursuant to provincial or territorial human rights legislation; or

(d) a judgement issued by a court of competent jurisdiction.

9) If the NCC is of the opinion that the Contractor has breached any of the provisions of this clause, the NCC may take the Work out of the Contractor's hands pursuant to GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS.

10) Subject to paragraph 7) of GC3.6 SUBCONTRACTING, the Contractor shall ensure that the provisions of this clause are included in all agreements and contracts entered into as a consequence of the Work.

## GC2.8 ACCOUNTS AND AUDITS

1) The Contractor shall, in addition to the requirements expressed in paragraph 6) of GC3.4 EXECUTION OF THE WORK, maintain full records of the Contractor's estimated and actual cost of the Work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto, and shall make them available on request to audit and inspection by the NCC or by persons designated to act on behalf of the NCC.

2) The Contractor shall allow any of the persons referred to in paragraph 1) of GC2.8 to make copies of and take extracts from any of the records and material, and shall furnish such persons or entities with any information those persons or entities may require from time to time in connection with such records and material.

3) The Contractor shall maintain and keep the records intact until the expiration of two years after the date that a Certificate of Completion has been issued or until the expiration of such other period of time as the NCC may direct.

4) The Contractor shall cause all subcontractors at any tier 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 the requirements of this clause as if they were the Contractor.

## GC3.1 PROGRESS SCHEDULE

1) The Contractor shall:

   (a) prepare and submit to the NCC, prior to the submission of the Contractor's first progress claim, a progress schedule in accordance with the requirements set out in the Contract;

   (b) monitor the progress of the Work relative to the schedule and update the schedule as stipulated by the contract documents;

   (c) advise the NCC of any revisions to the schedule required as the result of any extension of time for completion of the Contract that was approved by the NCC; and

   (d) prepare and submit to the NCC, at the time of issuance of an Certificate of Substantial Performance, an update of any schedule clearly showing a detailed timetable that is acceptable to the NCC for the completion of any unfinished Work and the correction of all listed defects.

## GC3.2 ERRORS AND OMISSIONS

1) The Contractor shall report promptly to the NCC any errors, discrepancies, or omissions the Contractor may discover when reviewing the contract documents. In making a review, the Contractor does not assume any responsibility to the NCC for the accuracy of the review. The Contractor shall not be liable for damage or costs resulting from such errors, discrepancies, or omissions in the contract documents prepared by or on behalf of the NCC that the Contractor did not discover.

## GC3.3 CONSTRUCTION SAFETY

1) Subject to GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS, the Contractor shall be solely responsible for construction safety at the place of the Work and for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Work. In any emergency, the Contractor shall either, stop the Work, make changes or order extra work to ensure the safety of life and the protection of the Work and neighbouring property.

2) Prior to commencing the Work, the Contractor shall notify the authorities having jurisdiction for construction safety at the site of the Work with respect to the intended commencement of the Work, and shall provide such authority with whatever additional information may be required by that authority.

## GC3.4 EXECUTION OF THE WORK

1) The Contractor shall perform, use or supply and pay for, all labour, Plant, Material, tools, construction machinery and equipment, water, heat, light, power, transportation and other facilities and services necessary for the performance of the Work in accordance with the Contract.

2) The Contractor shall, at all times, perform the Work in a proper, diligent and expeditious manner as is consistent with construction industry standards and in accordance with the progress schedule prepared pursuant to GC3.1 PROGRESS SCHEDULE and shall provide sufficient personnel to fulfil the Contractor's obligations in accordance with that schedule.

3) Subject to paragraph 4) of GC3.4, the Contractor shall have complete care, custody and control of the Work and shall direct and supervise the Work so as to ensure compliance with the Contract. The Contractor shall be responsible for construction means, methods, techniques, sequences and procedures and for co-ordinating the various parts of the Work.

4) When requested in writing by the NCC, the Contractor shall make appropriate alterations in the method, Plant or workforce at any time the NCC considers the Contractor's actions to be unsafe or damaging to either the Work, existing facilities, persons at the site of the Work or the environment.

5) The Contractor shall have sole responsibility for the design, erection, operation, maintenance and removal of temporary structures and other temporary facilities and for the construction methods used in their erection, operation, maintenance and removal. The Contractor shall engage and pay for registered professional engineering personnel, skilled in the appropriate discipline to perform these functions if required by law or by the Contract, and in all cases when such temporary facilities and their methods of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.

6) The Contractor shall keep at least one copy of current contract documents, submittals, reports, and records of meetings at the site of the Work, in good order and available to the NCC.

7) Except for any part of the Work that is necessarily performed away from or off the site of the Work, the Contractor shall confine Plant, storage of Material, and operations of employees to limits indicated by laws, ordinances, permits or the contract documents.

## GC3.5 MATERIAL

1) Unless otherwise specified in the Contract, all Material incorporated in the Work shall be new.

2) Subject to paragraph 3) of GC3.5, if a specified reused, refurbished, or recycled item of Material is not available, the Contractor shall apply to the NCC to substitute a similar item for the one specified.

3) If the NCC agrees that the Contractor's application for substitution of a reused, refurbished or recycled item is warranted, and that the substitute item is of acceptable quality and value to that specified and is suitable for the intended purpose, the NCC may approve the substitution, subject to the following:

   (a) the request for substitution shall be made in writing to the NCC and shall be substantiated by information in the form of the manufacturer's literature, samples and other data that may be required by the NCC;

   (b) the Contractor shall make the request for substitution in a manner that shall not negatively affect the progress schedule of the Contract and well in advance of the time the item of Material must be ordered;

(c) substitution of Material shall be permitted only with the prior written approval of the NCC, and any substituted items that are supplied or installed without such approval shall be removed from the site of the Work at the expense of the Contractor, and specified items installed at no additional cost to the NCC; and

(d) the Contractor shall be responsible for all additional expenses incurred by the NCC, the Contractor, its subcontractors and suppliers at any tier due to the Contractor's use of the substitute.

**GC3.6 SUBCONTRACTING**

1) Subject to the provisions of this clause, the Contractor may subcontract any part of the Work but not the whole of the Work.

2) The Contractor shall notify the NCC in writing of the Contractor's intention to subcontract.

3) A notification referred to in paragraph 2) of GC3.6 shall identify the part of the Work and the Subcontractor with whom the Contractor intends to subcontract.

4) The NCC may for reasonable cause, object to the intended subcontracting by notifying the Contractor in writing within six (6) days of receipt by the NCC of a notification referred to in paragraph 2) of GC3.6.

5) If the NCC objects to a subcontracting, the Contractor shall not enter into the intended subcontract.

6) The Contractor shall not change, nor permit to be changed, a Subcontractor engaged by the Contractor, in accordance with this clause, without the written consent of the NCC.

7) The Contractor shall ensure that all the terms and conditions of the Contract that are of general application shall be incorporated in every other contract issued as a consequence of the Contract, at whatever tier, except those contracts issued solely to suppliers at any tier for the supply of Plant or Material.

8) Neither a subcontracting nor the NCC's consent to a subcontracting shall be construed to relieve the Contractor from any obligation under the Contract or to impose any liability upon the NCC.

**GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS**

1) The NCC reserves the right to send other contractors or workers, with or without Plant and Material, onto the site of the Work.

2) When other contractors or workers are sent on to the site of the Work, the NCC shall:

(a) enter into separate contracts, to the extent it is possible, with the other contractors under conditions of contract that are compatible with the conditions of the Contract;

(b) ensure that the insurance coverage provided by the other contractors is co-ordinated with the insurance coverage of the Contractor as it affects the Work; and

(c) take all reasonable precautions to avoid labour disputes or other disputes arising from the work of the other contractors or workers.

3) When other contractors or workers are sent on to the site of the Work, the Contractor shall:

(a) co-operate with them in the carrying out of their duties and obligations;

(b) co-ordinate and schedule the Work with the work of the other contractors and workers;

(c) participate with other contractors and workers in reviewing their construction schedules when directed to do so;

(d) where part of the Work is affected by or depends upon the work of other contractors or workers for its proper execution, promptly report to the NCC in writing and prior to proceeding with that part of the Work, any apparent deficiencies in such work. Failure by the Contractor to so report shall invalidate any claims against the NCC by reason of the deficiencies in the work of other contractors or workers except those deficiencies that are not then reasonably discoverable; and

(e) when designated as being responsible for construction safety at the place for work, in accordance with the applicable provincial or territorial laws, carry out its duties in that role and in accordance with those laws.

4) If, when entering into the Contract, the Contractor could not have reasonably foreseen nor anticipated the sending of other contractors or workers on to the site of the Work and provided the Contractor:

(a) incurs extra expense in complying with the requirements of paragraph 3) of GC3.7; and

(b) gives the NCC written notice of a claim for that extra expense within thirty (30) days of the date that the other contractors or workers were sent onto the Work or its site,

the NCC shall pay the Contractor the cost of the extra labour, Plant and Material that was necessarily incurred, calculated in accordance with GC6.4 DETERMINATION OF PRICE.

## GC3.8 LABOUR

1) The Contractor shall maintain good order and discipline among the Contractor's employees and workers engaged in the Work shall not employ, on the site of the Work, anyone not skilled in the tasks assigned.

## GC3.9 TRUCK HAULAGE RATES

**CANCELLED**

## GC3.10 MATERIAL, PLANT AND REAL PROPERTY BECOME PROPERTY OF THE NCC

1) Subject to paragraph 9) of GC1.8 LAWS PERMITS AND TAXES, all Material and Plant and the interest of the Contractor in all real property, licences, powers and privileges purchased, used or consumed by the Contractor for the Work shall, immediately after the time of their purchase, use or consumption be the property of the NCC for the purposes of the Work and they shall continue to be the property of the NCC:

(a) in the case of Material, until the NCC indicates that the Materials shall not be required for the Work; and

(b) in the case of Plant, real property, licences, powers and privileges, until the NCC indicates that the interest vested in the NCC therein is no longer required for the purposes of the Work.

2) Material or Plant, that is the property of the NCC by virtue of paragraph 1) of GC3.10, shall not be taken away from the site of the Work nor used nor disposed of except for the purposes of the Work without the written consent of the NCC.

3) The NCC is not liable for loss of nor damage from any cause to the Material or Plant referred to in paragraph 1) of GC3.10, and the Contractor is liable for such loss or damage notwithstanding that the Material or Plant is the property of the NCC.

**GC3.11 DEFECTIVE WORK**

1) The Contractor shall promptly remove from the site of the Work and replace or re-execute defective Work whether or not the defective Work has been incorporated in the Work and whether or not the defect is the result of poor workmanship, use of defective Material, or damage through carelessness or other act or omission of the Contractor.

2) The Contractor, at the Contractor's expense, shall promptly make good other work destroyed or damaged by such removals or replacements.

3) If, in the opinion of the NCC, it is not expedient to correct defective Work or Work not performed as provided for in the Contract documents, the NCC may deduct from the amount otherwise due to the Contractor the difference in value between the Work as performed and that called for by the Contract documents.

4) The failure of the NCC to reject any defective Work or Material shall not constitute acceptance of the defective Work or Material.

**GC3.12 CLEANUP OF SITE**

1) The Contractor shall maintain the Work and its site in a tidy condition and free from an accumulation of waste material and debris.

2) Before the issue of a Certificate of Substantial Performance, the Contractor shall remove waste material and debris, and all Plant and Material not required for the performance of the remaining Work and, unless otherwise stipulated in the Contract Documents, shall cause the Work and its site to be clean and suitable for occupancy by the NCC.

3) Before the issue of a Certificate of Completion, the Contractor shall remove all surplus Plant and Materials and any waste products and debris from the site of the Work.

4) The Contractor's obligations described in paragraphs 1) to 3) of GC3.12 do not extend to waste products and other debris caused by the NCC's servants, or by other contractors and workers referred to in GC3.7 CONSTRUCTION BY OTHER CONTRACTORS OR WORKERS.

**GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK**

1) Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract, the Contractor shall, at the Contractor's expense:

   (a) rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC with respect to those parts of the Work accepted in connection with the Certificate of Substantial Performance within 12 months from the date of Substantial Performance; and

   (b) rectify and make good any defect or fault that appears in or comes to the attention of the NCC in connection with those parts of the Work described in the Certificate of Substantial Performance within 12 months from the date of the Certificate of Completion;

   (c) transfer and assign, to the NCC, any subcontractor, manufacturer or supplier extended warranties or guarantees implied or imposed by law or contained in the Contract covering periods beyond the 12 months stipulated above. Extended warranties or guarantees referred to

herein shall not extend the 12-month period whereby the Contractor, except as may be provided elsewhere in the Contract, must rectify and make good any defect or fault that appears in the Work or comes to the attention of the NCC;

(d) provide, to the NCC prior to the issuance of the Certificate of Completion, a list of all extended warranties and guarantees referred to in paragraph (c) above.

2) The NCC may direct the Contractor to rectify and make good any defect or fault referred to in paragraph 1) of GC3.13 or covered by any other expressed or implied warranty or guarantee and the Contractor shall rectify and make good such defect within the time stipulated in the direction.

3) A direction referred to in paragraph 2) GC3.13 shall be in writing and shall be given to the Contractor in accordance with GC2.3 NOTICES.

## GC4.1 PROTECTION OF WORK AND PROPERTY

1) The Contractor shall protect the Work and its site against loss or damage from any cause and shall similarly protect all Material, Plant and real property under the Contractor's care, custody and control whether or not such Material, Plant and real property are supplied by the NCC to the Contractor.

2) The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the NCC to inspect or to take security measures in respect of the Work and its site.

3) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraphs 1) or 2) of GC4.1, and the Contractor, shall comply with such direction.

## GC4.2 PRECAUTIONS AGAINST DAMAGE, INFRINGEMENT OF RIGHTS, FIRE AND OTHER HAZARDS

1) The Contractor shall do whatever is necessary to ensure that:

   (a) no person, property, right, easement nor privilege is injured, damaged or infringed upon by reasons of the Contractor's activities in performing the Work;

   (b) pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted nor endangered by the performance or existence of the Work, Material or Plant;

   (c) fire hazards in or about the site of the Work are eliminated and any fire is promptly extinguished;

   (d) the health and safety of all persons employed in the performance of the Work is not endangered by the methods nor means of their performance;

   (e) adequate medical services are available to all persons employed on the Work or its site at all times during the performance of the Work;

   (f) adequate sanitation measures are taken in respect of the Work and its site; and

   (g) all stakes, buoys and marks placed on the Work or its site by the NCC are protected and are not removed, defaced, altered nor destroyed.

2) The NCC may direct the Contractor to do such things and to perform such work as the NCC considers reasonable and necessary to ensure compliance with or to remedy a breach of paragraph 1) of GC4.2, and the Contractor shall comply with the direction of the NCC.

## GC4.3 MATERIAL, PLANT AND REAL PROPERTY SUPPLIED BY THE NCC

1) Subject to paragraph 2) of GC4.3, the Contractor is liable to the NCC 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 the NCC for use in connection with the Contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.

2) The Contractor is not liable to the NCC for any loss or damage to Material, Plant or real property referred to in paragraph 1) of GC4.3 if that loss or damage results from and is directly attributable to reasonable wear and tear.

3) The Contractor shall not use any Material, Plant or real property supplied by the NCC except for the purpose of performing the Contract.

4) When the Contractor fails to make good any loss or damage for which the Contractor is liable under paragraph 1) within a reasonable time, the NCC may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to the NCC for the cost thereof and shall, on demand, pay to the NCC an amount equal to that cost.

5) The Contractor shall keep records of all Material, Plant and real property supplied by the NCC as the NCC requires and shall satisfy the NCC, when requested, that such Material, Plant and real property are at the place and in the condition in which they ought to be.

## GC4.4 CONTAMINATED SITE CONDITIONS

1) For the purposes of GC4.4, a contaminated site condition exists when a solid, liquid, gaseous, thermal or radioactive irritant or contaminant, or other hazardous or toxic substance or material, including moulds and other forms of fungi, is present at the site of the Work to an extent that constitutes a hazard, or potential hazard, to the environment, property, or the health or safety of any person.

2) If the Contractor encounters a contaminated site condition of which the Contractor is not aware or about which the Contractor has not been advised, or if the Contractor has reasonable grounds to believe that such a site condition exists at the site of the Work, the Contractor shall:

   (a) take all reasonable steps, including stopping the Work, to ensure that no person suffers injury, sickness or death, and that neither property nor the environment is injured or destroyed as a result of the contaminated site condition;

   (b) immediately notify the NCC of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification from the Contractor, the NCC shall promptly determine whether a contaminated site condition exists, and shall notify the Contractor in writing of any action to be taken, or work to be performed, by the Contractor as a result of the NCC's determination.

4) If the Contractor's services are required by the NCC, the Contractor shall follow the direction of the NCC with regard to any excavation, treatment, removal and disposal of any polluting substance or material.

5) The NCC, at the NCC's sole discretion, may enlist the services of experts and specialty contractors to assist in determining the existence of, and the extent and treatment of contaminated site conditions, and the Contractor shall allow them access and co-operate with them in the carrying out of their duties and obligations.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE shall apply to any additional work made necessary because of a contaminated site condition.

## GC5.1 INTERPRETATION

In these Terms of Payment

1) The "payment period" means a period of 30 consecutive days or such other longer period as may be agreed between the Contractor and the NCC.

2) An amount is "due and payable" when it is due and payable by the NCC to the Contractor according to GC5.4 PROGRESS PAYMENT, GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK or GC5.6 FINAL COMPLETION.

3) An amount is overdue when it remains unpaid on the first day following the day upon which it is due and payable.

4) The "date of payment" means the date of the negotiable instrument of an amount due and payable by the NCC.

5) The "Bank Rate" means the rate of interest established by the Bank of Canada as the minimum rate at which it makes short term advances to members of the Canadian Payments Association.

6) The "Average Bank Rate" means the simple arithmetic mean of the Bank Rate in effect at 4:00 p.m. Ottawa Time each day during the calendar month which immediately precedes the calendar month in which payment is made.

## GC5.2 AMOUNT PAYABLE

1) Subject to any other provisions of the Contract, the NCC shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which the amounts payable by the NCC to the Contractor in accordance with the Contract exceed the amounts payable by the Contractor to the NCC, and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by the Contractor in respect of the Work to which the payment relates.

2) When making any payment to the Contractor, the failure of the NCC to deduct an amount payable to the NCC by the Contractor shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

3) No payment other than a payment that is expressly stipulated in the Contract, shall be made by the NCC to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

## GC5.3 INCREASED OR DECREASED COSTS

1) The Contract Amount shall not be increased nor 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, Material or any wage adjustment arising pursuant to the Labour Conditions.

2) Notwithstanding paragraph 1) of GC5.3, if any change, including a new imposition or repeal, of any tax, customs or other duty, charge, or any similar imposition that is imposed under sales, customs or excise tax legislation of the Government of Canada or any Provincial or Territorial legislation, affects the cost of the Work to the Contractor, and occurs:

   (a) after the date of submission by the Contractor of its tender; or

   (b) after the date of submission of the last revision, if the Contractor's tender was revised,

   the Contract Amount shall be adjusted in the manner provided in paragraph 3) of GC5.3.

3) If a change referred to in paragraph 2) of GC5.3 occurs, the Contract Amount shall be increased or decreased by an amount established by an examination by the NCC of the relevant records of the Contractor referred to in GC2.8 ACCOUNTS AND AUDITS to be the increase or decrease in the cost incurred by the Contractor that is directly attributable to that change.

4) For the purpose of paragraph 2) of GC5.3, if a tax is changed after the tender closing, but public notice of the change has been given by the Minister of Finance or the corresponding Provincial or Territorial authority before that closing, the change shall be deemed to have occurred before the solicitation closing.

5) Notwithstanding paragraphs 2) to 4) of GC5.3, no adjustment to the Contract Amount in respect of the Work or a part thereof shall be made for a change in any imposition referred to in this section that occurs after the date required by the Contract for completion of the Work or that part of the Work.

## GC5.4 PROGRESS PAYMENT

1) On the expiration of a payment period, the Contractor shall deliver to the NCC:

   (a) a written progress claim in a form acceptable to the NCC 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: and

   (b) a completed and signed statutory declaration containing a declaration that, up to the date of the progress claim, the Contractor has complied with all lawful obligations with respect to the Labour Conditions and that, in respect of the Work, all lawful obligations of the Contractor to its Subcontractors and Suppliers, referred to collectively in the declaration as "subcontractors and suppliers", have been fully discharged.

2) Within 10 days of receipt of a progress claim and statutory declaration from the Contractor, the NCC shall inspect, or cause to have inspected, the part of the Work and the Material described in the progress claim, and shall issue a progress report 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 NCC:

   (a) is in accordance with the Contract; and

   (b) was not included in any other progress report relating to the Contract.

3) Subject to GC5.2 AMOUNT PAYABLE, and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to:

   (a) 95% of the value that is indicated in the NCC's progress report if a labour and material payment bond has been furnished by the Contractor; or

   (b) 90% of the value that is indicated in the NCC's progress report if a labour and material payment bond has not been furnished by the Contractor.

4) Subject to GC5.2, "Amount Payable", and paragraph 5) of GC5.4, the NCC shall pay the Contractor an amount that is equal to 90% of the value that is indicated in the NCC's progress report

5) In the case of the Contractor's first progress claim, it is a condition precedent to the NCC's obligation under paragraph 3) of GC5.4 that the Contractor has provided all necessary documentation required by the Contract for the first progress claim and has provided evidence of compliance with workers' compensation legislation applicable to the place of the Work in accordance with GC1.9 WORKERS' COMPENSATION.

## GC5.5 SUBSTANTIAL PERFORMANCE OF THE WORK

1) If, at any time before the issuance of a Certificate of Completion, the NCC determines that the Work has reached Substantial Performance as described in subparagraph 1) (b) of GC1.1.4 SUBSTANTIAL PERFORMANCE, the NCC shall issue a Certificate of Substantial Performance to the Contractor. The Certificate of Substantial Performance shall state or describe:

   (a) the date of Substantial Performance;

   (b) the parts of the Work not completed to the satisfaction of the NCC; and

   (c) all things that must be done by the Contractor before a Certificate of Completion is issued and before the 12-month warranty period referred to in GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK commences for the said parts and all the said things.

2) The issuance of a Certificate of Substantial Performance does not relieve the Contractor from the Contractor's obligations under GC3.11 DEFECTIVE WORK.

3) Subject to GC5.2 AMOUNT PAYABLE and paragraph 4) of GC5.5, the NCC shall pay the Contractor the amount referred to in paragraph 1) of GC5.2 AMOUNT PAYABLE, less the aggregate of:

   (a) the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT;

   (b) an amount that is equal to the NCC's estimate of the cost to the NCC of rectifying defects described in the Certificate of Substantial Performance; and

   (c) an amount that is equal to the NCC's estimate of the cost to the NCC of completing the parts of the Work described in the Certificate of Substantial Performance other than defects listed therein.

4) The NCC shall pay the amount referred to in paragraph 3) of GC5.5 not later than:

   (a) 30 days after the date of issue of a Certificate of Substantial Performance, or

   (b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration containing a declaration by the Contractor that up to the date of the Certificate of Substantial Performance, the Contractor has complied with all lawful obligations with respect to the Labour Conditions, discharged all its lawful obligations to its Subcontractors and Suppliers in respect of the work under the Contract, and discharged its lawful obligations referred to in GC1.8 LAWS, PERMITS AND TAXES;

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION; and

(iii) an update of the progress schedule in accordance with the requirements of GC3.1 PROGRESS SCHEDULE;

whichever is later.

**GC5.6 FINAL COMPLETION**

1) When the NCC is of the opinion that the Contractor has complied with the Contract and all orders and directions made pursuant thereto, and that the Work has been completed as described in GC1.1.5 COMPLETION, the NCC shall issue a Certificate of Completion to the Contractor and, if the Work or a portion of the Work is subject to a Unit Price Arrangement, the NCC shall issue a Certificate of Measurement that shall, subject to GC8, be binding upon and conclusive between the NCC and the Contractor as to the quantities referred to therein.

2) Subject to GC5.2 AMOUNT PAYABLE and paragraph 3) of GC5.6, the NCC shall pay the Contractor the amount referred to in GC5.2 AMOUNT PAYABLE, less the aggregate of the sum of all payments that were made pursuant to GC5.4 PROGRESS PAYMENT and GC5.5 SUBSTANTIAL PERFORMANCE OF WORK.

3) The NCC shall pay the amount referred to in paragraph 2) of GC5.6 not later than:

(a) 60 days after the date of issue of a Certificate of Completion; or

(b) 15 days after the Contractor has delivered to the NCC:

(i) a statutory declaration which contains a declaration 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; and

(ii) evidence of compliance with workers' compensation legislation in accordance with GC1.9 WORKERS' COMPENSATION;

whichever is later.

**GC5.7 PAYMENT NOT BINDING ON NCC**

1) Neither acceptance of a progress claim or progress report, nor any payment made by the NCC under the Contract, nor partial or entire use or occupancy of the Work by the NCC shall constitute an acceptance by the NCC of any portion of the Work or Material that is not in accordance with the requirements of the Contract.

**GC5.8 CLAIMS AND OBLIGATIONS**

1) The Contractor shall discharge all the Contractor's lawful obligations and shall satisfy all lawful claims against the Contractor arising out of the performance of the Work at least as often as the Contract requires the NCC to pay the Contractor.

2) Whenever requested to do so by the NCC, the Contractor shall make a statutory declaration declaring to the existence and condition of any obligations and claims against the Contractor arising out of the performance of the Work.

3) In order to discharge lawful obligations of and satisfy lawful claims against the Contractor or its Subcontractors arising out of the performance of the Contract, the NCC may pay an amount that is due and payable to the Contractor directly to the claimant. Such payment is, to the extent of the payment, a discharge of the NCC's liability to the Contractor under the Contract and may be deducted from any amount payable to the Contractor under the Contract.

4) For the purposes of paragraph 3) of GC5.8, and subject to paragraph 6) of GC5.8, a claim or obligation shall be considered lawful when it is so determined by:

   (a) a court of legal jurisdiction;

   (b) an arbitrator duly appointed to arbitrate the claim; or

   (c) the written consent of the Contractor authorizing payment of the claim or obligation.

5) If a claim or obligation would have been subject to the provisions of Provincial or Territorial lien legislation or, in the Province of Quebec, the law relating to legal hypothecs had the Contractor been performing the Work for an entity other than the NCC:

   (a) such amount as may be paid by the NCC pursuant to paragraphs 3) and 4) of GC5.8 shall not exceed the amount that the Contractor would have been obliged to pay had the provisions of such legislation or law been applicable to the Work;

   (b) a 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 the claimant might have had; and

   (c) for the purposes of determining the entitlement of a claimant, the notice required by paragraph 8) of GC5.8 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 such legislation.

6) The Contractor shall, at the request of any claimant, submit to binding arbitration those questions that need to be answered to establish the entitlement of the claimant to payment. The arbitration shall have as parties to it any Subcontractor or Supplier to whom the claimant supplied Material, performed work or rented equipment should such Subcontractor or Supplier wish to be adjoined, and the NCC shall not be a party to such arbitration. Subject to any agreement between the Contractor and the claimant, the arbitration shall be conducted in accordance with the governing Provincial or Territorial legislation applicable to the site of the Work.

7) Paragraph 3) of GC5.8 shall apply only to claims and obligations:

   (a) the notification of which has set forth the amount claimed to be owing and the person who by contract is primarily liable and has been received by the NCC in writing before final payment is made to the Contractor pursuant to GC5.6 FINAL COMPLETION, and within 120 days of the date on which the claimant:

(i) should have been paid in full under the claimant's contract with the Contractor, its Subcontractor or Supplier if the claim is for money that was lawfully required to be held back from the claimant; or

(ii) 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 its Subcontractor or Supplier where the claim is for money not lawfully required to be held back from the claimant; and

(b) the proceedings to determine the right to payment of which, pursuant to paragraph 5) of GC5.8, shall have commenced within one year from the date that the notification required by subparagraph 7)(a) of GC5.8 was received by the NCC.

8) Upon receipt of a notice of claim, the NCC may 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.

9) The NCC shall notify the Contractor in writing in a timely manner of receipt of any claim and of the intention of the NCC to withhold funds. At any time thereafter and until payment is made to the claimant, the Contractor may be entitled to post, with the NCC, security in a form acceptable to the NCC in an amount equal to the value of the claim, and upon receipt of such security the NCC shall release to the Contractor any funds that would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of this clause in respect of the claim of any claimant for whom the security stands.

**GC5.9 RIGHT OF SETOFF**

1) Without limiting any right of setoff or deduction given or implied by law or elsewhere in the Contract, the NCC may set off any amount payable to the NCC by the Contractor under the Contract, or under any current contract, against any amount payable to the Contractor under the Contract.

2) For the purposes of paragraph 1) of GC5.9, "current contract" means a contract between the NCC and the Contractor:

(a) under which the Contractor has an undischarged obligation to perform or supply work, labour or material; or

(b) in respect of which the NCC has, since the date of the Contract, exercised any right to take the work that is the subject of that contract out of the Contractor's hands.

**GC5.10 ASSESSMENTS AND DAMAGES FOR LATE COMPLETION**

1) For the purposes of this clause:

(a) the Work shall be deemed to be completed on the date of the Certificate of Completion; and

(b) the "period of delay" means the number of days commencing on the day fixed 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 GC6.5 DELAYS AND EXTENSION OF TIME and any other day on which, in the opinion of the NCC, completion of the Work was delayed for reasons beyond the control of the Contractor.

2) If the Contractor does not complete the Work by the day fixed for its completion but completes it thereafter, the Contractor shall pay the NCC an amount equal to the aggregate of:

(a) all salaries, wages and travelling expenses incurred by the NCC in respect of persons overseeing the performance of the Work during the period of delay;

(b) the cost incurred by the NCC as a result of the inability to use the completed Work for the period of delay; and

(c) all other expenses and damages incurred or sustained by the NCC during the period of delay as a result of the Work not being completed by the day fixed for its completion.

3) The NCC may waive the right of the NCC to the whole or any part of the amount payable by the Contractor pursuant to paragraph 2) of GC5.10 if, in the opinion of the NCC, it is in the public interest to do so.

**GC5.11 DELAY IN MAKING PAYMENT**

1) Notwithstanding GC1.5 TIME OF THE ESSENCE, any delay by the NCC in making any payment when it is due pursuant to GC5 TERMS OF PAYMENT, shall not be a breach of the Contract by the NCC.

2) Subject to paragraph 3) of GC5.11, the NCC shall pay to the Contractor simple interest at the Average Bank Rate plus 3 percent per annum on any amount that is overdue pursuant to paragraph 3) of GC5.1 INTERPRETATION, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment.

3) Interest shall be paid, on demand by the Contractor, except that:

(a) in respect of amounts that are less than 15 days overdue, no interest shall be paid in respect of payment made within such 15 days; and

(b) interest shall not be payable or paid on overdue advance payments, if any.

**GC5.12 INTEREST ON SETTLED CLAIMS**

1) For the purposes of this clause, a claim means a disputed amount subject to negotiation between the NCC and the Contractor under the Contract.

2) A claim is deemed to have been settled when an agreement in writing is signed by the NCC and the Contractor setting out the amount of the claim to be paid by the NCC and the items of work for which the said amount is to be paid.

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.

4) The NCC shall pay to the Contractor simple interest on the amount of a settled claim at the Average Bank Rate plus 3 per cent per annum from the date the settled claim was deemed to be outstanding until the day prior to the date of payment.

**GC5.13 RETURN OF SECURITY DEPOSIT**

1) After a Certificate of Substantial Performance has been issued, and if the Contractor is not in breach of nor in default under the Contract, the NCC shall return to the Contractor all or any part of a Security Deposit that, in the opinion of the NCC, is not required for the purposes of the Contract.

2) After a Certificate of Completion has been issued, the NCC shall return to the Contractor the remainder of any security deposit unless the Contract stipulates otherwise.

3) If the security deposit was paid to the NCC, the NCC shall pay interest thereon to the Contractor at a rate established pursuant to section 21(2) of the Financial Administration Act.

## GC6.1 CHANGES IN THE WORK

1) At any time before issuance of a Certificate of Completion, Canada may issue orders for additions, deletions or other changes to the Work, or changes in the location or position of the whole or any part of the Work, if the addition, deletion, change or other revision is deemed by Canada to be consistent with the general intent of the Contract.

2) An order referred to in paragraph 1) of GC6.1 shall be in writing and given to the Contractor in accordance with GC2.3 NOTICES.

3) Upon receipt of an order, the Contractor shall promptly perform the work in accordance with the order as if the order had appeared in and been part of the original Contract.

4) If anything done or omitted by the Contractor pursuant to an order increases or decreases the cost of the Work to the Contractor, payment for the work shall be made in accordance with GC6.4 DETERMINATION OF PRICE.

## GC6.2 CHANGES IN SUBSURFACE CONDITIONS

1) If, during the performance of the Work, the Contractor encounters subsurface conditions that are substantially different from the subsurface conditions described in the tender documents supplied to the Contractor, or a reasonable assumption of fact based thereon, the Contractor shall give notice to Canada immediately upon becoming aware of the situation.

2) If the Contractor is of the opinion that the Contractor may incur or sustain any extra expense or any loss or damage that is directly attributable to the changed subsurface conditions, the Contractor shall within 10 days of the date the changed subsurface conditions were encountered, give Canada written notice of intention to claim for that extra expense, loss or damage.

3) If the Contractor has given a notice referred to in paragraph 2) of GC6.2, the Contractor shall give Canada a written claim for extra expense, loss or damage no later than 30 days after the date that a Certificate of Substantial Performance is issued.

4) A written claim referred to in paragraph 3) of GC6.2 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified, and the Contractor shall supply such further and other information for that purpose as Canada requires.

5) If Canada determines that a claim referred to in paragraph 3) of GC6.2 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

6) If, in the opinion of Canada, the Contractor effects a saving of expenditure that is directly attributable to a substantial difference between the information relating to subsurface conditions at the site of the Work that is contained in the tender documents, or a reasonable assumption of fact based thereon, and the actual subsurface conditions encountered by the Contractor, the Contract Amount shall be reduced by the amount of the saving of expenditure determined in accordance with GC6.4 DETERMINATION OF PRICE.

7) If the Contractor fails to give a notice referred to in paragraph 2) of GC6.2 and a claim referred to in paragraph 3) of GC6.2 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

8) Canada does not warrant the content expressed in any subsurface report available for the perusal of the Contractor that does not form part of the tender and contract documents.

## GC6.3 HUMAN REMAINS, ARCHAEOLOGICAL REMAINS AND ITEMS OF HISTORICAL OR SCIENTIFIC INTEREST

1) For the purposes of this clause

   (a) "human remains" means the whole or any part of a deceased human being, irrespective of the time of death;

   (b) "archaeological remains" are items, artefacts or things made, modified or used by human beings in antiquity and may include, but not be limited to, stone, wood or iron structures or monuments, dump deposits, bone artefacts, weapons, tools, coins, and pottery; and

   (c) "items of historical or scientific interest" are naturally occurring or manufactured objects or things of any age that are not archaeological remains but may be of interest to society because of their historical or scientific significance, value, rarity, natural beauty, or other quality.

2) If, during the course of the Work, the Contractor encounters any object, item or thing which is described in paragraph 1) of GC6.3 or which resembles any object, item or thing described in paragraph 1) of GC6.3, the Contractor shall

   (a) take all reasonable steps, including stopping work in the affected area, to protect and preserve the object, item or thing;

   (b) immediately notify Canada of the circumstances in writing; and

   (c) take all reasonable steps to minimize additional costs that may accrue as a result of any work stoppage.

3) Upon receipt of a notification in accordance with subparagraph 2)(b) of GC6.3, Canada shall promptly determine whether the object, item or thing is one described in, or contemplated by paragraph 1) of GC6.3, and shall notify the Contractor in writing of any action to be performed, or work to be carried out, by the Contractor as a result of Canada's determination.

4) Canada may, at any time, enlist the services of experts to assist in the investigation, examination, taking of measurements or other such recordings, placing of permanent protection around or removing of the object, item or thing encountered by the Contractor, and the Contractor shall, to the satisfaction

of Canada, allow them access and co-operate with them in the carrying out of their duties and obligations.

5) Human remains, archaeological remains and items of historical or scientific interest encountered at the site of the Work shall be deemed to be the property of Canada.

6) Except as may be otherwise provided for in the Contract, the provisions of GC6.4 DETERMINATION OF PRICE and GC6.5 DELAYS AND EXTENSION OF TIME shall apply.

## GC6.4 DETERMINATION OF PRICE

### GC6.4.1 Price Determination Prior to Undertaking Changes

1) If a Lump Sum Arrangement applies to the Contract or a part thereof, the price of any change shall be the aggregate estimated cost of labour, Plant and Material that is required for the change as agreed upon in writing by the Contractor and Canada plus an allowance for supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount, which allowance shall be equal to

   (a) 20% of the aggregate costs referred to herein for that portion of the Work done by the Contractor's own forces, if the aggregate cost of the Work does not exceed $50,000;

   (b) 15% of the aggregate costs referred to herein for that portion of the Work that is done by subcontract, if the aggregate cost of the Work does not exceed $50,000; or

   (c) a negotiated percentage of the aggregate costs referred to herein or a negotiated amount

      (i) if the aggregate cost of the Work exceeds $50,000; or

      (ii) if the Contractor and Canada agree in writing.

2) If a Unit Price Arrangement applies to the Contract or a part thereof, the Contractor and Canada may, by agreement in writing, add items, units of measurement, estimated quantities and prices per unit to the Unit Price Table.

3) A price per unit referred to in paragraph 2) of GC6.4.1 shall be determined on the basis of the aggregate estimated cost of labour, Plant and Material that is required for the additional item as agreed upon by the Contractor and Canada, plus an allowance determined in accordance with paragraph 1) of GC6.4.1.

4) To facilitate approval of the price of the change or the additional price per unit as applicable, the Contractor shall submit a cost estimate breakdown identifying, as a minimum, the estimated cost of labour, Plant, Material, each subcontract amount, and the amount of the allowance.

5) If no agreement is reached as contemplated in paragraph 1) of GC6.4.1, the price shall be determined in accordance with GC6.4.2.

6) If no agreement is reached, as contemplated in paragraphs 2) and 3) of GC6.4.1, Canada shall determine the class and the unit of measurement of the item of labour, Plant or Material and the price per unit shall be determined in accordance with GC6.4.2.

### GC6.4.2 Price Determination Following Completion of Changes

1) If it is not possible to predetermine, or if there is failure to agree upon the price of a change in the Work, the price of the change shall be equal to the aggregate of

(a) all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, Plant and Material that fall within one of the classes of expenditure described in paragraph 2) of GC6.4.2, that are directly attributable to the performance of the Contract;

(b) an allowance for profit and all other expenditures or costs, including overhead, general administration costs, financing and interest charges, in an amount that is equal to 10% of the sum of the expenses referred to in subparagraph 1)(a) of GC6.4.2; and

(c) interest on the amounts determined under subparagraphs 1)(a) and 1)(b) of GC6.4.2 calculated in accordance with GC5.12 INTEREST ON SETTLED CLAIMS;

2) The cost of labour, Plant and Material referred to in subparagraph 1)(a) of GC6.4.2 shall be limited to the following categories of expenditure:

(a) payments to Subcontractors and Suppliers;

(b) wages, salaries, bonuses and, if applicable, travel and lodging expenses of employees of the Contractor located at the site of the Work and that portion of wages, salaries, bonuses and, if applicable, travel and lodging expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor provided they are actually and properly engaged on the Work under the Contract;

(c) assessments payable under any statutory authority relating to workers' compensation, employment insurance, pension plan or holidays with pay, provincial health or insurance plans, environmental reviews, and GST / HST collection costs;

(d) rent that is paid for Plant, or an amount equivalent to 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 or the equivalent amount is reasonable and use of that Plant has been approved by Canada;

(e) payments for maintaining and operating Plant necessary for and used in the performance of the Work, and payments for effecting repairs thereto that, in the opinion of Canada, are necessary for 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;

(f) 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;

(g) 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

(h) any other payments made by the Contractor with the approval Canada that are necessary for the performance of the Contract in accordance with the Contract Documents.

**GC6.4.3 Price Determination - Variations in Tendered Quantities**

1) Except as provided in paragraphs 2), 3), 4) and 5) of GC6.4.3, if it appears that the final quantity of labour, Plant and Material under a price per unit item shall exceed or be less than the estimated tendered quantity, the Contractor shall perform the Work or supply the Plant and Material required to complete the item and payment shall be made for the actual Work performed or Plant and Material supplied at the price per unit set out in the Contract.

2) If the final quantity of the price per unit item exceeds the estimated tendered quantity by more than 15%, either party to the Contract may make a written request to the other party to negotiate an

amended price per unit for that portion of the item which exceeds 115% of the estimated tendered quantity, and to facilitate approval of any amended price per unit, the Contractor shall, on request, provide Canada with

(a) detailed records of the actual cost to the Contractor of performing or supplying the tendered quantity for the price per unit item up to the time the negotiation was requested; and

(b) the estimated unit cost of labour, Plant and Material required for the portion of the item that is in excess of 115% of the tendered quantity.

3) If agreement is not reached as contemplated in paragraph 2) of GC6.4.3, the price per unit shall be determined in accordance with GC6.4.2.

4) If it appears that the final quantity of labour, Plant and Material under a price per unit item shall be less than 85% of the estimated tendered quantity, either party to the Contract may make a written request to the other party to negotiate a change to the price per unit for the item if

(a) there is a demonstrable difference between the unit cost to the Contractor of performing or supplying the estimated tendered quantity and the unit cost to the Contractor for performing or supplying the final quantity; and

(b) the difference in unit cost is due solely to the decrease in quantity and not to any other cause.

5) For the purposes of the negotiation referred to in paragraph 4) of GC6.4.3

(a) the onus of establishing, justifying and quantifying a proposed change lies with the party making the request for negotiation; and

(b) in no event shall the total price for an item that has been amended as a result of a reduction in quantity pursuant to paragraph 4) of GC6.4.3 exceed the amount that would have been payable to the Contractor had 85% of the tendered quantity actually been performed or supplied.

## GC6.5 DELAYS AND EXTENSION OF TIME

1) Upon application of the Contractor made before the date first fixed for completion of the Work or before any other date previously fixed under this clause, Canada may extend the time for completion of the Work by fixing a new date if Canada determines that causes beyond the control of the Contractor have delayed its completion.

2) The Contractor's application shall be accompanied by the written consent of the bonding company whose bond forms part of the Contract Security.

3) Subject to paragraph 4) of GC6.5, no payment, other than a payment that is expressly stipulated in the Contract, shall be made by Canada to the Contractor for any extra expense, loss or damage incurred or sustained by the Contractor due to delay, whether or not the delay is caused by circumstances beyond the control of the Contractor.

4) If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of Canada in providing any information or in doing any act that the Contract either expressly requires Canada to do or that would ordinarily be done by an owner in accordance with the practice of the trade, the Contractor shall give Canada written notice of intention to claim for that extra expense or loss or damage within ten working days of the date the neglect or delay first occurred.

5) When the Contractor has given a notice referred to in paragraph 4) of GC6.5, the Contractor shall give Canada a written claim for the extra expense, loss or damage no later than 30 days after the date that a Certificate of Completion is issued and not afterwards.

6) A written claim referred to in paragraph 5) of GC6.5 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable Canada to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as Canada may require.

7) If Canada determines that a claim referred to in paragraph 5) of GC6.5 is justified, Canada shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC6.4 DETERMINATION OF PRICE.

8) If the Contractor fails to give a notice referred to in paragraph 4) and a claim referred to in paragraph 5) of GC6.5 within the times stipulated, an extra payment shall not be made to the Contractor in respect of the occurrence.

## GC6.6 ALLOWABLE COSTS FOR CONTRACT CHANGES UNDER GC6.4.1

### GC6.6.1 General

1) The Contractor shall submit a cost estimate breakdown for each contemplated change, in accordance with paragraph 4) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES. The breakdown shall itemize all labour, material, plant and equipment costs estimated by the Contractor and subcontractors, and the amount of each allowance.

2) It is the responsibility of the Contractor to ensure that all prices included in the Contractor's breakdown to the NCC, including those of subcontractors, are fair and reasonable in view of the terms expressed herein.

3) The labour hours required for the contemplated change shall be based on the estimated number of hours to perform the work.

4) Time spent by a working foreman may be included in the number of labour hours, at a rate agreed to in writing by the Contractor and the NCC.

5) Time attributable to material handling, productivity factors and approved rest periods is to be included in the number of hours required by the contemplated change and will not be paid as a separate item under hourly rates.

6) Allowances referred to in section 04 below are not to be included in the hourly labour rates.

7) Credit for work deleted will only be for the work directly associated with the change.

8) When a change deletes work which has not yet been performed, the NCC is entitled to an adjustment in the Contract Amount equal to the cost the Contractor would have incurred had the work not been deleted.

9) Allowances referred to in Section 04 below shall not be applied to any credit amounts for deleted work.

10) In those cases where the change involves additions and deletions to the work, the allowances referred to in section 04 below shall apply only when the cost of the additions minus the cost of the deletions would result in an increase in the Contract Amount. The percentage allowance shall only be applied to that portion of the costs of the additions that is in excess of the cost of the deletions.

11) If the contemplated change in the work necessitates a change in the contract completion date, or has an impact on the work, the Contractor shall identify and include the resulting cost in the breakdown.

**GC6.6.2 Hourly Labour Rates**

1) The hourly labour rates listed in the Contractor's breakdown shall be determined in accordance with the collective agreements that are applicable at the site of the work and shall include:

   (a) the base rate of pay;

   (b) vacation pay:

   (c) benefits which includes:

      (i) welfare contributions;

      (ii) pension contributions;

      (iii) union dues;

      (iv) training and industry funds contributions; and

      (v) other applicable benefits, if any, that can be substantiated by the Contractor.

   (d) statutory and legislated requirements, assessed and payable under statutory authority, which includes:

      (i) Employment Insurance contributions;

      (ii) Canada Pension Plan or Québec Pension Plan contributions;

      (ii) Worker's Compensation Board or Commission de la santé et de la sécurité du travail premiums;

      (iv) Public Liability and Property Damage insurance premiums; and

      (v) health tax premiums.

2) In the case of nonunion labour, all rates claimed shall be in accordance with the terms of the Labour Conditions forming part of this contract and the Contractor must provide satisfactory proof of the rates actually paid.

**GC6.6.3 Material, Plant and Equipment Costs**

1) The costs of all purchases and rentals must be based on the actual amount paid to the suppliers by the Contractor or subcontractor and said costs are to include all applicable discounts.

**GC6.6.4 Allowance to the Contractor or Subcontractor**

1) The allowances determined in accordance with paragraph 1) of GC6.4.1 PRICE DETERMINATION PRIOR TO UNDERTAKING CHANGES shall be considered as full compensation for:

   (a) supervision, co-ordination, administration, overhead, margin and the risk of undertaking the work within the stipulated amount; and

(b) miscellaneous additional costs related to:

(i) the purchase or rental of material, plant and equipment;

(ii) the purchase of small tools and supplies;

(iii) safety and protection measures; and

(iv) permits, bonds, insurance, engineering, as built drawings, commissioning and site office.

## GC7.1 TAKING THE WORK OUT OF THE CONTRACTOR'S HANDS

1) By giving notice in writing to the Contractor in accordance with GC2.3 NOTICES, the NCC, without any other authorization, may take all or any part of the Work out of the Contractor's hands, and may employ such means as the NCC sees fit to have the Work completed if the Contractor:

   (a) fails to remedy any delay in the commencement or default in the diligent performance of the Work to the satisfaction of the NCC within six days of the NCC giving notice to the Contractor in writing in accordance with GC2.3 NOTICES;

   (b) defaults in the completion of any part of the Work within the time fixed for its completion by the Contract;

   (c) becomes insolvent, or has committed an act of bankruptcy, and has neither made a proposal to its creditors nor filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act;

   (d) abandons the work;

   (e) makes an assignment of the Contract without the consent required by GC1.16 ASSIGNMENT; or

   (f) otherwise fails to observe or perform any of the provisions of the Contract.

2) If the whole or any part of the Work is taken out of the Contractor's hands, the Contractor's right to any further payment that is due or accruing due under the Contract is, subject only to paragraph 3) of GC7.1, extinguished, and the Contractor is liable to pay the NCC, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by the NCC in respect of the Contractor's failure to complete the Work.

3) If the whole or any part of the Work that is taken out of the Contractor's hands is completed by the NCC, the NCC may pay the Contractor the amount, if any, of the holdback or a progress claim as determined by the NCC 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 the NCC for any other loss or damage incurred or sustained by reason of the Contractor's default.

4) The taking of the Work or any part thereof out of the Contractor's hands does not relieve the Contractor from any obligation under the Contract or imposed by law except the obligation to complete the performance of that part of the Work that was taken out of the Contractor's hands.

5) If the Work or any part thereof is taken out of the Contractor's hands, all Plant and Material and the interest of the Contractor, or its suppliers or subcontractors at any tier, in all real property, licences, powers and privileges acquired, used or provided by the Contractor, or its suppliers or subcontractors at any tier, under the Contract shall continue to be the property of the NCC without compensation.

6) When the NCC certifies that any Plant, Material, or any interest of the Contractor is no longer required for the purposes of the Work, or that it is not in the interests of the NCC to retain that Plant, Material, or interest, it shall revert to the Contractor.

7) If the Contractor has become insolvent or has committed an act of bankruptcy, and has either made a proposal to its creditors or filed a notice of intention to make such a proposal, pursuant to the Bankruptcy and Insolvency Act, the Contractor shall immediately forward a copy of the proposal or the notice of intention to the NCC.

**GC7.2 SUSPENSION OF WORK**

1) When, in the NCC's opinion, it is in the public interest to do so, the NCC may require the Contractor to suspend performance of the Work either for a specified or an unspecified period, by giving a notice of suspension in writing to the Contractor in accordance with GC2.3 NOTICES.

2) When a notice of suspension is received by the Contractor, the Contractor shall suspend all operations in respect of the Work except those that the NCC determines are necessary for the care and preservation of the Work, Plant and Material.

3) During a period of suspension, the Contractor shall not remove any part of the Work, Plant or Material from its site without the consent of the NCC.

4) If a period of suspension is 60 days or less, the Contractor shall resume the performance of the Work on the expiration of that period, and the Contractor is entitled to be paid the extra costs necessarily incurred by the Contractor as a result of the suspension, determined in accordance with GC6.4 DETERMINATION OF PRICE.

5) If a period of suspension is more than 60 days, the NCC and the Contractor may agree that the performance of the Work shall be continued by the Contractor, and the Contractor shall resume performance of the Work subject to any terms and conditions agreed upon by the NCC and the Contractor. If the NCC and the Contractor do not agree that performance of the Work shall be continued by the Contractor, or upon the terms and conditions under which the Contractor shall continue the Work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC7.3 TERMINATION OF CONTRACT.

**GC7.3 TERMINATION OF CONTRACT**

1) The NCC may terminate the Contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC2.3 NOTICES.

2) If the Contractor receives a notice of termination, the Contractor shall forthwith cease all operations in performance of the Contract, subject to any conditions stipulated in the notice.

3) Subject to paragraph 4) of GC7.3, if the Contract is terminated, the NCC shall pay the Contractor an amount determined to be due to the Contractor pursuant to GC6.4 DETERMINATION OF PRICE less the aggregate of all amounts that were paid to the Contractor by the NCC and all amounts that are due to the NCC from the Contractor pursuant to the Contract.

4) In no event shall the total amount payable by the NCC to the Contractor exceed the amount, calculated in accordance with GC5 TERMS OF PAYMENT, that would have been payable to the Contractor had the Contractor completed the Work.

5) Payment to the Contractor, if any, shall be made as soon as practicable under the circumstances.

**GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN**

1) If the Work is taken out of the Contractor's hands, or the Contractor is in breach of, or in default under, the Contract, the NCC may convert a security deposit to the NCC's own use.

2) If the NCC converts a security deposit, the amount realized shall be deemed to be an amount due from the NCC to the Contractor under the Contract.

3) Any balance of the amount realized that remains after payment of all losses, damage and claims of the NCC and others shall be paid by the NCC to the Contractor if, in the opinion of the NCC, it is not required for the purposes of the Contract.

# GC8 DISPUTE RESOLUTION

1) The Contractor may, within 10 days after the communication to the Contractor of any decision or direction referred to in GC6.1 CHANGES IN THE WORK and GC2.2 INTERPRETATION OF CONTRACT, protest that decision or direction.

2) A protest referred to in paragraph 1) of GC8 shall be in writing, contain full reasons for the protest, be signed by the Contractor and be given to the NCC.

3) If the Contractor gives a protest pursuant to paragraph 2) of GC8, 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 the Contractor considers appropriate in the circumstances.

4) The giving of a protest by the Contractor pursuant to paragraph 2) of GC8 shall not relieve the Contractor from complying with the decision or direction that is the subject of the protest.

5) Subject to paragraph 6) of GC8, the Contractor shall take any action referred to in paragraph 3) of GC8 within 3 months after the date of the Certificate of Completion referred to in GC5.6 FINAL COMPLETION and not afterwards, except where it is otherwise provided by law.

6) The Contractor shall take any action referred to in paragraph 3) of GC8 resulting from a direction under GC3.13 WARRANTY AND RECTIFICATION OF DEFECTS IN WORK, within 3 months after the expiry of a warranty or guarantee period and not afterwards, except where it is otherwise provided by law.

7) Subject to paragraph 8) of GC8, if the NCC determines that the Contractor's protest is justified, the NCC 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.

8) Costs referred to in paragraph 7) of GC8 shall be calculated in accordance with GC6.4 DETERMINATION OF PRICE.

## GC9.1 OBLIGATION TO PROVIDE CONTRACT SECURITY

1) The Contractor shall, at the Contractor's expense and within 7 days after the date that the Contractor receives notice that the Contractor's bid was accepted by the NCC, obtain and deliver Contract Security to the NCC in one or more of the forms prescribed in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) If the whole or a part of the Contract Security provided is in the form of a security deposit, it shall be held and disposed of in accordance with GC5.13 RETURN OF SECURITY DEPOSIT and GC7.4 SECURITY DEPOSIT - FORFEITURE OR RETURN.

3) If a part of the Contract Security provided is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond at the site of the Work.

4) It is a condition precedent to the release of the first progress payment that the Contractor has provided the Contract Security as specified herein.

5) In addition to the limitation imposed in paragraph 4) of GC9.1, the Contractor further acknowledges and agrees that it will not be entitled to have access to the site, nor to commence work pursuant to this contract until it has delivered the Contract Security as specified herein.

## GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY

1) The Contractor shall deliver to the NCC (a), (b) or (c):

   (a) 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 including taxes

   (b) A labour and material payment bond in an amount that is equal to not less than 50% of the Contract Amount including taxes, and a security deposit in an amount that is equal to not less than 10% of the Contract Amount including taxes.

   (c) A security deposit in an amount prescribed by subparagraph 1)(b) of GC9.2, plus an additional amount that is equal to 10% of the Contract Amount including taxes.

2) The amount of a security deposit referred to in subparagraph 1)(b) of GC9.2 shall not exceed $2,000,000 regardless of the Contract Amount including taxes.

3) A performance bond and a labour and material payment bond referred to in paragraph 1) of GC9.2 shall be in a form and be issued by a bonding or surety company that is approved by the NCC.

   (a) The approved form for the performance bond is enclosed at the end of GC9.

   (b) The approved form for the labour and material payment bond is enclosed at the end of GC9

   (c) The list of approved bonding or surety companies is displayed at the following Website:

   http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12027 .

4) A security deposit referred to in subparagraphs 1)(b) and 1)(c) of GC9.2 shall be in the form of:

(a) a bill of exchange, bank draft or money order made payable to the NCC and certified by an approved financial institution or drawn by an approved financial institution on itself; or

(b) bonds of, or unconditionally guaranteed as to principal and interest by, the Government of Canada.

5) For the purposes of subparagraph 4)(a) of GC9.2:

(a) 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 certain sum of money to, or to the order of, the NCC;

(b) if a bill of exchange, bank draft or money order is certified by or drawn on an institution or corporation other than a chartered bank, it must be accompanied by proof that the said institution or corporation meets at least one of the criteria described in subparagraph 5)(c) of GC9.2, either by letter or by a stamped certification on the bill of exchange, bank draft or money; and

(c) An approved financial institution is:

(i) a corporation or institution that is a member of the Canadian Payments Association as defined in the Canadian Payments Act;

(ii) a corporation that accepts deposits that are insured, to the maximum permitted by law, by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec;

(iii) a corporation that accepts deposits from the public if repayment of the deposit is guaranteed by Her Majesty the Queen in right of a province;

(iv) a corporation, association or federation incorporated or organized as a credit union or co-operative credit society that conforms to the requirements of a credit union which are more particularly described in paragraph 137(6) of the Income Tax Act; or

(v) Canada Post Corporation.

6) Bonds referred to in subparagraph 4)(b) of GC9.2 shall be provided on the basis of their market value current at the date of the Contract, and shall be:

(a) made payable to bearer; or

(b) accompanied by a duly executed instrument of transfer of the bonds to the NCC in the form prescribed by the Domestic Bonds of Canada Regulations; or

(c) registered as to principal, or as to principal and interest, in the name of the NCC pursuant to the Domestic Bonds of Canada Regulations.

## GC9.3 IRREVOCABLE STANDBY LETTER OF CREDIT

1) As an alternative to a security deposit, an irrevocable standby letter of credit is acceptable to the NCC, the amount of which shall be determined in the same manner as a security deposit referred to in GC9.2 TYPES AND AMOUNTS OF CONTRACT SECURITY.

2) An irrevocable standby letter of credit shall:

(a) be an arrangement, however named or described, whereby a financial institution (the “Issuer”) acting at the request and on the instructions of a customer (the “Applicant”) or on its own behalf:

(i) is to make a payment to, or to the order of, the NCC as the beneficiary;

(ii) is to accept and pay bills of exchange drawn by the NCC;

(ii) authorizes another financial institution to effect such payment or accept and pay such bills of exchange; or

(iv) authorizes another financial institution to negotiate against written demand(s) for payment provided that the terms and conditions of the letter of credit are complied with;

(b) state the face amount that may be drawn against it;

(c) state its expiry date;

(d) provide for sight payment to the NCC by way of the financial institution's draft against presentation of a written demand for payment signed by the NCC;

(e) provide that more than one written demand for payment may be presented subject to the sum of those demands not exceeding the face value of the letter of credit;

(f) provide that it is subject to the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600;

(g) clearly specify that it is irrevocable or deemed to be irrevocable pursuant to article 6 c) of the International Chamber of Commerce (ICC) Uniform Customs and Practice for Documentary Credits, 2007 Revision, ICC Publication No. 600; and

(h) be issued or confirmed, in either official language in a format left to the discretion of the issuer or confirmer, by an approved financial institution on its letterhead.

# PERFORMANCE BOND

Bond Number _____

Amount $ _____

**KNOW ALL MEN BY THESE PRESENTS**, that _____ as Principal, hereinafter called the Principal, and _____ as Surety, hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee, hereinafter called the NCC, In the amount of _____ dollars ($ _____ ), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**SIGNED AND SEALED** this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract with the NCC, dated the _____ day of _____ , _____ , for: _____ .

**NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION** are such that if the Principal shall well and faithfully observe and perform all the obligations on the part of the Principal to be observed and performed in connection with the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. Whenever the Principal shall be, and declared by the NCC to be, in default under the Contract, the Surety shall
   (a) if the work is not taken out of the Principal's hands, remedy the default of the Principal,
   (b) if the work is taken out of the Principal's hands and the NCC directs the Surety to undertake the completion of the work, complete the work in accordance with the Contract provided that if a contract is entered into for the completion of the work,
      (i) it shall be between the Surety and the completing contractor, and
      (ii) the selection of such completing contractor shall be subject to the approval of the NCC,
   (c) if the work is taken out of the Principal's hands and the NCC, after reasonable notice to the Surety, does not direct the Surety to undertake the completion of the work, assume the financial responsibility for the cost of completion in excess of the moneys available to the NCC under the Contract,
   (d) be liable for and pay all the excess costs of completion of the Contract, and
   (e) not be entitled to any Contract moneys earned by the Principal, up to the date of his default on the Contract and any holdbacks relating to such earned Contract moneys held by the NCC, and the liability of the Surety under this Bond shall remain unchanged provided, however, and without restricting the generality of the foregoing, upon the completion of the Contract to the satisfaction of the NCC, any Contract moneys earned by the Principal or holdbacks related thereto held by the NCC may be paid to the Surety by the NCC.

2. The Surety shall not be liable for a greater sum than the amount specified in this Bond.

3. No suit or action shall be instituted by the NCC herein against the Surety pursuant to these presents after the expiration of two (2) years from the date on which final payment under the Contract is payable.

**IN TESTIMONY WHEREOF**, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

**SIGNED, SEALED AND DELIVERED in the presence of:**

Principal _____

Witness _____

Surety _____

| Note: Affix Corporate seal if applicable. |
| --- |
| |

# LABOUR AND MATERIAL PAYMENT BOND

Bond Number _____

Amount $ _____

**KNOW ALL MEN BY THESE PRESENTS**, that _____ as Principal,

hereinafter called the Principal, and _____ as Surety, hereinafter

called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto the National Capital Commission as Obligee,

hereinafter called the NCC, In the amount of _____ dollars

($ _____ ), lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety

bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**SIGNED AND SEALED** this _____ day of _____ , _____ . WHEREAS, the Principal has entered into a Contract

with the NCC, dated the _____ day of _____ , _____ , for: _____

_____ which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

**NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION** are such that, if payment is promptly made to all Claimants who have performed labour or services or supplied material in connection with the Contract and any and all duly authorized modifications and extensions of the Contract that may hereafter be made, notice of which modifications and extensions to the Surety being hereby waived, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. For the purpose of this bond, a Claimant is defined as one having a direct contract with the Principal or any Sub-Contractor of the Principal for labour, material or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone services or rental of equipment (but excluding rental of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract.

2. For the purpose of this Bond, no payment is required to be made in respect of a claim for payment for labour or services performed or material supplied in connection with the Contract that represents a capital expenditure, overhead or general administration costs incurred by the Principal during the currency or in respect of the Contract.

3. The Principal and the Surety hereby jointly and severally agree with the NCC that if any Claimant has not been paid as provided for under the terms of his contract with the Principal or a Sub-Contractor of the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's labour or service was done or performed or materials were supplied by such Claimant, the NCC may sue on this bond, have the right to prosecute the suit to final judgment for such sum or sums as may be due and have execution thereon; and such right of the NCC is assigned by virtue of Part VIII of the Financial Administration Act to such Claimant.

4. For the purpose of this bond the liability of the Surety and the Principal to make payment to any claimant not having a contract directly with the Principal shall be limited to that amount which the Principal would have been obliged to pay to such claimant had the provisions of the applicable provincial or territorial legislation on lien or privileges been applicable to the work. A claimant need not comply with provisions of such legislation setting out steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which the claimant might have had. Any such claimant shall be entitled to pursue a claim and to recover judgment hereunder subject to the terms and notification provisions of the Bond.

5. Any material change in the Contract between the Principal and the NCC shall not prejudice the rights or interest of any Claimant under this Bond who is not instrumental in bringing about or has not caused such change.

6. No suit or action shall be commenced hereunder by any Claimant:

   (a) Unless such Claimant shall have given written notice within the time limits hereinafter set forth to the Principal and the Surety above named, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal and the Surety at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the Contract is located. Such notice shall be given

      (i) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal or by the Sub-Contractor of the Principal under either the terms of the Claimant's Contract with the Principal or the Claimant's Contract with the Sub-Contractor of the Principal within one hundred and twenty (120) days after such Claimant should have been paid in full under this Contract;

…/2

(ii) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such Claimant did or performed the last of the service, work or labour or furnished the last of the materials for which such claim is made under the Claimant's Contract with the Principal or a Sub-Contractor of the Principal

(b) After the expiration of one (1) year following the date on which the Principal ceased work on the said Contract, including work performed under the guarantees provided in the Contract;

(c) Other than in a court of competent jurisdiction in the province or district of Canada in which the subject matter of the Contract or any part thereof is situated and not elsewhere, and the parties hereto hereby agree to submit to the jurisdiction of such court.

7. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

8. The Surety shall not be entitled to claim any moneys relating to the Contract and the liability of the Surety under this Bond shall remain unchanged and, without restricting the generality of the foregoing, the Surety shall pay all valid claims of Claimants under this Bond before any moneys relating to the Contract held by the NCC are paid to the Surety by the NCC.

9. The Surety shall not be liable for a greater sum that the amount specified in this bond.

**IN TESTIMONY WHEREOF**, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority, the day and year first above written.

**SIGNED, SEALED AND DELIVERED in the presence of:**

Principal _____

Witness _____

Surety _____

| Note: Affix Corporate seal if applicable. |
| --- |
| |

## GC10.1 INSURANCE CONTRACTS

1) The Contractor shall, at the Contractor's expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the NCC in accordance with the requirements of GC10.

2) The insurance contracts referred to in paragraph 1) of GC10.1 shall:

   (a) be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in GC10; and

   (b) provide for the payment of claims under such insurance contracts in accordance with GC10.2 INSURANCE PROCEEDS.

## GC10.2 INSURANCE PROCEEDS

1) In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid directly to the NCC, and:

   (a) the monies so paid shall be held by the NCC for the purposes of the contract; or

   (b) if the NCC elects, shall be retained by the NCC, in which event they vest in the NCC absolutely.

2) In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC10.1 INSURANCE CONTRACTS, the proceeds of the claim shall be paid by the insurer directly to the claimant.

3) If an election is made pursuant to paragraph 1) of GC10.2, the NCC may cause an audit to be made of the accounts of the Contractor and of the NCC in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between:

   (a) the aggregate of the amount of the loss or damage suffered or sustained by the NCC, including any costs incurred in respect of the clearing of the work and its site and any other amount that is payable by the Contractor to the NCC under the contract, minus any monies retained pursuant to subparagraph 1)(b) of GC10.2; and

   (b) the aggregate of the amounts payable by the NCC to the Contractor pursuant to the contract up to the date of the loss or damage.

4) A difference that is established pursuant to paragraph 3) of GC10.2 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.

5) When payment of a deficiency has been made pursuant to paragraph 4) of GC10.2, all rights and obligations of the NCC 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 paragraph 3) of GC10.2, be deemed to have been expended and discharged.

6) If an election is not made pursuant to subparagraph 1)(b) of GC10.2, the Contractor shall, subject to paragraph 7) of GC10.2, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at the Contractor's expense as if that part of the work had not yet been performed.

7) When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in paragraph 6) of GC10.2, the NCC shall pay the Contractor out of the monies referred to in paragraph 1) of GC10.2 so far as they will thereunto extend.

8) Subject to paragraph 7) of GC10.2, payment by the NCC pursuant to paragraph 7) of GC10.2 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding subparagraphs 3)(a) and 3)(b) of GC5.4 PROGRESS PAYMENT.

## GC10.3 INSURANCE TERMS

### GC10.3.1 General

#### GC10.3.1.1 Proof of Insurance

1) Before commencement of the Work, and prior to contract award, the Contractor shall deposit with the NCC a Certificate of Insurance (approved Insurance form is enclosed at the end of this section).

2) Upon request by the NCC, the Contractor shall provide originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the provisions contained herein.

3) The insurance policies shall be endorsed to provide the NCC with no less than 30 days notice in writing in advance of a cancellation of insurance or any reduction in coverage.

#### GC10.3.1.2 Payment of Deductible

1) Any moneys paid or payable in respect of a deductible amount shall be borne exclusively by the Contractor.

### GC10.3.2 Commercial General Liability

#### GC10.3.2.1 Scope of Policy

1) The insurance coverage provided shall not be less than that provided by IBC Form 2100, as amended from time to time, and shall have:

(a) an Each Occurrence Limit of not less than $5,000,000;

(b) a Products/Completed Operations Aggregate Limit of not less than $5,000,000; and

(c) a General Aggregate Limit of not be less than $10,000,000 per policy year, if the policy is subject to such a limit.

2) The policy shall either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:
   (a) Blasting;

   (b) Pile driving and caisson work;

   (c) Underpinning;

   (d) Removal or weakening of support of any building or land whether such support be natural or otherwise if the work is performed by the insured Contractor.

**GC10.3.2.2 Insured**

1) The policy shall insure the Contractor and shall include the NCC as an additional Insured, with respect to liability arising out of the operations of the Contractor with regard to the work.

**GC10.3.2.3 Period of Insurance**

1) Unless otherwise directed in writing by the NCC, or, otherwise stipulated elsewhere herein, the policy required herein shall be in force and be maintained from the date of contract award until the day of issue of the Certificate of Completion except that the coverage for Completed Operations Liability shall, in any event, be maintained for a period of at least six (6) years beyond the date of the Certificate of Substantial Performance.

**GC10.3.3 Builder's Risk / Installation Floater**

**GC10.3.3.1 Scope of Policy**

1) The insurance coverage provided by a Builder's Risk policy or an Installation Floater policy shall not be less than that provided by IBC Forms 4042 and 4047, as amended from time to time.

2) The policy shall permit use and occupancy of the project, or any part thereof, where such use and occupancy is for the purposes for which the project is intended upon completion.

3) The policy may exclude or be endorsed to exclude coverage for loss or damage caused by any of the following:

   (a) Asbestos;

   (b) Fungi or spores;

   (c) Cyber;

   (d) Terrorism.

**GC10.3.3.2 Amount of Insurance**

1) 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 the NCC at the site of the project to be incorporated into and form part of the finished Work. If the value of the Work is changed, the policy shall be changed to reflect the revised contract value.

**GC10.3.3.3 Insurance Proceeds**

1) The policy shall provide that the proceeds thereof are payable to the NCC may direct in accordance with GC10.2, "Insurance Proceeds".

2) The Contractor shall, without delay, do such things and execute such documents as are necessary to effect payment of the proceeds.

# CERTIFICAT OF INSURANCE
# ATTESTATION D'ASSURANCE

- **To be completed by the insurer / À être rempli par l'assureur**

| **CONTRACT / MARCHÉ** | |
|---|---|
| Description and location of work / Description et endroit des travaux | Contract no. / N° de contrat |

| **INSURER / ASSUREUR** | | | |
|---|---|---|---|
| Name / Nom | | | |
| Address / Adresse | No., Street / N°, rue | | |
| | City / Ville | Province | Postal code / Code postal |

| **BROKER / COURTIER** | | | |
|---|---|---|---|
| Name / Nom | | | |
| Address / Adresse | No., Street / N°, rue | | |
| | City / Ville | Province | Postal code / Code postal |

| **INSURED / ASSURÉ** | | | |
|---|---|---|---|
| Name of contractor / Nom de l'entrepreneur | | | |
| Address / Adresse | No., Street / N°, rue | | |
| | City / Ville | Province | Postal code / Code postal |

**ADDITIONAL INSURED / ASSURÉ ADDITIIONNEL**

The National Capital Commission / La Commission de la capitale nationale

**This insurer certifies that the following policies of insurance are at present in force covering all operations of the Insured, in connection with the contract made between the named insured and the National Capital Commission.**

**L'assureur atteste que les polices d'assurances suivantes sont présentement en vigueur et couvrent toutes les activités de l'assuré en fonction du marché conclu entre l'Assuré dénommé la Commission de la capitale nationale**

**POLICY / POLICE**

| Type<br>Genre | Number<br>Numéro | Inception Date<br>Date d'effet | Expiry Date<br>Date d'expiration | Limit of Liability<br>Limites de garantie |
|---|---|---|---|---|
| Commercial General Liability<br>Responsabilité civile des entreprises | | | | |
| Builder's Risk "All Risks"<br>Assurance des chantiers « tous risques » | | | | |
| Installation Floater "All Risks"<br>Risques d'installation « tous risques » | | | | |
| Other (list) / Autre (énumérer) | | | | |

| | |
|---|---|
| Each of these policies includes the coverages and provisions as specified in Insurance Terms and each policy has been endorsed to cover the National Capital Commission as an Additional Insured. The Insurer agrees to notify the National Capital Commission in writing thirty (30) days prior to any material change in, or cancellation of any policy or coverage. | Chacune des présentes polices renferment des garanties et dispositions spécifiées aux Conditions d'assurance, et chaque police a été amendée pour couvrir la Commission de la capitale nationale en tant qu'assuré additionnel. L'assureur convient de donner un préavis de trente (30) jours à la Commission de la capitale nationale en cas de changement visant la garantie d'assurance ou les conditions ou de l'annulation de n'importe quelle police ou garantie. |

Name of Insurer's Office or Authorized Employee / Nom du cadre ou de la personne autorisée

Telephone number / Numéro de téléphone

Signature

Date

# OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS

## 1. General

1.1 In this Contract "OHS" means "occupational health and safety".

1.2 With respect to the work to be performed under the Contract, the Contractor covenants and agrees to perform at, and to enforce conformity with, a standard equivalent to or greater than the best practices prevailing in the construction industry at that time.

1.3 The Contractor acknowledges that, to the extent that the following matters may be affected by conduct of the work, it is responsible for the:

1.3.1 health and safety of persons on site;

1.3.2 safety of property on site;

1.3.3 protection of persons adjacent to the site; and,

1.3.4 protection of the environment.

1.4 Without limiting the generality of section 1.3, the Contractor acknowledges that it is required to, and covenants and agrees to, comply and to enforce compliance with all laws or regulations that may be applicable to the conduct of the work including, without limitation:

(a) the provisions of the *Occupational Health and Safety Act* of Ontario and all regulations, policies or directives issued thereunder for work performed in Ontario;

(b) La *Loi sur la santé et la sécurité du travail* of Québec and all regulations, policies or directives issued thereunder for work performed in Québec;

(c) Applicable provisions of the *Canada Labour Code, Part II;*

(d) Employment standards legislation in the province(s) in which any part of the work is performed; and

(e) Any policies or directives issued by the NCC in respect of the subject matter of the contract.

The NCC will present any such policies or directives referred to in paragraph (e) to the Contractor in written form by not later than the pre-construction meeting. The Contractor is obliged to ensure that the relevant policies and directives have been communicated to and acknowledged by all its employees and that they will be complied with. The NCC reserves the right to require the Contractor to produce evidence satisfactory to the NCC acting reasonably that the Contractor has discharged the foregoing obligations.

1.5 By entering into the Contract with the NCC, the Contractor represents and warrants to the NCC that it has informed itself of and is knowledgeable about the obligations imposed by the legislation referred to in 1.4. above.

1.6 For purposes of the relevant provincial OHS legislative regime the Contractor acknowledges and agrees that it is the "Constructor" and covenants to discharge and accept all liability for the performance of the obligations of the "Constructor" in respect of the work provided for in the Contract. Notwithstanding a determination by the relevant authority having jurisdiction that the NCC is the "Constructor" in the event of a dispute between the Contractor and the NCC, the Contractor acknowledges and agrees that the Contractor shall be financially responsible for the implementation of protective measures necessary to fulfill the obligations of the "Constructor".

1.7 As between the NCC and the Contractor, the NCC's decision as to whether the Contractor is discharging its obligations in respect of OHS issues shall be definitive. Without limiting the generality of the foregoing, in the event of any dispute with respect to instructions given by the NCC's designated representative, the Contractor may note such dispute, but must nevertheless forthwith comply with any such instructions.

1.8 The Contractor hereby indemnifies and agrees to hold harmless the NCC, its agents and employees, from and against any and all claims, demands, losses, costs (including legal fees on a full indemnity basis), damages, actions, suits or proceedings (hereinafter collectively referred to as "claims") by third parties that arise out of or are attributable to the Contractor's errors or omissions in the performance of the Contract. Without limiting the generality of the foregoing, this indemnification extends to any claims related to any violation of any statute or regulation relating to OHS matters.

1.9 The NCC shall provide the contractor:

1.9.1 a written description of every known and foreseeable health and safety hazard to which persons employed in the performance of the work may be exposed because of the nature of the site;

1.9.2 a list of any prescribed materials, equipment, devices and clothing necessary because of the nature of the site;

1.9.3 with written information indicating the prescribed circumstances and manner to use all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and,

1.9.4 with a copy of any NCC policies and procedures that may be applicable in relation to the work site.

1.10 Without limiting the generality of 1.9, prior to the commencement of the work by the contractor, the contractor shall, at the contractor's expense:

1.10.1 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are informed of any health and safety hazard described pursuant to 1.9.1;

1.10.2 provide all persons employed in the performance of the work or granted access to the work or its site with prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2;

1.10.3 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with the prescribed circumstances and manner all prescribed materials, equipment, devices and clothing listed pursuant to 1.9.2; and

1.10.4 take all reasonable care to ensure that all persons employed in the performance of the work or granted access to the work or its site are familiar with policies and procedures referred to in 1.9.4.

**2. Qualifications of Personnel**

2.1 By entering into this agreement the contractor represents and warrants the it has the requisite experience, training, formal certification and equipment to enable it to discharge the obligations enumerated in sections 1.3. 1.4, 1.5 and 1.6 above.

2.2 The Contractor represents and warrants that supervisory personnel employed by the Contractor in respect of performance of any part of the work have the requisite experience, authority, training, formal certification and equipment to ensure that the obligations enumerated in sections 1.3 1.4, 1.5

and 1.6 above are discharged and agrees to deliver such evidence as may be required by the NCC from time to time to verify same.

**3. Certification**

3.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver a Worker's Compensation Clearance Certificate. Where the duration of the project is greater than sixty days, the Contractor covenants and agrees to deliver up-dated certificates at least every 60 days. In the event of a failure by the Contractor to deliver up-dated certificates, the NCC shall be entitled to immediately terminate the contract without notice and without incurring any liability to the Contractor.

3.2 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver historical information on its injury experience including any pertinent Worker's Compensation Experience Reports. Such historical information shall report data for the previous three years.

**4. Plans Policies and Procedures**

4.1 After receiving notification that its bid has been retained and prior to and as a condition of contract award, the Contractor covenants and agrees to deliver for the review and approval of the NCC:

(a) A copy of the contractor's OHS policy;

(b) A safety program and plan specific to the work to be performed pursuant to the Contract which plan shall include a risk assessment and analysis, a description of safe working methods, injury and incident reporting protocols, regular periodic reporting on compliance with OHS obligations including any policies, practices and procedures otherwise provided for herein, and a site-specific contingency and emergency response plan; and

(c) Health and safety training records of personnel and alternates responsible for OHS issues on site.

The Contractor covenants and agrees to deliver the necessary material safety data sheets for the review and approval of the NCC prior to entering the site to perform work related to the relevant material.

Approval by the NCC does not amend the provisions of the Contract with respect to the allocation of liability for discharging or failing to discharge OHS obligations. Such liability remains with the Contractor notwithstanding the granting of such approval.

4.2 The Contractor acknowledges and agrees that prior to commencement of work it must attend a pre-construction briefing at which any special or additional practices and procedures to be followed in completing the work are to be established. Without limiting the provisions of section 1.4(e) above, the representatives of the Contractor attending the briefing will be required to deliver a signed acknowledgement that the practices and procedures set out in the pre-construction briefing have been understood and will be complied with.

4.3 At any time and from time to time during the performance of the work, the NCC shall have the right to audit the manner in which the Contractor is discharging its OHS obligations and to determine whether the project specification and/or OHS policies, practices and procedures are being complied with. In the event that the audit discloses any failure by the Contractor to discharge such OHS obligations , the NCC shall be entitled to forthwith rectify at the Contractor's expense any such deficiency and the NCC shall have the further right to immediately terminate the contract without notice and without incurring any liability to the Contractor.

4.4 The Contractor covenants and agrees to conform with all requirements of the Workplace Hazardous Materials Information System.

4.5 The Contractor acknowledges and agrees that where required by any law or regulation applicable to the performance of the work it must establish and maintain a project health and safety committee. The contractor further acknowledges and agrees that it must enable staff to attend all relevant safety meetings, and that the cost of same, including costs attributable to standing down equipment is included in its bid price and is not independently recoverable.

4.6 Where required by the relevant provincial regulatory regime, the Contractor acknowledges and agrees that it is responsible for delivery of notice of the project to the relevant regulatory authority, and for the performance of any other administrative activity required to meet the obligations imposed in the pertinent provincial regulatory regime.

4.7 **(Optional depending on hazard or scope of project)**. The contractor covenants and agrees that it shall employ and assign to the work, a competent OHS professional as Health and Safety Coordinator that must:

(a) have a minimum two (2) years' site-related working experience specific to activities associated with.(identify specific subject matter)

(b) have basic working knowledge of specified occupational safety and health regulations,

(c) be responsible for completing health and safety training session and ensuring that personnel not successfully completing the required training are not permitted to enter the site to perform the Work,

(d) be responsible for implementing, enforcing daily and monitoring the site-specific Health and Safety Plan, and

(e) be on site during execution of the Work.

The parties acknowledge that in lieu of employing an OHS professional, the Contractor may provide same by sub-contracting for such services.

4.8 Upon completion of the work the Contractor covenants and agrees to participate with the NCC in a post performance interview to evaluate the performance of the Contractor in respect of the OHS obligations under the contract. Without limiting the generality of the foregoing, the interview will identify areas of compliance and non-compliance in terms of:

(a) actual performance of the work;

(b) reporting or procedural requirements;

(c) resolution of deficiencies.

The contractor acknowledges and agrees that the results of the post-completion interview may be relied upon by the NCC in evaluating bids subsequently submitted by the Contractor on other NCC projects.

**Security Requirements**

The NCC complies with Treasury Board's *Policy on Government Security* and consequently, it will require that the Contractor's employees submit to a personal security screening process (Security Clearance Form TBS/SCT 330-60E). The NCC may also perform a credit check when the duties or tasks to be performed require it or in the event of a criminal record containing a charge/offence of a financial nature.

The NCC reserves the right to not award the Contract until such time as the Contractor's core employees have obtained the required level of security screening as identified by the NCC's Corporate Security. In this case the level of security required will be **Reliability/Site Access/Secret**.

The NCC also reserves the right to request that the Contractor submit to a *Designated Organisation Screening* and/or *Facility Security Clearance*– depending on the nature of the information it will be entrusted with. In the event that the Contractor does not meet the requirements to obtain the requested clearance, the Contractor shall take the corrective measures recommended by the Canadian Industrial Security Directorate (of PWGSC) or by the NCC's Corporate Security in order to meet these requirements. If no corrective measures are possible or if the Contractor fails to take the recommended measures, then the Contractor shall be in default of its obligations under this Contract and the NCC shall have the rights and remedies listed in section 2.14, including the right to terminate the Contract without further notice to the Contractor.

**Additional information**

As part of their personal screening, individuals may be required to provide evidence of their status as a Canadian citizen or permanent resident as well as any other information/documentation requested by the NCC's Corporate Security in order to complete the screening.

The NCC reserves the right to refuse access to personnel who fail to obtain the required level of security screening.

The NCC reserves the right to impose additional security measures with respect to this Contract as the need arises.

**Company Security Representative**

The Contractor shall appoint one Company Security Representative (CSR) as well as one alternate (for companies who have more than five employees).

Selection criteria for the CSR and the alternate are the following:

- They must be employees of the Contractor;
- They must have a security clearance (the NCC will process the clearances once the individuals have been identified).

**Responsibilities of the Company Security Representative**

The CSR's responsibilities are the following:

- Act as liaison between the NCC's Corporate Security and the Contractor to ensure coordination;
- In collaboration with the NCC's Corporate Security, identify the Contractor's employees who will require access to NCC information/assets/sites **as well as any recurring subcontractors** (and their employees) who will require similar access and may not be supervised by the Contractor at all times during such access. Ensure that accurate and complete Personnel Security Screening documentation is

submitted to the NCC's Corporate Security for the employees/subcontractors who have been identified;

- Ensure that employees/subcontractors, upon notification of having been granted a reliability status, sign the *Security Screening Certificate and Briefing Form* and return to the NCC's Corporate Security;
- Ensure that only persons who have been security screened to the appropriate level and who are on a "need-to-know basis" will have access to information and assets;
- Maintain a current list of security screened employees/subcontractors;
- Ensure proper safeguard of all information and assets, including any information/assets entrusted to subcontractors;
- If a Security incident or suspected breach of security occurs, prepare and submit to the NCC an occurrence report as soon as possible.

NCC
CCN

**NCC PROPERTY**
**HVAC SYSTEM UPGRADES**
**BOILERS REPLACEMENT**

**ELECTROMECHANICAL SPECIFICATIONS**

| | **Mechanical** | **Electrical** |
|---|---|---|
| Prepared by: | Daniel Raby, tech. | Eric Allain, tech. |
| Verified by : | Steve Tremblay, P. Eng. | Sylvain Lavoie, P. Eng. |


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FILE : A000464
JUNE 23, 2015
FOR TENDER

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S. P. TREMBLAY
100146924
23-06-2015
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
S. LAVOIE
PROVINCE OF ONTARIO

## 1.1 MINIMUM STANDARDS

.1 Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.

## 1.2 SHOP DRAWINGS

.1 Submit for the NCC Representative's review, a pdf electronic version of each shop drawing.

.2 The review is for the sole purpose of ascertaining conformance with the general design concept, and does not mean approval of the design details inherent in the shop drawings, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents.

.3 Do not commence manufacture or order materials before shop drawings are reviewed.

## 1.3 TAXES

.1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

## 1.4 FEES, PERMITS, AND CERTIFICATES

.1 Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

## 1.5 FIRE SAFETY REQUIREMENTS

.1 Comply with the National Building Code of Canada (NBC) for fire safety in construction and the National Fire Code of Canada (NFC) for fire prevention, fire fighting and life safety in building in use.

.2 Comply with Human Resources and Skills Development Canada (HRSDC), Fire Commissioner of Canada (FCC) standards:

.1 No. 301: Standard for Construction Operations
.2 No. 302: Standard for Welding and Cutting
.3 No. 374: Fire Protection Standard for General Storage (Indoor and Outdoor)

.4 available from Fire Protection Engineering Services, Labour Program, HRSDC or internet.
.5 Retain all fire safety documents and standards on site.

.3 Welding and cutting:
.1 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to NCC Representative:
.1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
.2 Completed welding permit as defined in FC 302.
.3 Return welding permit to NCC Representative immediately upon completion of procedures for which permit was issued.
.2 A fire watcher as described in FC 302 shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 10m may be ignited by conduction or radiation.

.4 Where work requires interruption of fire alarms or fire suppression, extinguishing or protection systems:
.1 Provide watchman service as described in FC 301; In general, watchman service is defined as an individual conversant with Fire Emergency Procedures, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.
.2 Retain services of manufacturer for fire protection systems on daily basis or as approved by FCC, to isolate and protect all devices relating to:
.1 modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
.2 cutting, welding, soldering or other construction activities which might activate fire protection systems.

.5 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.

.6 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

## 1.6 FIELD QUALITY CONTROL

.1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.

.2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.

.3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

1.7 TEMPORARY UTILITIES

.1 Existing services required for the work may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.

.2 Notify the NCC Representative and utility companies of intended interruption of services, obtain requisite permission.

.3 Give the NCC Representative 48 hours notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Keep duration of these interruptions to a minimum. Carry out all interruptions after normal working hours of the occupants, preferably on weekends.

1.8 REMOVED MATERIALS

.1 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

1.9 PROTECTION

.1 Protect finished work against damage until take-over.

.2 Protect adjacent work against the spread of dust and dirt beyond the work areas.

.3 Protect operatives and other users of site from all hazards.

1.10 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with NCC Representative to facilitate work as stated. Refer to article 25 Scheduling below for work that must be done during "off hours".

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work, provide temporary

means to maintain security.

.4 Where elevators, dumbwaiters, conveyors or escalators exists Contractor may use these at NCC Representative discretion. Protect from damage, safety hazards and overloading of existing equipment.

.5 Sanitary facilities will be assigned for Contractor's personnel. Others shall not be used. Keep facilities clean.

.6 Closures: Protect work temporarily until permanent enclosures completed.

## 1.11 SITE STORAGE

.1 The NCC Representative will assign storage space which shall be equipped and maintained by the Contractor.

.2 Do not unreasonably encumber site with materials or equipment.

.3 Move stored products or equipment which interfere with operations of NCC Representative or other contractors.

.4 Obtain and pay for use of additional storage or work areas needed for operations.

## 1.12 CUT, PATCH AND MAKE GOOD

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove all items so shown or specified.

.3 Patch and make good surfaces cut, damaged or disturbed, to NCC Representative's approval. Match existing material, colour, finish and texture.

.4 Install firestops and smoke seals in accordance with ULC-S115-2011, around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly.

## 1.13 SLEEVES, HANGERS AND INSERTS

.1 Co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain NCC Representative's approval before cutting into structure.

1.14 EXAMINATION

.1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.

1.15 SIGNS

.1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etc, in both official languages or by the use of commonly-understood graphic symbols to the NCC Representative's approval.

.2 No advertising will be permitted on this project.

1.16 ACCESS AND EGRESS

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

1.17 SCAFFOLDS AND WORK PLATFORMS

.1 Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.

1.18 OPERATIONS AND MAINTENANCE MANUALS

.1 Submit to NCC Representative six (6) copies of approved Operations Data and Maintenance Manual in both official languages, compiled as follows:
.1 Bind data in vinyl hard cover 3 "D" ring type loose leaf binders for 212 x 275 mm size paper. Binders must not exceed 75 mm thick or be more than 2/3 full.
.2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.
.3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.

.2 Include following information plus data specified.
.1 Maintenance instruction for finished surface and materials.
.2 Copy of hardware and paint schedules.
.3 Description: Operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.

.4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:

.1 lubrication products and schedules.

.2 trouble shooting procedures.

.3 adjustment techniques.

.4 operational checks.

.5 Suppliers names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.

.5 Guarantees showing:

.1 Name and address of projects.

.2 Guarantee commencement date (date of Interim Certificate of Completion).

.3 Duration of guarantee.

.4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.

.5 Signature and seal of Guarantor.

.6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

.3 Spare parts: List all recommended spares to be maintained on site to ensure optimum efficiency. List all special tools appropriate to unique application. All parts/tools detailed must be identified as to manufacturer, manufacturer part number and supplier (including address).

.4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

.5 For any removed or added equipment, fill and return the information form of the equipment(CMMS).

## 1.19 RECORDS

.1 As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to NCC Representative's inspection for issuance of final certificate of completion, supply to the NCC Representative one (1) set of white prints with all deviations neatly inked in. The NCC Representative will provide two sets of clean white prints for this purpose.

## 1.20 GUARANTEES AND WARRANTIES

.1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with NCC Representative.

1.21 CLEAN UP

.1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the NCC Representative, remove debris from site, neatly stack material for use, and clean up generally.

.2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.

.3 Clean areas under contract to a condition at least equal to that previously existing and to approval of NCC Representative.

1.22 SECURITY CLEARANCES

.1 All personnel employed on this project will be subject to security check. Obtain requisite clearance, as instructed, for each individual required to enter the premises.

.2 Personnel will be checked daily at start of work shift and given a pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.23 SECURITY ESCORT

.1 All personnel employed on this project shall be escorted when executing work in non-public areas during normal working hours. Personnel shall be escorted in all areas after normal working hours.

.2 Submit an escort request to NCC Representative at least 3 days before the service is needed. For requests submitted within the time mentioned above, the costs of the security escort will be paid for by the NCC Representative. The cost incurred by a late request will be charged to the Contractor.

.3 Any escort request may be cancelled free of charge.

.4 The costs of the escort will be calculated in the average hourly price rate of a security guard at the rate of at least eight hours a day for a late request of escort and of four hours for a late cancellation.

1.24 BUILDING SMOKING ENVIRONMENT

.1 Smoking is not permitted in the Building. Obey smoking restrictions on building property.

1.25 SCHEDULING

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the NCC Representative, take necessary measures to complete work within scheduled time. Do not change schedule without notifying NCC Representative.

.2 Carry out work during "regular hour" Monday to Friday from 07:00 to 18:00 hours and on Saturdays, Sundays and statutory holidays.

1.26 COST BREAKDOWN

.1 Before submitting first progress claim submit breakdown of Contract Amount in detail as directed by NCC Representative and aggregating the Contract Amount. After approval by NCC Representative cost breakdown will be used as the basis of progress payments

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.2 Submit copies of incident and accident reports.

.3 Submit WHMIS MSDS - Material Safety Data Sheets.

.4 NCC Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to NCC Representative within 7 days after receipt of comments from NCC Representative.

.5 NCC Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.6 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to NCC Representative.

.7 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

### 1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

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

1.6 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 NCC Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

1.7 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act, Industrial and Commercial Establishments Regulation.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

.3 Comply with Occupational Health and Safety Regulations, 1996.

.4 Comply with Occupational Health and Safety Act, General Safety Regulations, O.I.C.

1.9 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to

Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise NCC Representative verbally and in writing.

1.10 HEALTH AND SAFETY CO-ORDINATOR

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

1.11 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with NCC Representative.

1.12 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by NCC Representative.

.2 Provide NCC Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 NCC Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

.1 All applicable Control subsections.
.2 All applicable Mechanical subsections.
.3 All applicable Electrical subsections.

### 1.2 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection substantial performance interim completion.

.2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

### 1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
.1 Instruct Owner's personnel.
.2 Provide written report that demonstration and instructions have been completed.

.2 The NCC Representative must describe each technical facility and explain the philosophy of the concept, design criteria and the designer's intent.

.3 The employees of the Contractor factory trained and authorized employees of accredited manufacturers must provide training on starting, operation and shutdown of equipment, components and technical facilities. It must explain the characteristics of control devices: utility, impact on facilities and interdependent adjustment of setpoints and limiters. It must also provide training on commissioning, maintenance and adjustment of equipment and components of technical systems.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Two weeks ahead of schedule, the schedule for presenting demonstrations of how each piece of equipment and technical facilities for approval by the NCC Representative.

.2 Present a detailed training plan for review and approval by the NCC Representative. The plan must include a list of components, mechanical systems and integrated equipment and other topics to be covered during the training period. The plan shall also include dates and times for each preliminary training session. Provide a list of trainers and their credentials.

.3 In the week following the holding of demonstrations, reporting that attest that the demonstrations have been made and that the training was satisfactory (see the training program and training record sheets which are attached).

## 1.5 CONDITIONS FOR THE HOLD OF THE DEMONSTRATIONS OF FUNCTIONING

.1 The equipment has been inspected and started in accordance with the requirements set out in the tender.

.2 Testing, adjustment and balancing has been made in accordance with Section 01 91 00 - Commissioning and technical facilities are fully operational.

.3 Provide copies of operating manuals and maintenance for use for demonstrations and training sessions.

## 1.6 PREPARATION

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 The training materials must include at least the following documents:
.1 Plans in line with execution;
.2 The Operations Manual;
.3 Maintenance Manual;
.4 ERA documents and reports for monitoring performance.

.4 The training material must contain all the detailed information that will be needed for training later.

## 1.7 DEMONSTRATION AND INSTRUCTIONS

.1 Provide training during normal business hours. Each training session should last no longer than 3 hours. It must be between 8h and 11h30 or between 13h30 and 16h00.

.2 The training should cover all stages of the operation and maintenance. Use manuals for operating and maintenance staff training.

.3 Examine the content of textbooks to explain in detail

all aspects of the operation and maintenance.

.4 Prepare additional information as needed and add to the operating manuals and maintenance.

.5 The training can be given on the job, classroom, orally, in writing and using audiovisual equipment.

.6 Training must be completed before the receiving installation.

1.8 FOLLOW-UP SESSIONS

.1 Hold a follow-up session. If necessary, follow-up session will be held prior to issuance of certificate of final completion. This session will aim to clarify issues that may have an NCC Representative or manager of commissioning as a result of experiences during the initial period of operation.

.2 The maximum duration of follow-up sessions must be six (6) hours (3 hours and 3 hours in English in French) for sub-sections of Control, Mechanical and Electrical respectively. If training in French is not required, to spend time equivalent to the additional training in English.

1.9 TIME ALLOCATED TO TRAINING

.1 Allocate a total of six training (6) hours.

## PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

## PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 The main objectives of the commissioning process can be classified as follows:
.1 To ensure installation of all new equipment conforms to the contract document.
.2 Performance verification that all components of the equipment actually perform as specified. This will be verified by measurements, visual inspection, equipment data sheets, manufacturer's representative assistance at start-up, and integrated testing.
.3 Operation & Maintenance Personnel fully trained to operate and maintain the new equipment and systems.

1.2 RELATED SECTIONS

.1 All applicable Control subsections.

.2 All applicable Mechanical subsections.

.3 All applicable Electrical subsections.

1.3 SCOPE OF COMMISSIONING

.1 The scope consists of:
.1 Testing of the 'new' components installed as defined in the tender document.
.2 Testing of system(s) including existing system(s) which has been modified or extended as part of the work as defined in the tender document.
.3 Integrated System Performance Testing and fine tuning as defined in the tender document.
.4 Seasonal testing as defined in the tender document.
.5 The Contractor shall provide the hiring of an independent company specializing in commissioning to perform testing and component testing. The results will be included in tabular form.

1.4 COMMISSIONING SCHEDULE

.1 Within 1 month of contract award, the contractor will be responsible for providing a detailed schedule for showing all commissioning activities. Schedule to include the following milestones as a minimum; testing, start-up, training, delivery of O&M Manual, sequencing of commissioning, acceptance, and occupancy.

.2 Unless otherwise specified in writing by the NCC Representative, all testing and related requirements specified herein will be successfully performed prior to the issuance of the Interim Certificate of

Completion.

1.5 SUBMITTAL

.1 Prior to start of Work; submit one (1) set of shop drawings to the NCC Representative for review and comments, from an O&M perspective. This shall include all components and systems delivered within the Controls, Mechanical and Electrical sub-sections.

.2 Submit CMMS documentation for all components or systems to be removed as part of this project prior to removal.

.3 Submit start-up report forms prior to scheduling commissioning activities.

.4 Submit O&M Manual for review and comments prior to scheduling commissioning activities and training of O&M personnel.

.5 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy or other reasons beyond Contractor's control, promptly after execution of those services.

.6 Documentation will be required from all equipment manufacturers outlining that their respective equipment is operational, has been installed to their requirements, started and commissioned successfully.

.7 Submit not later than 2 weeks after award of contract. Request to make any changes to these commissioning specification, including; timing, procedures, tolerances and instruments. Request should be made in writing to the NCC Representative, and approval obtained from the NCC Representative not less than 3 weeks prior to start of commissioning.

1.6 MANUFACTURERS INVOLVEMENT

.1 Arrange for Manufacturer to submit copies of all production test records for production test required by these specifications prior to shipping.

.2 Prior to start-up of equipment or systems, obtain manufacturer's installation, start-up and operation instructions and review with NCC Representative.

.3 Use manufacturer's trained start-up personnel to maintain integrity of warranty.

.4 Verify with manufacturer that testing as specified will not void any warranties.

.5 Manufacturer's personnel to be experienced in design, installation and operation of equipment and systems

and be able to interpret test results in clear, concise, logical manner.

.6 Report in writing to NCC Representative any deficiencies or defects noted during performance of services.

## 1.7 SEASONAL TESTING

.1 Not withstanding all inclusive requirements specified in this section, additional separate cycles of performance testing and verification will be required at later date for components and systems whose full operation is dependent on seasonal conditions.

.2 Contractor's responsibilities with respect to such commissioning activities will be as specified in relevant sections.

## 1.8 RESPONSIBILITIES

.1 NCC Representative is responsible for the overall delivery of commissioning activities, review and approval of all documentation, overview of performance, verification of activities, and verification of accuracy of reported results.

.2 NCC Representative is responsible for the witnessing and certification of the performance verification results.

.3 Contractor is responsible to perform all commissioning activities and record results.

.4 Responsibility of the satisfactory completion of the project, and demonstration that the requirements of the commissioning are satisfied rest with the Contractor, who will employ and pay for Specialists, supervision, inspection and testing as required, to complete the work as described.

.5 Coordinate all sub-trades, other divisions, manufacturers, suppliers, and other specialists as required to ensure all phases of work shall be properly organized prior to commencement of each particular testing procedure. Establish all necessary manpower requirements.

.6 Coordinate the activities of this Section with the starting and testing of:

.1 Special components and systems specified in the Controls sub-sections.

.2 Mechanical components and systems specified in the Mechanical sub-sections.

.3 Electrical components and systems specified in the Electrical sub-sections.

.7 Where any components or systems require testing prior to starting, ensure that such work has been completed and approved prior to starting of these components and systems.

## 1.9 PREPARATION

.1 The contractor shall have contract documents, shop drawings, product data, and operation and maintenance data in hand during equipment performance verification process.

.2 Except when otherwise specified, complete all start-up and testing prior to acceptance test and hand-over of the project.

.3 Co-ordinate work and manpower requirements of sub-trades, suppliers, manufacturers, specialists, disciplines as required to ensure that all work is properly organized prior to start-up and testing.

.4 Where equipment or systems require testing prior to start-up, ensure that such work is completed and approved prior to delivery of equipment or systems.

.5 Notify NCC Representative seven (7) days prior to time project will be ready for testing, adjusting, and balancing.

## 1.10 START-UP AND TESTING

.1 Before start-up, clean all newly installed equipment and or systems and verify same to be free from all contaminants.

.2 After testing, protect equipment and systems from construction activities.

.3 Conceal equipment and systems only after inspection and testing is completed and approved by NCC Representative.

.4 Assume all liabilities and costs for inspections including disassembly and re-assembly after approval, starting, testing, and adjusting, including supply of testing equipment.

## 1.11 WITNESSING OF STARTING AND TESTING

.1 Provide sufficient notice not less than seven (7) days prior to commencement.

.2 NCC Representative may witness all or any portion of start-up and testing at their discretion.

.3 General Contractor to be present at all tests performed by sub-trades, suppliers, and equipment manufacturers.

## 1.12 START-UP ACTIVITIES

.1 Factory and on-site testing

.2 Inspect the components individually before starting.

.3 Pre-start-up, component by component inspections. Check of all equipment, systems, installation, electrical connections, etc. for conformity to contract documents, equipment manufacturer's installation requirements, etc.

.4 Check of location, installation, setting of controls, limit and safety devices and operate as designed.

.5 Compilation of pre-start-up deficiency list and rectification of all deficiencies in writing to NCC Representative.

.6 Start-up verification for proper and safe operation.

.7 Identification and correction of start-up and pre-commissioning deficiencies.

.8 Failure to follow specified start-up procedures shall result in a re-evaluation of equipment by independent testing agency selected by NCC Representative. Should results reveal that the equipment start-up was not in accordance with specified requirements, the contractor shall remove from site and replace with new, which will also be subject to specific start-up procedures.

.9 TAB shall be as specified in relevant sections and shall verify the performance of all systems to ensure that they meet requirements of the contract document.

## 1.13 MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, maintain equipment and systems as directed by equipment/system manufacturer.

.2 In conjunction with the manufacturer, develop written maintenance program. Submit to NCC Representative for approval before implementation.

## 1.14 START-UP DOCUMENTATION

.1 Assemble and submit start-up reports to the NCC Representative before commencement of commissioning.

.2 Start-up documentation to include as a minimum, witness

and certified by the NCC Representative, factory and on-site test certificates, pre-start-up inspection reports, installation/start-up check lists signed, certified and witnessed.

1.15 COMMISSIONING DOCUMENTATION

.1 All results of test, performance verification and commissioning procedures to be reported, documented, witnessed and certified by NCC Representative using forms supplied by NCC Representative and approved by the NCC Representative.

.2 All commissioning documentation to be reviewed and approved by the NCC Representative.

.3 The NCC Representative will develop project specific verification forms for verification of components and systems which will be provided to the Contractor. Fully completed forms with the exception of verification results data, are to be completed and submitted to the NCC Representative within four (4) weeks of approval of shop drawings, or as specified.

.1 Supplementing the above, the Contractor shall provide project specific verification forms for electrical mechanical, control (EMCS) systems. Submit sample verification forms with shop drawing submission. Update forms as required and resubmit to NCC Representative should there be changes to the initial scope of work. After contractor start-up and debugging of programming, complete verification process in the presence of the NCC Representative.

.2 Component forms shall be completed as follows:

.1 The specified requirements shall be completed by Contractor and verified by the NCC Representative.

.2 The shop drawing information shall be completed by hand and shall reflect APPROVED shop drawings.

.3 The installed information shall be completed by the contractor from nameplates on installed equipment. This shall be completed by hand.

.4 The systems verification cannot take place before all related components have been verified as correct.

.5 Integrated systems verification cannot take place before all related systems have been verified as correct.

.6 Verification forms will be provided for information and convenience to the Contractor and will not relieve the Contractor of responsibility for verification of components, systems, or integrated systems not included on the verification forms. Refer to sample verification forms at the end of this Section.

.7 A verification form is to be completed for each integrated system in a category requiring

verification.

.8 System and Integrated system verification forms are to be completed by the Contractor and verified by the NCC Representative.

1.16 TRAINING

.1 In accordance with Section 017900 - Demonstration & Training

.2 As supplemented in other sections of the contract document.

1.17 START OF COMMISSIONING

.1 Notify NCC Representative not less than seven (7) days prior to commencement of commissioning.

.2 Commissioning to be in accordance with the completion schedule for the project and commissioning plan.

.3 Start commissioning only after completion of start-up, TAB, and any elements of building affecting start-up and performance verification of systems has been rectified.

.4 Contractor to provide sufficient 'qualified' personnel to NCC Representative's satisfaction at field locations and at the central operation work (monitoring) station to successfully test and commission components, systems, and integrated systems.

1.18 COMMISSIONING GENERAL REQUIREMENTS

.1 Carry out commissioning under actual or simulating operating range in all modes. (i.e.: regular, emergency, day, night, heating, and cooling).

.2 Each system to be tested independently. If interlocked with or operation is affected by other systems, in unison with those systems.

.3 Commissioning procedures to be repeatable and reported results are to be verifiable.

.4 Follow equipment manufacturer's instruction re: operating and safety aspects.

1.19 CONFLICTS

.1 If requirements of this or other sections of construction or commissioning specification conflict, report to the NCC Representative before start-up and obtain clarification.

.2 Failure to report conflicts and obtain clarification will result in application of most stringent requirement.

1.20 COMMISSIONING MEETING

.1 In accordance with requirements of project meeting supplemented as specified herein, commissioning meetings will be held at same time as, and form part of regular construction progress meetings, or can be separate.

.2 Commissioning meetings will be held weekly during the construction phase. Meetings to continue on regular basis until issuance of Interim Certificate of Completion, after which meetings will occur as required to address operational and warranty issues.

.3 Purpose of meetings shall be to resolve issues, monitor progress, identify deficiencies relating to commissioning.

.4 To be present at the meetings, General Contractor and all his sub-contractors, NCC Representative and Project Manager.

.5 NCC Representative to put forward agenda, chair meeting as well as record and distribute minutes.

1.21 RECORDS OF COMMISSIONING ACTIVITIES

.1 Maintain accurate, detailed records of commissioning activities including names of technicians, supervisors and dates of commissioning activities.

1.22 INTER-DISCIPLINARY CO-ORDINATION

.1 Be present, assist and witness commissioning of all systems and equipment of other disciplines which impact upon, interface with, are interlocked or interconnected with system being commissioned.

1.23 PRE-COMMISSIONNING REVIEW

.1 Review contract documents and confirm in writing to NCC Representative adequacy of provisions for commissioning and all other aspects of design pertinent to the success of commissioning.

.2 Before starting commissioning, review:
.1 Installation Documentation
.2 Documentation;
.3 Design Criteria and Intents
.4 All Start-up Documentation

.5 Commissioning Specifications, requirements and forms
.6 Commissioning Schedules
.7 Commissioning Standards and Procedures
.8 Cleanliness of Systems
.9 As-built drawings (marked-up)
.10 O&M Manual

.3 Report to NCC Representative in writing all discrepancies and deficiencies.

## 1.24 OPERATION OF SYSTEM DURING COMMISSIONING

.1 Operate and maintain for the length of time required as determined by the NCC Representative for commissioning to be completed, and as required for verification of reported results.

## 1.25 COMMISSIONING TOLERANCES

.1 Definitions:
.1 Application tolerances: Specified range of acceptable deviations of measured values from specified values or specified design criteria.
.2 Measurement tolerances: Unless specified otherwise, all measured and reported values to be within ± 2% of actual values.
.3 Instrument accuracy tolerances: Accuracy of measured value as percentage of actual value. Refer to relevant sections of these commissioning specifications.
.4 Values measured during verification of reported results to be within ± 5% of reported results.

## 1.26 RESULTS

.1 If start-up, testing and or PV produce unacceptable results, repair, replace or repeat specified stating and or PV procedures until acceptance results are achieved.

.2 Provide manpower and materials, bear cost for re-commissioning.

## 1.27 INSTRUMENTS

.1 Submit list of all instruments proposed to be used, listing all data including serial number, current calibration certificate date, calibration expiry date for review and approval by NCC Representative.

.2 Provide safety equipment required for personnel

involved in the starting testing and commissioning program.

.3 In addition to instruments listed in the specification document, provide the following:
.1 Two way radio
.2 Ladders
.3 Other equipment
.4 Safety equipment for start-up and testing personnel.
.5 Provide list of equipment and instruments to be used in the start-up, TAB, testing for review and approval by the NCC Representative.

## 1.28 INSTALLED INSTRUMENTATION

.1 1. Instruments installed under Contract may be used for TAB and PV if:
.1 Accuracy complies with these specifications.
.2 Calibration certificates have been deposited with the NCC Representative.
.3 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

## 1.29 WITNESSING COMMISSIONING

.1 Commissioning Manager will witness all activities. NCC Representative may witness some activities to satisfy the design intent has been met.

.2 NCC Representative will certify all the results.

.3 Contractor to be present at all tests.

## 1.30 AUTHORITIES HAVING JURISDICTION

.1 The contractor will complete initial start-up successfully prior to performance verifications and certification by presiding authorities having jurisdiction.

.2 To facilitate the turnover of the project, call and arrange for authorities to witness procedures in a manner that avoids unnecessary duplication of tests. It shall be the responsibility of the Contractor to confirm which tests the presiding authorities having jurisdiction are required to attend. Confirm that the presiding authorities will be present for each test, as required.

.3 Any cost associated with presiding authorities attending testing during the daytime and during off-hours shall be the responsibility of the Contractor. Include all such cost in your tender.

.4 Obtain Certificates of Approval, acceptance and compliance with the rules and regulations of authority having jurisdiction. Provide copies to the NCC Representative within five (5) days of tests with the commissioning report.

.5 Submit reports generated by special testing agencies to the NCC Representative prior to the issuance of the Interim Certificate of Completion.

.6 Special Testing agencies shall be approved by the NCC Representative with acceptable facilities and qualifications.

1.31 DEFICIENCIES, FAULTS, DEFECTS, REPETITION

.1 Correct all deficiencies found during start-up and commissioning to satisfaction of the NCC Representative.

.2 Report faults, defects affecting commissioning to NCC Representative in writing as they become apparent. Unless instructed otherwise, halt commissioning until same is rectified.

.3 Where verification of reported results fail to receive NCC Representative approval, and where repetition of verification again fails to receive approval, and where NCC Representative deems Contractor's request for 2nd verification was premature, then all costs incurred by NCC Representative for 3rd and subsequent verifications to be borne by the contractor.

1.32 ACTIVITIES UPON COMPLETION OF COMMISSIONING

.1 After commissioning is completed to satisfaction of NCC Representative, replace drive guards, close access doors, lock devices in set positions, and ensure sensors are at required settings.

.2 Permanently and indelibly mark all settings to allow restoration at any time during life of facility. Markings not be eradicated or covered in any way.

.3 Record 'as commissioned' settings in commissioning report.

1.33 COMPLETION OF COMMISSIONING

.1 Co-operate fully with NCC Representative during all stages of acceptance and occupancy of the facility.

.2 Upon completion of commissioning, leave all systems in normal operating mode.

.3 Except for warranty and seasonal verification activities specified in these commissioning specifications, commissioning to be completed prior to issuance of Interim Certificate of Completion.

.4 Compile test reports, verification forms, and certificates, by Division, by specification Section, into one Commissioning Manual.

.5 Submit draft manual for review and approval to the NCC Representative 2 weeks prior to application for Interim Certificate of Completion for the project.

.6 Submit 6 copies of the approved manual prior to Interim Certificate of Completion.

## PART 2 – PRODUCTS

2.1 N/A .1 N/A

## PART 3 – EXECUTION

3.1 N/A .1 N/A

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 00 10 - General Instructions.

.2 Shop drawings to show:
.1 Mounting arrangements.
.2 Operating and maintenance clearances.

.3 Shop drawings and product data accompanied by:
.1 Detailed drawings of bases, supports, and anchor bolts.
.2 Acoustical sound power data, where applicable.
.3 Points of operation on performance curves.
.4 Manufacturer to certify current model production.
.5 Certification of compliance to applicable codes.

.4 Closeout Submittals:
.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.
.2 Operation and maintenance manual approved by, and final copies deposited with, NCC Representative before final inspection.
.3 Operation data to include:
.1 Control schematics for systems including environmental controls.
.2 Description of systems and their controls.
.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
.4 Operation instruction for systems and component.
.5 Description of actions to be taken in event of equipment failure.
.6 Valves schedule and flow diagram.
.7 Colour coding chart.
.4 Maintenance data to include:
.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
.2 Data to include schedules of tasks, frequency, tools required and task time.
.5 Performance data to include:
.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to NCC Representative for approval. Submission of individual data will not be accepted unless directed by NCC Representative.

.2 Make changes as required and re-submit as directed by NCC Representative.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

1.2 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

2.1 N/A

.1 Not used.

## PART 3 - EXECUTION

3.1 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers.

3.3 DEMONSTRATION

.1 NCC Representative will use equipment and systems for test purposes prior to acceptance. Supply labour,

material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:
.1 Boilers and pumps.
.2 Water heaters.

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

## 3.4 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

PART 1 - GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
.1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
.2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
.3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
.4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.
.1 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.2 ASTM A 536-84(2004)e1, Standard Specification for Ductile Iron Castings.
.3 ASTM B 88M-05, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
.1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)
.1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
.1 MSS-SP-67-02a, Butterfly Valves.
.2 MSS-SP-70-06, Gray Iron Gate Valves, Flanged and Threaded Ends.
.3 MSS-SP-71-05, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
.4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.

.8 National Research Council (NRC)/Institute for Research

in Construction
.1 NRCC 38728, National Plumbing Code of Canada (NPC) - 2010.

.9 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:
.1 Provide maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
.1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M.

2.2 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 1 ½ and smaller : wrought copper to ANSI/ASME B16.22; with stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

2.3 JOINTS

.1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A 307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 GATE VALVES

.1 NPS 2 and under, soldered:
.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:
.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

2.5 GLOBE VALVES

.1 NPS2 and under, soldered:
.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:
.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.

2.7 BALL VALVES

.1 NPS 2 and under, screwed:
.1 Class 150.
.2 Bronze Forged Brass body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, soldered:
.1 To ANSI/ASME B16.18, Class 150.
.2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

## PART 3 - EXECUTION

### 3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 INSTALLATION

.1 Install in accordance with Province(s) Plumbing Code and local authority having jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

### 3.3 PRESSURE TESTS

.1 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

### 3.4 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

### 3.5 START-UP

.1 Timing: start up after:
.1 Pressure tests have been completed.
.2 Disinfection procedures have been completed.
.3 Certificate of static completion has been issued.
.4 Water treatment systems operational.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:
.1 Establish circulation and ensure that air is

eliminated.
.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
.3 Bring HWS storage tank up to design temperature slowly.
.4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
.5 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

## 3.6 PERFORMANCE VERIFICATION

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:
.1 Verify performance of temperature controls.
.2 Verify compliance with safety and health requirements.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American National Standards Institute/Canadian Standards Association (ANSI/CSA)

.2 Canadian Standards Association (CSA International)
.1 CSA B51-03(R2007), Boiler, Pressure Vessel, and Pressure Piping Code.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

### 1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

### 2.1 INDIRECT WATER HEATER

.1 Supply and install as indicated on drawings, a Viessmann Vitocell 300-V storage tank suitable for domestic hot water production in combination with a hot water heating system. Both the tank and heat exchanger shall be made of fully hygienic, high-alloy stainless steel, austenitic, chrome-nickel-steel, titanium stabilized (grade SA 240 - 316 Ti).

.2 The tank will be supplied with:
.1 Thermometer
.2 Four (4) brass adaptors
.3 One (1) well for sensor with insulation
.4 Temperature and pressure relief valve

.3 The tank shall be provided with 58mm thermal insulation (foamed-in-place PUR foam, HCFC-free).

.4 The tank shall have front and top-mounted openings to allow inspection and cleaning without piping disconnection.

.5 The tank shall have a two (2) years warranty on accessories and eight (8) years warranty on the heat exchanger and tank.

## PART 3 - EXECUTION

### 3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 INSTALLATION

.1 Install in accordance with manufacturer's recommendations.

### 3.3 FIELD QUALITY CONTROL

.1 Manufacturer's factory trained, certified Engineer to start up DHW heaters.

PART 1 - GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 00 10 - General Instructions.

.2 Shop drawings to show:
.1 Mounting arrangements.
.2 Operating and maintenance clearances.

.3 Shop drawings and product data accompanied by:
.1 Detailed drawings of bases, supports, and anchor bolts.
.2 Acoustical sound power data, where applicable.
.3 Points of operation on performance curves.
.4 Manufacturer to certify current model production.
.5 Certification of compliance to applicable codes.

.4 Closeout Submittals:
.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.
.2 Operation and maintenance manual approved by, and final copies deposited with, NCC Representative before final inspection.
.3 Operation data to include:
.1 Control schematics for systems including environmental controls.
.2 Description of systems and their controls.
.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
.4 Operation instruction for systems and component.
.5 Description of actions to be taken in event of equipment failure.
.6 Valves schedule and flow diagram.
.7 Colour coding chart.
.4 Maintenance data to include:
.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
.2 Data to include schedules of tasks, frequency, tools required and task time.
.5 Performance data to include:
.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
.2 Equipment performance verification test results.
.3 Special performance data as specified.
.4 Testing, adjusting and balancing reports

as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.6 Approvals:
.1 Submit 2 copies of draft Operation and Maintenance Manual to NCC Representative for approval. Submission of individual data will not be accepted unless directed by NCC Representative.
.2 Make changes as required and re-submit as directed by NCC Representative.

.7 Additional data:
.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

## PART 2 - PRODUCTS

2.1 N/A

.1 Not used.

## PART 3 - EXECUTION

3.1 PAINTING REPAIRS AND RESTORATION

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers.

3.3 DEMONSTRATION

.1 NCC Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:
.1 Boilers ans pumps.
.2 Water heaters.

.3 Supply tools, equipment and personnel to demonstrate

and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

## 3.4 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 Canadian Standards Association (CSA International)
.1 CSA B139-09 (R2014), Installation Code for Oil Burning Equipment.

.3 National Fire Code of Canada (NFCC)

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

## PART 2 - PRODUCTS

### 2.1 N/A

.1 Not used.

## PART 3 - EXECUTION

### 3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation

and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

## 3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada and CSA B139.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer, CSA B139 and as indicated without interrupting operation of other system, equipment, components.

## 3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.
.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

## 3.5 AIR VENTS

.1 Install manual air vents to at high points in piping systems.

.2 Install isolating valve at each automatic air valve.

.3 Install drain piping to approved location and terminate where discharge is visible.

## 3.6 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

## 3.7 PIPEWORK INSTALLATION

.1 Install pipework to CSA B139.

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible.

.12 Ream pipes, remove scale and other foreign material before assembly.

.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.14 Provide for thermal expansion as indicated.

.15 Valves:
.1 Install in accessible locations.
.2 Remove interior parts before soldering.
.3 Install with stems above horizontal position unless indicated.
.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.
.6 Use ball valves at branch take-offs for isolating

purposes except where specified.

.16 Check Valves:
.1 Install silent check valves on discharge of pumps.
.2 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

## 3.8 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:
.1 Concrete, masonry walls, concrete floors on grade: terminate flush with finished surface.
.2 Other floors: terminate 25 mm above finished floor.
.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:
.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
.2 Elsewhere:
.1 Provide space for firestopping.
.2 Maintain fire rating integrity.
.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
.4 Ensure no contact between copper pipe or tube and sleeve.

## 3.9 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.
.1 Chrome or nickel plated brass or type 302 stainless steel..

.3 Sizes: outside diameter to cover opening or sleeve.
.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.10 PREPARATION FOR FIRE STOPPING

.1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation.

.2 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.11 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

.2 Before start-up, clean interior of piping systems.

.3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.12 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise NCC Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections of heating, ventilating and air conditioning work.

.3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Conduct tests in presence of NCC Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. NCC Representative to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by NCC Representative.

3.13 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by NCC Representative.

.2 Be responsible for damage to existing plant by this work.

3.14 CLEANING

.1 Clean in accordance with Section 01 00 10 - General

Instructions.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME).
- .1 ASME B40.100-01, Pressure Gauges and Gauge Attachments.
- .2 ASME B40.200-01, Thermometers, Direct Reading and Remote Reading.

.2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-14.4-M88, Thermometers, Liquid-in-Glass, Self Indicating, Commercial/Industrial Type.
- .2 CAN/CGSB-14.5-M88, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 00 10 - General Instructions.

.2 Submit shop drawings and product data.

.3 Submit manufacturer's product data for following items:
- .1 Thermometers.
- .2 Pressure gauges.
- .3 Stop cocks.
- .4 Wells.

## PART 2 - PRODUCTS

### 2.1 GENERAL

.1 Design point to be at mid point of scale or range.

.2 Ranges: as indicated.

### 2.2 DIRECT READING THERMOMETERS

.1 Industrial, variable angle type, liquid filled, 125 mm scale length: to CAN/CGSB 14.4 or ASME B40.200.

### 2.3 THERMOMETER WELLS

.1 Copper pipe: copper or bronze.

.2 Steel pipe: brass or stainless steel.

2.4 PRESSURE GAUGES

.1 112 mm, dial type: to ASME B40.100, Grade 2A, stainless steel bourdon tube having 0.5% accuracy full scale unless otherwise specified.

.2 Provide:
- .1 Bronze stop cock.
- .2 Oil filled for high vibration applications.

PART 3 – EXECUTION

3.1 GENERAL

.1 Install so they can be easily read from floor or platform. If this cannot be accomplished, install remote reading units.

.2 Install between equipment and first fitting or valve.

3.2 THERMOMETERS

.1 Install in wells on piping. Provide heat conductive material inside well.

.2 Install in locations as indicated and on inlet and outlet of:
- .1 Water boilers.
- .2 DHW tanks.

.3 Use extensions where thermometers are installed through insulation.

3.3 PRESSURE GAUGES

.1 Install in following locations:
- .1 Suction and discharge of pumps.
- .2 Upstream and downstream of PRV's.
- .3 Upstream and downstream of control valves.
- .4 Outlet of boilers.
- .5 In other locations as indicated.

.2 Use extensions where pressure gauges are installed through insulation.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
.1 ANSI/ASME B1.20.1-1983(R2006), Pipe Threads, General Purpose (Inch).
.2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 ASTM International
.1 ASTM A 276-08, Standard Specification for Stainless Steel Bars and Shapes.
.2 ASTM B 62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.
.3 ASTM B 283-08a, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
.4 ASTM B 505/B 505M-08a, Standard Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
.1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
.2 MSS-SP-80-2008, Bronze Gate Globe, Angle and Check Valves.
.3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit data for valves specified in this Section.

### 1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Valves:
.1 Except for specialty valves, to be single manufacturer.

.2 End Connections:
.1 Connection into adjacent piping/tubing:
.1 Steel pipe systems: screwed ends to ANSI/ASME B1.20.1.
.2 Copper tube systems: solder ends to ANSI/ASME B16.18.

.3 Gate Valves:
.1 Requirements common to gate valves, unless specified otherwise:
.1 Standard specification: MSS SP-80.
.2 Bonnet: union with hexagonal shoulders.
.3 Connections: screwed with hexagonal shoulders.
.4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
.5 Packing: non-asbestos.
.6 Handwheel: non-ferrous.
.7 Handwheel Nut: bronze to ASTM B 62.
.2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125
.1 Body: with long disc guides, screwed bonnet with stem retaining nut.
.2 Operator: Handwheel.
.3 NPS 2 and under, non-rising stem, solid wedge disc, Class 150:
.1 Body: with long disc guides, screwed bonnet with stem retaining nut.
.2 Operator: handwheel.
.4 NPS 2 and under, rising stem, split wedge disc, Class 125:
.1 Body: with long disc guides, screwed bonnet.
.2 Disc: split wedge, bronze to ASTM B 283, loosely secured to stem.
.3 Operator: handwheel lockshield.
.5 NPS 2 and under, rising stem, solid wedge disc, Class 125:
.1 Body: with long disc guides, screwed bonnet.
.2 Operator: handwheel.
.6 NPS 2 and under, rising stem, solid wedge disc, Class 150:
.1 Body: with long disc guides, screwed bonnet.
.2 Operator: handwheel.

.4 Globe Valves:
.1 Requirements common to globe valves, unless specified otherwise:
.1 Standard specification: MSS SP-80.
.2 Bonnet: union with hexagonal shoulders.
.3 Connections: screwed with hexagonal shoulders.
.4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.
.5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
.6 Handwheel: non-ferrous.
.7 Handwheel Nut: bronze to ASTM B 62.
.2 NPS 2 and under, composition disc, Class 125:
.1 Body and bonnet: screwed bonnet.
.2 Disc and seat: renewable rotating PTFE disccomposition to suit service conditions, regrindable bronze seat, loosely secured to bronze stem to ASTM B 505.
.3 Operator: handwheel.
.3 NPS 2 and under, composition disc, Class 150:
.1 Body and bonnet: union bonnet.
.2 Disc and seat: renewable rotating PTFE disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B 505.
.3 Operator: handwheel.
.4 NPS 2 and under, plug disc, Class 150, screwed ends:
.1 Body and bonnet: union bonnet.
.2 Disc and seat ring: tapered plug type with disc stem ring of AISI S420 stainless steel to ASTM A 276, loosely secured to stem.
.3 Operator: handwheel.

.5 Check Valves:
.1 Requirements common to check valves, unless specified otherwise:
.1 Standard specification: MSS SP-80.
.2 Connections: screwed with hexagonal shoulders.
.2 NPS 2 and under, swing type, bronze disc, Class 125:
.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
.2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
.3 NPS 2 and under, swing type, bronze disc:
.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
.2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
.4 NPS 2 and under, swing type, composition disc,

Class 200:
.1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
.2 Disc: renewable rotating disc to suit service conditions, bronze two-piece hinge disc construction.
.5 NPS 2 and under, horizontal lift type, composition disc, Class 150:
.1 Body: with integral seat, union bonnet ring with hex shoulders, cap.
.2 Disc: renewable PTFE rotating disc in disc holder having guides top and bottom, of bronze to ASTM B 62.
.6 NPS 2 and under, vertical lift type, bronze disc, Class 125:
.1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.

.6 Silent Check Valves:
.1 NPS 2 and under:
.1 Body: cast high tensile bronze to ASTM B 62 with integral seat.
.2 Pressure rating: Class 125.
.3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
.4 Disc and seat: renewable rotating disc.
.5 Stainless steel spring, heavy duty.
.6 Seat: regrindable.

.7 Ball Valves:
.1 NPS 2 and under:
.1 Body and cap: cast high tensile bronze to ASTM B 62.
.2 Pressure rating: Class125.
.3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders solder ends to ANSI.
.4 Stem: tamperproof ball drive.
.5 Stem packing nut: external to body.
.6 Ball and seat: replaceable stainless steel hard chrome solid ball and Teflon seats.
.7 Stem seal: TFE with external packing nut.
.8 Operator: removable lever handle.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Remove internal parts before soldering.

.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
.1 ASME B31.1-07, Power Piping.

.2 ASTM International
.1 ASTM A 125-1996(2007), Standard Specification for Steel Springs, Helical, Heat-Treated.
.2 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.3 ASTM A 563-07a, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
.1 MSS SP 58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
.2 MSS SP 69-2003, Pipe Hangers and Supports - Selection and Application.
.3 MSS SP 89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.4 Underwriter's Laboratories of Canada (ULC)

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Manufacturers' Instructions:
.1 Provide manufacturer's installation instructions.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP 58.
.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.
.4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP 58.

### 2.2 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with MSS SP 58. ANSI B31.1 and

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

### 2.3 PIPE HANGERS

.1 Finishes:
.1 Pipe hangers and supports: galvanized after manufacture.
.2 Use electro-plating galvanizing process.
.3 Ensure steel hangers in contact with copper piping are epoxy coated.

.2 Upper attachment to concrete:
.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
.2 Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP 69.

.3 Hanger rods: threaded rod material to MSS SP 58:
.1 Ensure that hanger rods are subject to tensile loading only.
.2 Provide linkages where lateral or axial movement of pipework is anticipated.
.3 Do not use 22 mm or 28 mm rod.

.4 Pipe attachments: material to MSS SP 58:
.1 Attachments for steel piping: carbon steel galvanized.
.2 Attachments for copper piping: copper plated black steel.
.3 Use insulation shields for pipework.
.4 Oversize pipe hangers and supports.

.5 Adjustable clevis: material to MSS SP 69 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

.6 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP 69.

.7 U-bolts: carbon steel to MSS SP 69 with 2 nuts at each end to ASTM A 563.
.1 Finishes for steel pipework: galvanized.
.2 Finishes for copper, glass, brass or aluminum pipework: galvanized, with formed portion plastic coated.

.8 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP 69.

## 2.4 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:
.1 64 kg/m³ density insulation plus insulation protection shield to: MSS SP 69, galvanized sheet carbon steel. Length designed for maximum 3 m span.

.2 Insulated hot piping:
.1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP 69.

## 2.5 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel. Submit calculations with shop drawings.

## 2.6 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

.1 Provide templates to ensure accurate location of anchor bolts.

## 2.7 HOUSE-KEEPING PADS

.1 Provide 100 mm high concrete housekeeping pads for base-mounted equipment; size pads 50 mm larger than

equipment; chamfer pad edges.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 INSTALLATION

.1 Install in accordance with:
.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:
.1 Install on piping systems at pumps, boilers and as indicated.

.3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

### 3.3 HANGER SPACING

.1 Plumbing piping: to Canadian Plumbing Code.

.2 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.

.3 Copper piping: up to NPS 1/2: every 1.5 m.

### 3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

### 3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

## 3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:
.1 Ensure that rod is vertical under operating conditions.
.2 Equalize loads.

.2 Adjustable clevis:
.1 Tighten hanger load nut securely to ensure proper hanger performance.
.2 Tighten upper nut after adjustment.

.3 C-clamps:
.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:
.1 Hammer jaw firmly against underside of beam.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.2 National Building Code of Canada (NBC) - 2010

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 00 10.

- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10. Include product characteristics, performance criteria, and limitations.

.2 Submit shop drawings in accordance with Section 01 00 10.
- .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
- .2 Provide shop drawings complete with performance and product data.
- .3 Provide detailed drawings of seismic control measures for equipment and piping.

.3 Quality assurance submittals: submit following.
- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .2 Instructions: submit manufacturer's installation instructions.
  - .1 NCC Representative will make available one (1) copy of systems supplier's installation instructions.
- .3 Manufacturer's Field Reports: manufacturer's field reports specified.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Size and shape of bases type and performance of vibration isolation as indicated.

2.2 ELASTOMERIC PADS

.1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.

.2 Type EP2 - rubber waffle or ribbed; 9 mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.

2.13 SEISMIC CONTROL MEASURES

.1 General:
.1 Seismic control systems to work in every direction.
.2 Fasteners and attachment points to resist same maximum load as seismic restraint.
.3 Drilled or power driven anchors and fasteners not permitted.
.4 No equipment, equipment supports or mounts to fail before failure of structure.
.5 Supports of cast iron or threaded pipe not permitted.
.6 Seismic control measures not to interfere with integrity of firestopping.

.2 Static equipment:
.1 Anchor equipment to equipment supports. Anchor equipment supports to structure.
.2 Suspended equipment:
.1 Use one or more of following methods depending upon site conditions:
.1 Install tight to structure.
.2 Cross brace in every direction.
.3 Brace back to structure.
.4 Cable restraint system.
.3 Seismic restraints:
.1 Cushioning action gentle and steady.
.2 Never reach metal-like stiffness.

.3 Piping systems:
.1 Piping systems: hangers longer than 300 mm; brace at each hanger.
.2 Compatible with requirements for anchoring and guiding of piping systems.

.4 Bracing methods:
.1 Structural angles or channels.
.2 Cable restraint system incorporating grommets,

shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 INSTALLATION

.1 Seismic control measures to meet requirements of NBC.

.2 Ensure piping and electrical connections to isolated equipment do not reduce system flexibility and that piping/conduit passage through walls and floors do not transmit vibrations.

### 3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

SPEC NOTE: Use the following paragraphs only when the manufacturer's field review services are desired to verify quality of installation. Consult with manufacturer to ascertain extent of services available.

.1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.

.2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:

.1 Upon completion of installation.

.3 Submit manufacturer's reports to NCC Representative within 3 days of manufacturer representative's review.

.4 Make adjustments and corrections in accordance with written report.

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

### 1.2 QUALIFICATIONS OF TAB PERSONNEL

.1 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.2 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.3 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.4 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.5 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

### 1.3 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates

to match load requirements over full operating ranges.

1.4 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to NCC Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to NCC Representative in writing proposed procedures which vary from standard.

.3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by NCC Representative for verification of TAB reports.

1.9 START OF TAB

.1 Notify NCC Representative 7 days prior to start of TAB.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
.1 Hydronic systems: plus or minus 10%.

1.11 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

.1 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.2 Calibrate within 3 months of TAB. Provide certificate of calibration to NCC Representative.

1.13 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB, the proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 TAB REPORT

.1 Format in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:
.1 Project record drawings.
.2 System schematics.

.3 Submit 5 copies of TAB Report to NCC Representative for verification and approval, in English or French in D-ring binders, complete with index tabs.

1.15 SETTINGS

.1 After TAB is completed to satisfaction of NCC Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.16 COMPLETION OF TAB

.1 TAB considered complete when final TAB Report received and approved by NCC Representative.

PART 2 – PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 – EXECUTION

3.1 NOT USED .1 Not used.

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 Section Includes:
.1 Thermal insulation for piping and piping accessories in commercial type applications.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM B 209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
.2 ASTM C 335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
.3 ASTM C 411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
.4 ASTM C 449/C 449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
.5 ASTM C 533-2004, Calcium Silicate Block and Pipe Thermal Insulation.
.6 ASTM C 547-2003, Mineral Fiber Pipe Insulation.
.7 ASTM C 795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
.8 ASTM C 921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
.2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.4 Manufacturer's Trade Associations
.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.
.2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings
.4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

## 1.3 DEFINITIONS

.1 For purposes of this section:
.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
.2 "EXPOSED" - will mean "not concealed" as specified.

.2 TIAC ss:
.1 CRF: Code Rectangular Finish.
.2 CPF: Code Piping Finish.

## 1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10 - General Instructions. Include product characteristics, performance criteria, and limitations.

# PART 2 - PRODUCTS

## 2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.
.1 Maximum flame spread rating: 25.
.2 Maximum smoke developed rating: 50.

## 2.2 INSULATION

.1 Mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C 335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/ULC-S702.
.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
.1 Mineral fibre: to CAN/ULC-S702.
.2 Jacket: to CGSB 51-GP-52Ma.
.3 Maximum "k" factor: to CAN/ULC-S702.

## 2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5 mm diameter stainless steel.

.5 Bands: stainless steel, 19mm wide, 0.5 mm thick.

## 2.4 CEMENT

.1 Thermal insulating and finishing cement:
.1 Hydraulic setting or Air drying on mineral wool, to ASTM C 449/C 449M.

## 2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

## 2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

## 2.7 JACKETS

.1 Canvas:
.1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.
.2 Lagging adhesive: compatible with insulation.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

### 3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturers instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:
.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

### 3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at valves, primary flow measuring elements flanges and unions at equipment.

.2 Design: to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:
.1 Insulation, fastenings and finishes: same as system.
.2 Jacket: high temperature fabric.

### 3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.
.1 Securements: SS wire at 300 mm on centre.
.2 Seals: lap seal adhesive, lagging adhesive.
.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.
.1 Securements: SS wire at 300 mm on centre.
.2 Seals: VR lap seal adhesive, VR lagging adhesive.
.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.
.1 Run-outs to individual units and equipment not exceeding 4000 mm long.
.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

| **Application** | **Temp °C** Run out | **TIAC code** to 1 | **Pipe sizes (NPS) and insulation thickness(mm)** 1 1/4 to 2 | 2 1/2 to 4 | 5 to 6 | 8 & over | | |
|---|---|---|---|---|---|---|---|---|
| Hot Water Heating | 60 - 94 | A-1 | 25 | 38 | 38 | 38 | 38 | 38 |
| Domestic HWS and Recirculation | | A-1 | 25 | 25 | 25 | 38 | 38 | 38 |
| Water Domestic CWS | | A-3 | 25 | 25 | 25 | 25 | 25 | 25 |

.5 Finishes:
.1 Exposed indoors: canvas jacket.
.2 Exposed in mechanical rooms: canvas jacket.
.3 Concealed, indoors: canvas on valves, fittings. No further finish.
.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

## PART 1 - GENERAL

### 1.1 HYDRONIC SYSTEMS - PERFORMANCE VERIFICATION (PV)

.1 Perform hydronic systems performance verification after cleaning is completed and system is in full operation.

.2 When systems are operational, perform following tests:

.1 Conduct full scale tests at maximum design flow rates, temperatures and pressures for continuous consecutive period of 48 hours to demonstrate compliance with design criteria.

.2 Verify performance of hydronic system circulating pumps as specified, recording system pressures, temperatures, fluctuations by simulating maximum design conditions and varying.

.1 Pump operation.

.2 Boiler and operation.

.3 Maximum heating demand.

.4 Boiler and failure.

.5 Outdoor reset.

### 1.2 HYDRONIC SYSTEM CAPACITY TEST

.1 Perform hydronic system capacity tests after:

.1 TAB has been completed

.2 Verification of operating, limit, safety controls.

.3 Verification of primary and secondary pump flow rates.

.4 Verification of accuracy of temperature and pressure sensors and gauges.

.2 Calculate system capacity at test conditions.

.3 Using manufacturer's published data and calculated capacity at test conditions, extrapolate system capacity at design conditions.

.4 When capacity test is completed, return controls and equipment status to normal operating conditions.

.5 Heating system capacity test:

.1 Perform capacity test when ambient temperature is within 10% of design conditions. Simulate design conditions by:

.1 Reducing space temperature by turning of heating system for sufficient period of time before starting testing.

.2 Test procedures:

.1 Open fully radiation control valves.
.2 With boilers on full firing and hot water heating supply temperature stabilized, record flow rates and supply and return temperatures simultaneously.
.3 Conduct flue gas analysis test on boilers at full load and at low fire conditions.

## PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

## PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

# PART 1 - GENERAL

## 1.1 SUMMARY

.1 Section Includes:
.1 Materials and installation for piping, valves and fittings for gas fired equipment.

## 1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
.1 ASME B16.5-03, Pipe Flanges and Flanged Fittings.
.2 ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
.3 ASME B16.22-01, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
.4 ASME B18.2.1-96, Square and Hex Bolts and Screws Inch Series.

.2 American Society for Testing and Materials International (ASTM)
.1 ASTM A 47/A 47M-99(2004), Standard Specification for Ferritic Malleable Iron Castings.
.2 ASTM A 53/A 53M-04, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
.3 ASTM B 75M-99, Standard Specification for Seamless Copper Tube Metric.
.4 ASTM B 837-01, Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

.3 Canadian Standards Association (CSA International)
.1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.4 Canadian Standards Association (CSA)/Canadian Gas Association (CGA)
.1 CAN/CSA B149.1HB-00, Natural Gas and Propane Installation Code Handbook.

## 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.

.3 Instructions: submit manufacturer's installation instructions.

## PART 2 - PRODUCTS

### 2.1 PIPE

.1 Steel pipe: to ASTM A 53/A 53M, Schedule 40, seamless as follows:
- .1 NPS 1/2 to 2, screwed.
- .2 NPS2 1/2 and over, plain end.

### 2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste.

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: nonmetallic flat.

### 2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged or welded:
- .1 Malleable iron: screwed, banded, Class 150.
- .2 Steel pipe flanges and flanged fittings: to ASME B16.5.
- .3 Unions: malleable iron, brass to iron, ground seat, to ASTM A 47/A 47M.
- .4 Bolts and nuts: to ASME B18.2.1.
- .5 Nipples: schedule 40, to ASTM A 53/A 53M.

### 2.4 VALVES

.1 Provincial Code approved, lubricated ball type.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 PIPING

.1 Install in accordance with Section 23 05 01 - Installation of Pipework, applicable Provincial/Territorial Codes, CAN/CSA B149.1, CAN/CSA B149.2,, supplemented as specified.

.2 Install drip points:
.1 At low points in piping system.
.2 At connections to equipment.

## 3.3 VALVES

.1 Install valves with stems upright or horizontal unless otherwise approved by NCC Representative.

.2 Install valves at branch take-offs to isolate pieces of equipment, and as indicated.

## 3.4 FIELD QUALITY CONTROL

.1 Site Tests/Inspection:
.1 Test system in accordance with CAN/CSA B149.1 and requirements of authorities having jurisdiction.

## 3.5 ADJUSTING

.1 Purging: purge after pressure test in accordance with CAN/CSA B149.1.

.2 Pre-Start-Up Inspections:
.1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.
.2 Check gas trains, entire installation is approved by authority having jurisdiction.

## 3.6 CLEANING

.1 Cleaning: in accordance with Section 23 08 02-Cleaning and Start-Up of Mechanical Piping Systems CAN/CSA B149.1, supplemented as specified.

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
.1 Copper piping valves and fittings for hydronic systems.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Welding Society (AWS)
.1 ANSI/AWS A5.8/A5.8M-04, Specification Filler Metals for Brazing and Bronze Welding.

.2 American Society of Mechanical Engineers (ASME)
.1 ANSI/ASME B16.4-98, Gray-Iron Threaded Fittings.
.2 ANSI/ASME B16.15-1985(2004), Cast Bronze Threaded Fittings.
.3 ANSI B16.18-2001, Cast Copper Alloy, Solder Joint Pressure Fittings.
.4 ANSI/ASME B16.22-2001, Wrought Copper and Copper-Alloy Solder Joint Pressure Fittings.

.3 American Society for Testing and Materials International (ASTM)
.1 ASTM B 32-04, Standard Specification for Solder Metal.
.2 ASTM B 61-02, Standard Specification for Steam or Valve Bronze Castings.
.3 ASTM B 62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.
.4 ASTM B 88M-03, Standard Specification for Seamless Copper Water Tube Metric.
.5 ASTM E 202-04, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

.4 Manufacturers Standardization Society (MSS)
.1 MSS SP 67-2002a, Butterfly Valves.
.2 MSS SP 70-1998, Cast Iron Gate Valves, Flanged and Threaded Ends.
.3 MSS SP 71-1997, Grey Iron Swing Check Valves, Flanged and Threaded Ends.
.4 MSS SP 80-2003, Bronze Gate, Globe, Angle and Check Valves.
.5 MSS SP 85-2002, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 ACTION AND

.1 Product Data:
.1 Submit manufacturer's printed product

INFORMATIONAL SUBMITTALS

literature, specifications and datasheet in accordance with Section . Include product characteristics, performance criteria, and limitations.

## PART 2 - PRODUCTS

### 2.1 TUBING

.1 Type A or B hard drawn copper tubing: to ASTM B 88M.

### 2.2 FITTINGS

.1 Cast bronze threaded fittings: to ANSI/ASME B16.15.

.2 Wrought copper and copper alloy solder joint pressure fittings: to ANSI/ASME B16.22.

.3 Cast iron threaded fittings: to ANSI/ASME B16.4.

.4 Cast copper alloy solder joint pressure fittings: to ANSI B16.18.

### 2.3 FLANGES

.1 Brass or bronze: threaded.

.2 Cast iron: threaded.

.3 Orifice flanges: slip-on, raised face, 2100 kPa.

### 2.4 JOINTS

.1 Solder, tin-antimony, 95:5: to ASTM B 32.

.2 Silver solder BCUP: to ANSI/AWS A5.8.

.3 Brazing: as indicated.

### 2.5 VALVES

.1 Connections:
.1 NPS 2 and smaller: ends for soldering.
.2 NPS 2 1/2 and larger: flanged ends.

.2 Globe valves: application: emergency bypass:
.1 NPS 2 and under:
.1 Mechanical Rooms: with PTFE disc, as specified Section 23 05 23.01 - Valves - Bronze.

.3 Drain valves: gate, Class 125, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.

.4 Swing check valves:
.1 NPS 2 and under:
.1 Class 125, swing, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.

.5 Silent check valves:
.1 NPS 2 and under:
.1 As specified Section 23 05 23.01 - Valves - Bronze.

.6 Ball valves:
.1 NPS 2 and under: as specified Section 23 05 23.01 - Valves - Bronze.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 PIPING INSTALLATION

.1 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.2 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping where ever practical.

.3 Slope piping in direction of drainage and for positive venting.

.4 Use eccentric reducers at pipe size change installed to provide positive drainage or positive venting.

.5 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.6 Assemble piping using fittings manufactured to ANSI standards.

### 3.3 VALVE INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install ball valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.3 Install globe valves in by-pass around control valves as indicated.

.4 Install silent check valves on discharge of pumps and as indicated.

.5 Install swing check valves in horizontal lines on discharge of pumps and as indicated.

## 3.4 FLUSHING AND CLEANING

.1 Flush and clean in presence of NCC Representative.

.2 Flush after pressure test for a minimum of 4h.

.3 Fill with solution of water and non-foaming, phosphate-free detergent 3% solution by weight. Circulate for minimum of 8h.

.4 Refill system with clean water. Circulate for at least 4h. Clean out strainer screens/baskets regularly. Then drain.

.5 Refill system with clean water. Circulate for at least 2h. Clean out strainer screens/baskets regularly. Then drain.

.6 Drainage to include drain valves, dirt pockets, strainers, low points in system.

.7 Re-install strainer screens/baskets only after obtaining NCC Representative's approval.

## 3.5 FILLING OF SYSTEM

.1 Refill system with clean water adding water treatment as specified.

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes.
.1 Materials and installation for steel piping, valves and fittings for hydronic systems in building services piping.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME).
.1 ASME B16.1-98, Cast Iron Pipe Flanges and Flanged Fittings.
.2 ASME B16.3-98, Malleable Iron Threaded Fittings.
.3 ASME B16.5-03, Pipe Flanges and Flanged Fittings.
.4 ASME B16.9-01, Factory-Made Wrought Buttwelding Fittings.
.5 ASME B18.2.1-03, Square and Hex Bolts and Screws (Inch Series).
.6 ASME B18.2.2-87(R1999), Square and Hex Nuts (Inch Series).

.2 American Society for Testing and Materials International, (ASTM).
.1 ASTM A 47/A 47M-99, Standard Specification for Ferritic Malleable Iron Castings.
.2 ASTM A 53/A 53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
.3 ASTM A 536-84(1999)e1, Standard Specification for Ductile Iron Castings.
.4 ASTM B 61-02, Standard Specification for Steam or Valve Bronze Castings.
.5 ASTM B 62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.
.6 ASTM E 202-00, Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.3 American Water Works Association (AWWA).
.1 AWWA C111-00, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International).
.1 CSA B242-M1980(R1998), Groove and Shoulder Type Mechanical Pipe Couplings.
.2 CAN/CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).

.5 Manufacturer's Standardization of the Valve and

Fittings Industry (MSS).
.1 MSS-SP-67-025, Butterfly Valves.
.2 MSS-SP-70-98, Cast Iron Gate Valves, Flanged and Threaded Ends.
.3 MSS-SP-71-97, Cast Iron Swing Check Valves Flanged and Threaded Ends.
.4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
.5 MSS-SP-85-02, Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

2.1 PIPE

.1 Steel pipe: to ASTM A53/A53M, Grade B.

2.2 PIPE JOINTS

.1 NPS2 and under: screwed fittings with PTFE tape or lead-free pipe dope.

.2 NPS2-1/2 and over: welding fittings and flanges to CAN/CSA W48.

.3 Roll grooved: standard coupling to CSA B242.

.4 Flanges: plain.

.5 Orifice flanges: slip-on raised face, 2100 kPa.

.6 Flange gaskets: to AWWA C111.

.7 Pipe thread: taper.

.8 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.

.9 Roll grooved coupling gaskets: type EPDM.

2.3 FITTINGS

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.

.2 Pipe flanges and flanged fittings:
.1 Cast iron: to ASME B16.1, Class 125.

.2 Steel: to ASME B16.5.

.3 Butt-welding fittings: steel, to ASME B16.9.

.4 Unions: malleable iron, to ASTM A 47/A 47M and ASME B16.3.

## 2.4 VALVES

.1 Connections:
.1 NPS2 and smaller: screwed ends.
.2 NPS2.1/2 and larger: Flanged ends.

.2 Globe valves: to MSS-SP- 80 85 Application: emergency bypass:
.1 NPS2 and under:
.1 Mechanical Rooms: withPTFE disc, as specified Section 23 05 23.01 - Valves - Bronze.
.2 Elsewhere: Globe, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.

.3 Drain valves: Gate, Class 125, non-rising stem, solid wedge disc, as specified Section 23 05 23.01 - Valves - Bronze.

.4 Swing check valves: to MSS-SP-71.
.1 NPS2 and under:
.1 Class 125, swing, with composition disc, as specified Section 23 05 23.01 - Valves - Bronze.
.2 NPS21/2 and over:
.1 Flanged ends: as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

.5 Silent check valves:
.1 NPS2 and under:
.1 As specified Section 23 05 23.01 - Valves - Bronze.
.2 NPS21/2 and over:
.1 Flanged ends: as specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

.6 Ball valves:
.1 NPS2 and under: as specified Section 23 05 23.01 - Valves - Bronze.

# PART 3 - EXECUTION

## 3.1 PIPING

.1 Install pipework in accordance with Section 23 05 05

INSTALLATION

- Installation of Pipe Work.

3.2 CLEANING, FLUSHING AND START-UP

.1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

3.3 TESTING

.1 Test system in accordance with Section 21 05 01 - Common Work Results for Mechanical.

3.4 BALANCING

.1 Balance water systems to within plus or minus 10 % of design output.

.2 Refer to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC for applicable procedures.

3.5 PERFORMANCE VERIFICATION

.1 In accordance with Section 23 08 01 - Performance Verification of Mechanical Piping.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
.1 ASME-04(2007), Boiler and Pressure Vessel Code.

.2 ASTM International Inc.
.1 ASTM A 47/A 47M-99(2004), Standard Specification for Ferritic Malleable Iron Castings.
.2 ASTM A 278/A 278M-01(2006), Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).
.3 ASTM A 516/A 516M-06, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.
.4 ASTM A 536-84(2004), Standard Specification for Ductile Iron Castings.
.5 ASTM B 62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 Canadian Standards Association (CSA International)
.1 CSA B51-03(R2003), Boiler, Pressure Vessel, and Pressure Piping Code.
.2 CSA B51-03(R2005), Boiler, Pressure Vessel, and Pressure Piping Code, Supplement #1.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for expansion tanks, air vents, separators, valves, and strainers and include product characteristics, performance criteria, physical size, finish and limitations.

## PART 2 - PRODUCTS

### 2.1 DIAPHRAGM TYPE EXPANSION TANK

.1 Vertical galvanized steel steel pressurized diaphragm type expansion tank.

.2 Capacity: as indicated.

.3 Size: as indicated.

.4 Diaphragm sealed in EPDM suitable for 115 degrees C operating temperature.

.5 Working pressure: 860 kPa with ASME stamp and certification.

.6 Air precharged to 84 kPa (initial fill pressure of system).

.7 Supports: provide supports with hold down bolts and installation templates.

2.2 AUTOMATIC AIR VENT

.1 Standard float vent: brass body and NPS 1/8 connection and rated at 690 kPa working pressure.

.2 Industrial float vent: cast iron body and NPS 1/2 connection and rated at 860 kPa working pressure.

.3 Float: solid material suitable for 115 degrees C working temperature.

2.3 PIPE LINE STRAINER

.1 NPS 1/2 to 2: bronze body to ASTM B 62, screwed connections, Y pattern.

.2 NPS 2 1/2 to 12: cast steel body to ASTM A 278/A 278M, Class 30 connections.

.3 Blowdown connection: NPS 1.

.4 Screen: stainless steel with 1.19 mm perforations.

.5 Working pressure: 860 kPa.

## PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Run drain lines and blow off connections to terminate above nearest drain.

.2 Maintain adequate clearance to permit service and

maintenance.

.3 Should deviations beyond allowable clearances arise, request and follow NCC Representative's directive.

.4 Check shop drawings for conformance of tappings for ancillaries and for equipment operating weights.

3.3 STRAINERS

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead of each pump.

3.4 AIR VENTS

.1 Install at high points of systems.

.2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain.

3.5 EXPANSION TANKS

.1 Adjust expansion tank pressure as indicated.

3.6 PRESSURE SAFETY RELIEF VALVES

.1 Run discharge pipe to terminate above nearest drain.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Electrical Equipment Manufacturers Advisory Council (EEMAC)

.2 Canadian Standards Association (CSA International)
.1 CSA-B214-07, Installation Code for Hydronic Heating Systems.

.3 National Electrical Manufacturers' Association (NEMA)
.1 NEMA MG 1-2006, Motors and Generators.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 10 - General Instructions.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for pump, circulator, and equipment, and include product characteristics, performance criteria, physical size, finish and limitations indicate point of operation, and final location in field assembly.

.3 Submit manufacturer's detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers.

### 1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance and operation data for incorporation into manual specified in Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

### 2.1 IN-LINE CIRCULATORS

.1 Refer to indicated schedule on drawing.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install hydronic pumps to: CSA-B214.

.2 In line circulators: install as indicated by flow arrows.
.1 Support at inlet and outlet flanges or unions.
.2 Install with bearing lubrication points accessible.

.3 Ensure that pump body does not support piping or equipment.
.1 Provide stanchions or hangers for this purpose.
.2 Refer to manufacturer's installation instructions for details.

.4 Check rotation prior to start-up.

.5 Install pressure gauge test cocks.

3.3 START-UP

.1 General:
.1 In accordance with manufacturer's recommendations.

.2 Procedures:
.1 Before starting pump, check that cooling water system over-temperature and other protective devices are installed and operative.
.2 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
.3 Run-in pumps for 12 continuous hours minimum.
.4 Verify operation of over-temperature and other protective devices under low- and no-flow condition.
.5 Eliminate air from scroll casing.
.6 Adjust alignment of piping and conduit to ensure true flexibility.
.7 Eliminate cavitation, flashing and air entrainment.
.8 Adjust pump shaft seals, stuffing boxes, glands.
.9 Measure pressure drop across strainer when clean and with flow rates as finally set.
.10 Replace seals if pump used to degrease system or if pump used for temporary heat.

3.4 PERFORMANCE VERIFICATION (PV)

.1 Verify that manufacturer's performance curves are accurate.

.2 Ensure valves on pump suction and discharge provide tight shut-off.

.3 Multiple Pump Installations - Series and Parallel:
.1 Repeat PV procedures specified above for pump performance and pump BHP for combinations of pump operations.

.4 Mark points of design and actual performance at design conditions as finally set upon completion of TAB.

.5 Commissioning Reports: in accordance with Section 01 91 00 - Commissioning. Reports to include:
.1 Record of point(s) of actual performance at maximum and minimum conditions and for single and parallel operation as finally set at completion of commissioning on pump curves.
.2 Use Report Forms specified in Section 01 91 00 - Commissioning.
.3 Pump performance curves (family of curves).

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 Section Includes:
.1 Materials, components, equipment and chemicals for installation of complete HVAC water treatment system.

### 1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
.1 ASME Boiler and Pressure Vessel Code, Section VII-2004.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10 - General Instructions. Include product characteristics, performance criteria, and limitations.
.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS).

.2 Closeout Submittals:
.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

.1 Equipment, chemicals, service provided by one supplier.

### 2.2 POT FEEDER

.1 Welded steel, pressure rating 1200 kPa. Temperature rating: 90 degrees C.

### 2.3 CHEMICALS

.1 Provide necessary chemicals in order to treat the water following the flushing and refilling of the heating system.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

### 3.2 CHEMICAL FEED PIPING

.1 Install crosses at changes in direction. Install plugs in unused connections.

### 3.3 CLEANING OF MECHANICAL SYSTEM

.1 Flush mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Use chemicals to inhibit corrosion of various system materials that are safe to handle and use.

.2 Examine and clean filters and screens, periodically during circulation of cleaning solution, and monitor changes in pressure drop across equipment.

.3 Drain and flush systems until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.

.4 Disposal of cleaning solutions approved by authority having jurisdiction.

### 3.4 WATER TREATMENT SERVICES

.1 Provide necessary laboratory and technical assistance.

.2 Provide clear, concise, written instructions and advice to operating staff.

### 3.5 FIELD QUALITY CONTROL

.1 Start-up:
.1 Start up water treatment systems in accordance with manufacturer's instructions.

.2 Commissioning:
.1 Commissioning Agency: to be installing water treatment sub-contractor.
.2 Timing:

.1 After start-up deficiencies rectified.
.2 After start-up and before TAB of connected systems.

.3 Commissioning procedures - Closed Circuit Hydronic Systems:
.1 Analyze water in system.
.2 Based upon an assumed rate of loss.
.3 Record types, quantities of chemicals applied.

.4 Training:
.1 Commission systems, perform tests in presence of, and using assistance of, assigned O&M personnel.
.2 Train O&M personnel in softener regeneration procedures.

.5 Certificates:
.1 Upon completion, furnish certificates confirming satisfactory installation and performance.

.6 Commissioning Reports:
.1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, other data required by NCC Representative.

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 Section Includes:
- .1 Heating boiler units:
  - .1 Exhaust system.
  - .2 Boiler controls.
  - .3 Distribution manifold.
  - .4 Hot water.
  - .5 Installation.

### 1.2 REFERENCES

.1 American Boiler Manufacturer's Association (ABMA)

.2 American National Standards Institute (ANSI)
- .1 ANSI Z21.13-2004/CSA 4.9-2004, Gas-Fired Low-Pressure Steam and Hot Water Boilers.

.3 American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME)
- .1 ANSI/ASME Boiler and Pressure Vessel Code, Section IV, 2004.

.4 Canadian Gas Association (CGA)
- .1 CAN1-3.1-77(R2001), Industrial and Commercial Gas-Fired Package Boilers.
- .2 CAN/CSA-B149.1-10, Natural Gas and Propane Installation Code.

.5 Canadian Standards Association (CSA International)
- .1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.

.6 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10 - General Instructions. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 00 10 - General Instructions.
- .2 Indicate the following:
  - .1 General arrangement showing terminal points, instrumentation test connections.

.2 Clearances for operation, maintenance, servicing, tube cleaning, tube replacement.
.3 Foundations with loadings, anchor bolt arrangements.
.4 Piping hook-ups.
.5 Equipment electrical drawings.
.6 Burners and controls.
.7 All miscellaneous equipment.
.8 Flame safety control system.
.9 Exhaust and combustion air intake configuration.

.3 Engineering data to include:
.1 Boiler efficiency.

.3 Closeout Submittals:
.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 00 10 - General Instructions.

## PART 2 - PRODUCTS

### 2.1 CONDENSATION BOILER

.1 General:
.1 The gas-fired hot water condensing heating boiler shall be fabricated of high-quality stainless steel (SA240-316Ti), featuring the latest innovations of condensing boiler technology. The boiler shall incorporate a modulating compact cylindrical stainless steel gas burner with a high-alloy stainless steel heat exchanger surface capable of operating with consistently high efficiency. The boiler control system shall maintain optimized combustion, even in case of fluctuating gas composition and air resistance. The boiler control shall have priority for both electrical and fuel savings with its intelligent combustion controller. Boiler shall be equipped with a variable speed combustion fan for quiet and economical operation.

.2 Performance Criteria:
.1 Each boiler shall be designed for operating at:
.1 Total input: 104-285 MBH (30-83 kW)
.2 Total CSA/DOE output: 95-260 MBH (28-76 kW)
.3 Boiler turn-down ratio shall be as stated above.
.4 Certified AFUE efficiency shall not be below 92.0%.
.5 ASME maximum allowable working pressure (MAWP): 60 psig.
.6 ASME maximum water temperature (Fixed High Limit): 210°F (99°C).

.3 Construction

.1 The boiler shall include a single compact heat exchanger made of high-alloy stainless steel, designed based on the laminar heat transfer principle for high operational reliability and a long service life. A radial design shall be used to obtain maximum heat transfer performance in a single pass. Rectangular design of the coil is required to maximize the coil gap length and ensure maximum utilization of the heat exchanger surface. Defined gaps (0.8 mm) between coil passes and a heat exchanger length of 53 mm shall be sized to promote laminar flue gas flow for efficient heat transfer. The heat exchanger design shall allow for self-cleaning functionality.

.2 The burner shall be constructed from high-grade stainless steel for universal use with natural gas or propane gas. Burner ignition shall be by a direct spark ignition system. The boiler shall be equipped with a digital boiler control unit interface.

.3 The burner shall be capable of operating at altitudes of up to 10,000 ft (3,000 m) without change of orifices, but with the use of an electronic coding card.

.4 Wire and cable entry to boiler shall be facilitated by strain reliefs to protect electrical wires. All controls, relays, transformers, ignition module, wiring, and redundant seat combination gas valve shall be installed behind the boiler enclosure.

.5 The boiler shall be equipped with a flue gas vent opening at the top of the boiler. Venting shall be side wall horizontal, vertical or hybrid sealed (direct vent) chimney system. Provide CPVC starter adapter.

.6 The boiler shall be rated for zero (0") clearance to combustibles, including its vent system.

.7 Standard equipment shall also include the following items:

.1 Manual reset fixed high limit set at 210°F (99°C), wired in series with ignition system

.2 Integrated control

.3 45 psig pressure relief valve

.4 Temperature & Pressure gage and pipe fittings

.4 Certifications:

.1 All individual components shall be accepted as part of the system under the governing body having jurisdiction. Field approval shall not be required for any component. Boiler shall be CSA approved and shall be built in compliance with ASME Section IV, carrying the "H" stamp.

.2 The boiler shall have the following approvals and listings, or be in compliance with:

.1 CSA, CRN, ASME, I=B=R, MA State approval, AHRI (GAMA), Energy Star

2.2 BOILER CONTROL

.1 General:

.1 The control shall communicate a modulating boiler temperature set point to the individual boilers, and shall be weather responsive reset-based. The control shall be able to communicate with up to 4 boilers. The control shall have the ability to communicate to mixing valve controls, and shall allow for a single outdoor temperature sensor to be used and communicated to mixing valve controls. The control shall use an infinitely adjustable heating curve to calculate supply temperature. To assist in the calculation of supply temperature, the control shall allow for the selection of building construction. The control shall be capable of managing DHW production.

.2 General Requirements:

.1 The control shall provide the following:

.1 A potential-free contact output for compiled failure alarms.

.2 A fused output for the system supply pump.

.3 A dry contact input for external heat demand to override outdoor reset calculated set point temperature.

.4 An alarm output based on meeting supply temperature set point with respect to elapsed time.

.2 The control shall be able to accept a 0-10VDC signal from an external resistive module.

.3 Construction:

.1 The control housing shall be comprised of a steel or CPVC enclosure with knockouts for wiring or conduit.

.2 Control Interface:

.1 The control shall have the following features:

.1 A visual indicator for system faults.

.2 A multiple level access system for system programming and information retrieval.

.3 A visual indicator as to the current boiler enabled.

.4 The ability to display current boiler water temperature.

.5 The ability to display the current mode of the boiler.

.3 Additional Features

.1 The control shall provide the following additional features:

.1 Pump protection, by cycling the system supply pump at a periodic interval.

.2 A relay test function to test control outputs and status indicators.

.3 An auto rotation sequence for the boilers.

.4 An hour and pulse counter for system

pump and individual boiler operation.
.2 The control shall enter a warm weather mode with respect to warm weather conditions.

.4 Certifications:
.1 All individual components shall be accepted as part of the system under the governing body having jurisdiction. Field approval shall not be required for any component.
.2 All electrical wiring is to be done in accordance with the latest editions of:
.1 CSA C22.1 Canadian Electrical Code and/or local electrical codes (for Canada)
.2 ANSI/NFPA 70 National Electrical Code (for U.S.)

## 2.3 DISTRIBUTION MANIFOLD

.1 General:
.1 The multiple boiler low-loss distribution manifold shall be prefabricated in modular form, with each module able to accommodate 2 boilers. The unit shall be self-contained, requiring only electrical, gas and system-side connections.
.2 The manifold modules shall incorporate flanged connections at each end to allow for the factory-approved gasketed connections of the low-loss header and multiple modules.
.3 Manifold modules shall incorporate unionized boiler supply and return pipe connections and fixing brackets for Viessmann Vitodens 200-W hot water heating boilers, models B2HA-80. The manifold system shall be designed to allow for the mounting of power pump modules, master control, boilers, valves and circulators.
.4 The manifold system shall be hydrostatically tested to 100 psig.
.5 The manifold system shall be a free-standing structure.

.2 Performance Criteria:
.1 The manifold system shall be designed to have faster installation times and greater predictability in performance over field-constructed multiple boiler plants.
.2 The master boiler staging, rotation and modulation control unit shall have PID logic to operate the multiple boiler system as a single condensing boiler plant.
.3 The low-loss header discharge temperature set-point shall be provided by the programmable outdoor reset curve, dry-contact single temperature set-point, or optional 0-10V DC input from a Building Management System (BMS). Domestic hot water logic shall remain part of the master control when required or provided from the boiler plant.

.4 The manifold system shall be designed so that variable speed pumps may be used on the secondary side of the low-loss header without interfering with boiler plant operation.

.3 Construction: The manifold system shall be made of steel suitable for the distribution of hot water heating fluids. All external surfaces shall be primed and painted with corrosion-resistant paint. Major component joints in the manifold system shall be welded; threaded joints shall only be permitted to affix serviceable components.

.4 Certifications: All individual components shall be accepted as part of the system under the governing body having jurisdiction. Field approval shall not be required for any component, as the manifold is considered a piping option, and is constructed as such.

2.4 EXHAUST SYSTEM

.1 The venting system shall be designed using a direct venting, two-pipe system. The exhaust pipe and fittings shall be made of ULC S636 certified stainless steel material. The vent system manufacturer shall be listed in the boiler manufacturer installation manual. The combustion air pipe and fittings shall be made of CSA B181.2 and CAN/ULC S102.2 certified PVC DWV system.

.2 The installation manual must show all details of maximum lengths, equivalent lengths of fittings and termination details. Approvals of the venting system shall be stated by the boiler manufacturer as CSA or UL, as a package.

## PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 INSTALLATION

.1 Install in accordance with ANSI/ASME Boiler and Pressure Vessels Code Section IV, regulations of Province having jurisdiction, except where specified otherwise, and manufacturers recommendations.

.2 Make required piping connections to inlets and outlets recommended by boiler manufacturer.

.3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer for operation, servicing and maintenance without disruption of operation of any other equipment/system.

.4 Mount unit level.

.5 Pipe hot water relief valves full size to nearest drain.

.6 Pipe blowdown/drain to blowdown tank/floor drain.

.7 Natural gas installations - in accordance with CAN/CSA-B149.1.

## 3.3 MOUNTINGS AND ACCESSORIES

.1 Safety valves and relief valves:

.1 Run separate discharge from each valve.
.2 Terminate discharge pipe as indicated.
.3 Run drain pipe from each valve outlet and drip pan elbow to above nearest drain.

.2 Blowdown valves:
.1 Run discharge to terminate as indicated.

## 3.4 SEQUENCE OF OPERATION

.1 The two Vitodens 200-W B2HA-80 boilers shall be sequenced by a Vitotronic 300-K boiler sequencing control panel to achieve an instantaneous system supply setpoint temperature at the low loss header. This setpoint temperature shall be calculated according to the mode of operation as follows :

.2 Space Heating Mode :
.1 The Vitotronic 300-K shall continuously monitor the outside air temperature, individual boiler water temperatures and low loss header temperature. The low loss header setpoint temperature shall be based on a preselected outdoor reset heating curve which satisfies the heat requirements of the building. The Vitotronic 300-K shall dictate to each boiler via KM BUS communication an individual boiler water temperature setpoint in order to achieve the low loss header setpoint temperature. Each of the on-board Vitotronic boiler controls shall then modulate its respective burner to achieve its internal boiler temperature setpoint temperature. Each individual boiler pump (P-01 and/or P-02) shall only function when the boiler it is serving has a heat demand. Upon the completion of a boiler heat demand cycle the boiler pump (P-01 and/or P-02) shall have a brief post purge cycle to cool down the boiler it is serving. The system zone heating pumps (P-03, P-04 and P-05) are turned on manually and shall run continuously.

.3 Domestic Hot Water Mode :

.1 The Vitotronic 300-K shall continuously monitor the temperature of the indirect fired Vitocell domestic hot water tank (WH-01) via its domestic hot water tank sensor. Upon a call for heat for domestic hot water the Vitotronic 300-K shall :

.1 turn on the domestic hot water pump (P-06) serving the Vitocell indirect DHW.

.2 increase the low loss header setpoint temperature to 15°C (adjustable) above the selected domestic hot water tank temperature (WH-01). The Vitotronic 300-K shall dictate to each boiler via KM BUS communication an individual boiler water temperature setpoint in order to achieve its low loss header setpoint temperature. Each of the on-board Vitotronic boiler controls shall then modulate its respective burner to achieve its internal boiler temperature setpoint temperature.

## 3.5 FIELD QUALITY CONTROL

.1 Commissioning:

.1 Manufacturer to:

.1 Certify installation.

.2 Start up and commission installation.

.3 Carry out on-site performance verification tests.

.4 Demonstrate operation and maintenance.

.2 Provide NCC Representative at least 72 hours notice prior to inspections, tests, and demonstrations. Submit written report of inspections and test results.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
- .2 CSA C22.2.
- .3 CAN3-C235-83(R2000), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
- .1 EEMAC 2Y-1-1958, Light Gray Color for Indoor Switch Gear.

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
- .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

### 1.2 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

### 1.3 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
- .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data: submit WHMIS MSDS in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 01 - Hazardous Materials.

.3 Submit for review single line electrical diagrams under plexiglass in glazed frames and locate as indicated.
  .1 Electrical distribution system in main electrical room.

.4 Submit for review fire alarm riser diagram, plan and zoning of building at fire alarm control panel and annunciator.

.5 Shop drawings:
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
  .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
  .4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
  .5 Submit 1 copy of 600 x 600 mm minimum size drawings and product data to inspection authorities.
  .6 If changes are required, notify NCC Representative of these changes before they are made.

.6 Quality Control: in accordance with Section 01 45 00 - Quality Control.
  .1 Provide CSA certified equipment and material.
  .2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special approval before delivery to site.
  .3 Submit test results of installed electrical systems and instrumentation.
  .4 Permits and fees: in accordance with General Conditions of contract.
  .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
  .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to NCC Representative.

.7 Manufacturer's Field Reports: submit to NCC Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices as per the conditions of Provincial Act respecting manpower vocational training and qualification.
  .1 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
  .2 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.2 Health and Safety Requirements: do construction occupational health and safety.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Material Delivery Schedule: provide NCC Representative with schedule within 2 weeks after award of Contract.

1.7 SYSTEM STARTUP

.1 Instruct NCC Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant will aspects of its care and operation.

1.8 OPERATING INSTRUCTIONS

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:
  .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  .3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.
.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

.1 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

.2 Factory assemble control panels and component assemblies.

### 2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03 - Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

### 2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of inspection authorities.

.2 Decal signs, minimum size 175 x 250 mm.

### 2.4 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows: .1 Nameplates: lamicoid 3 mm matt white finish face, black core, lettering accurately aligned and engraved into core mechanically attached with self-tapping screws.

.1 Sizes as follows:

NAMEPLATE SIZES

| | | | | |
|---|---|---|---|---|
| Size 1 | | 1 | line | 3 mm high letters |
| Size 2 | | 1 | line | 5 mm high letters |
| Size 3 | | 1 | lines | 3 mm high letters |
| Size 4 | | 2 | line | 8 mm high letters |
| Size 5 | | 2 | lines | 5 mm high letters |
| Size 6 | 2 | 100 mm | 1 line | 12 mm high letters |
| Size 7 | 2 | 100 mm | 2 lines | 6 mm high letters |

.2 Labels: embossed plastic labels with 6mm high letters unless specified otherwise.

.3 Wording on nameplates to be approved by NCC Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. " as directed by NCC Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and color coding throughout.

.3 Color coding: to CSA C22.1.

.4 Use color coded wires in communication cables, matched throughout system.

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Color code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points or floor, and at 15 m intervals.

.3 Colors: 25 mm wide prime color and 20 mm wide auxiliary color.

| | Prime | Auxiliary |
|---|---|---|
| up to 250 V | Yellow | |
| up to 600 V | Yellow | Green |
| Telephone | Green | |
| Fire Alarm | Red | |
| Other Security Systems | Red | Yellow |

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint distribution enclosures light gray to EEMAC 2Y-1.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.2 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.3 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm.

.2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.5 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1200 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Above top of continuous baseboard heater: 200 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms: 1400 mm.

.3 Panelboards: as required by Code or as indicated.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.7 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust

branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests.

.1 Power distribution system including phasing, voltage, grounding and load balancing.
.2 Circuits originating from branch distribution panels.
.3 Lighting and its control.
.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
.5 Systems: fire alarm system.
.6 Insulation resistance testing:
.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of NCC Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

## 3.8 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment

scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
- .2 CSA C22.2 No.65-93(R1999), Wire Connectors.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
- .1 EEMAC 1Y-2, 1961 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
- .1 Connector body and stud clamp for stranded copper conductors.
- .2 Clamp for stranded copper conductors.
- .3 Stud clamp bolts.
- .4 Bolts for copper conductors.
- .5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, flexible conduit, as required to: CAN/CSA-C22.2 No.18.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors and:

- .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
- .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
- .3 Install fixture type connectors and tighten. Replace insulating cap.
- .4 Install bushing stud connectors in accordance with EEMAC 1Y-2 .

## PART 1 - GENERAL

### 1.1 PRODUCT DATA

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

## PART 2 - PRODUCTS

### 2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE RWU90 XLPE, Jacketed.

### 2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:
- .1 Grounding conductor: copper as indicated.
- .2 Circuit conductors: copper, size as indicated.

.3 Insulation:
- .1 Cross-linked polyethylene XLPE.
- .2 Rating: , 600 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: aluminum.

.6 Overall covering: thermoplastic polyvinyl chloride.

.7 Fastenings:
- .1 One hole malleable iron straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables at 600 mm centers.
- .3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:
- .1 Watertight approved for TECK cable.

2.3 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Type: ACWU90 jacket over thermoplastic armour and compliant to applicable Building Code classification for this project.

.5 Connectors: anti short connectors.

2.4 CONTROL CABLES

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:
- .1 Insulation: thermoplastic.
- .2 Sheath: cotton braid thermoplastic jacket.

.2 Type: low energy 300 V control cable: solid annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors, sized as indicated:
- .1 Insulation: PVC.
- .2 Shielding: braid over each pair.
- .3 Overall covering: PVC jackets.

.3 Type: 600 V stranded annealed copper conductors, sizes as indicated:
- .1 Insulation: PVC R90 (x-link).
- .2 Shielding: magnetic tape over each conductor.
- .3 Overall covering: thermoplastic jacket thermosetting jackets.

## PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Cable Color Coding: to Section 26 05 00 Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centers, pull boxes, and termination points.

.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable concealed, securely supported by straps.

3.5 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.6 INSTALLATION OF ALUMINUM SHEATHED CABLE

.1 Group cables wherever possible on channels.

3.7 INSTALLATION OF CONTROL CABLES

.1 Install control cables in conduit.

.2 Ground control cable shield.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
.1 CSA C22.2.

## PART 2 - PRODUCTS

### 2.1 CONNECTORS AND TERMINATIONS

.1 Copper long barrel compression connectors to CSA C22.2 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Bond and ground as required to CSA C22.2 No.41.

## PART 1 - GENERAL

1.1 NOT USED

.1 Not used.

## PART 2 - PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended.

## PART 3 - EXECUTION

3.1 INSTALLATION

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole malleable iron straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

- .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.

.2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels at 1 m on centre spacing.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of NCC Representative.

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-06, Canadian Electrical Code, Part 1

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide shop drawings:
- .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

## PART 2 - PRODUCTS

### 2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

## PART 3 - EXECUTION

### 3.1 JUNCTION AND PULL BOXES INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00- Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

## PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

## PART 2 - PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 1207 V outlet boxes for 120 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 One-piece electro-galvanized construction.

.2 Single and multi-gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

2.3 CONDUIT BOXES

.1 Cast FS or FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

2.5 SERVICE FITTINGS

.1 'High tension' receptacle fitting made of 2 piece stainless steel with brushed aluminum housing finish for 1 duplex two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

## PART 3 - EXECUTION

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armored cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product data: submit manufacturer's printed product literature, specifications and datasheets.
- .1 Submit cable manufacturing data.

.2 Quality assurance submittals:
- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

## PART 2 - PRODUCTS

### 2.1 CABLES AND REELS

.1 Provide cables on reels or coils.
- .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Identify cables for exclusively dc applications.

.4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.2 Rigid pvc conduit: to CSA C22.2 No. 211.2.

2.3 CONDUIT FASTENINGS

.1 One hole malleable iron straps to secure surface conduits 50 mm and smaller.
    .1 Two hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1m on center.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.
    .1 Set-screws are not acceptable.

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 Polypropylene.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms, in unfinished areas.

.3 Use electrical metallic tubing (EMT) except in cast concrete.

.4 Use flexible metal conduit for connection to motors in dry areas.

.5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.6 Install conduit sealing fittings in hazardous areas.
- .1 Fill with compound.

.7 Minimum conduit size for lighting and power circuits: 21 mm.

.8 Bend conduit cold:
- .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.9 Mechanically bend steel conduit over 21 mm diameter.

.10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.11 Install fish cord in empty conduits.

.12 Remove and replace blocked conduit sections.
- .1 Do not use liquids to clean out conduits.

.13 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.6 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International).
- .1 CAN/CSA C22.2 No.4-M89 (R2000), Enclosed Switches.
- .2 CSA C22.2 No.39-M89 (R2003), Fuseholder Assemblies.

## PART 2 - PRODUCTS

### 2.1 DISCONNECT SWITCHES

.1 Fusible, non-fusible, horsepower rated disconnect switch in CSA Enclosure 3R, to CAN/CSA C22.2 No.4 size as indicated.

.2 Provision for padlocking in on-off off switch position by three locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuseholders: to CSA C22.2 No.39 relocatable suitable without adaptors, for type and size of fuse indicated.

.5 Quick-make, quick-break action.

.6 ON-OFF switch position indication on switch enclosure cover.

### 2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Install disconnect switches complete with fuses if applicable.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.2 No.14-95 (R2001), Industrial Control Equipment.

## PART 2 - PRODUCTS

### 2.1 CONTACTORS

.1 Contactors: to CSA C22.2 No.14.

.2 Electrically held controlled by pilot devices as indicated and rated for type of load controlled.

.3 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.

.4 Mount in CSA Enclosure 1 unless otherwise indicated.

.5 Include following options in cover:
- .1 Red indicating lamp.
- .2 Stop-Start pushbutton.
- .3 Hand-Off-Auto selector switch.
- .4 On-Off selector switch.

### 2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Size 4 nameplate indicating name of load controlled as indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Install contactors and connect auxiliary control devices.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA C22.2 No.14-95(R2001), Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)
- .1 NEMA ICS 1-2001, Industrial Control and Systems: General Requirements.

### 1.2 SHOP DRAWINGS

.1 Include schematic, wiring, interconnection diagrams.

### 1.3 QUALITY ASSURANCE

.1 Submit to NCC Representative copy of test results.

### 1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.2 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by NCC Representative Consultant.

## PART 2 - PRODUCTS

### 2.1 AC CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No.14.

.2 Convertible contact type: contacts field convertible from NO to NC, electrically held. Coil rating: 120 V. Contact rating: 24 V, 15 A.

### 2.2 RELAY ACCESSORIES

.1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

2.3 OPERATOR CONTROL STATIONS

.1 Enclosure: CSA Type3R, surface flush mounting:

2.4 PUSHBUTTONS

.1 Illuminated, Heavy duty. Operator extend type. Black, with 1-NO and 1-NC contacts, labels as indicated. Stop pushbuttons colored red, provision for padlocking in depressed position labeled "emergency stop".

2.5 SELECTOR SWITCHES

.1 Maintained, 2 position labeled as indicated standard, operators knob, contact arrangement as indicated.

2.6 INDICATING LIGHTS

.1 Standard, LED type, lens color: as indicated.

2.7 CONTROL AND RELAY PANELS

.1 CSA Type 1 sheet steel enclosure with hinged padlockable access door, accommodating relays timers, labels, as indicated, factory installed and wired to identify terminals.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install pushbutton stations, control devices and interconnect.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing.

.4 Check out complete system for operational sequencing.

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 International Electrotechnical Commission (IEC)
- .1 IEC 947-4-1-2002, Part 4: Electromechanical contactors and motor-starters.

### 1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:
- .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:
- .1 Provide shop drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Provide shop drawings for each type of starter to indicate:
    - .1 Mounting method and dimensions.
    - .2 Starter size and type.
    - .3 Layout and components.
    - .4 Enclosure types.
    - .5 Wiring diagram.
    - .6 Interconnection diagrams.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Starters: to IEC 947-4 with AC4 utilization category.

### 2.2 MANUAL MOTOR STARTERS

.1 Three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
- .1 Switching mechanism, quick make and break.
- .2 One overload heater, manual reset, trip indicating handle.

.2 Accessories:
- .1 Toggle : heavy duty labeled as indicated.
- .2 Indicating light: standard heavy duty oil tight type and color green.
- .3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.4 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Manual starter designation label, white plate, black letters, size 1, engraved as indicated.

.3 Magnetic starter designation label, white plate, black letters, size engraved as indicated.

## PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install starters and control devices in accordance with manufacturer's instructions.

.2 Install and wire starters and controls as indicated.

.3 Ensure correct fuses installed.

.4 Confirm motor nameplate and adjust overload device to suit.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and manufacturer's instructions.

.2 Operate switches and contactors to verify correct functioning.

.3 Perform starting and stopping sequences of contactors and

relays.

.4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.