



SPECIFICATIONS

SOLICITATION #: 23-58107

BUILDING: SAS
110 Gymnasium Place Avenue
Saskatoon, SK

PROJECT: SAS-01 Chiller Replacement Project

PROJECT #: 6193

Date: October 2023



SPECIFICATION

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Construction Tender Form

Project Identification **SAS-01 Chiller Replacement Project**

Tender No.: **23-58107**

1.2 Business Name and Address of Tenderer

Name _____

Address _____

Contact Person(Print Name) _____

Telephone (_____) _____ **Fax:** (_____) _____

1.3 Offer

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

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

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

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

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

1.3.1 Offer (continued)

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

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

1.4 Acceptance and Entry into Contract

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

1.5 Construction Time

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

1.6 Bid Security

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

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

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

National Research Council Conseil national de recherches
Canada Canada

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

1.7 Contract Security

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

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

1.8 Appendices

This Tender Form includes Appendix No. _____N/A_____.

1.9 Addenda

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

| NUMBER | DATE | NUMBER | DATE |
|--------|------|--------|------|
| | | | |
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(Tenderers shall enter numbers and dates of addenda)

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

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

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

(Type or print the business name of the Tenderer)

AUTHORIZED SIGNATORY (IES)

(Signature of Signatory)

(Print name & Title of Signatory)

(Signature of Signatory)

(Print name & Title of Signatory)

SEAL

BUYANDELL NOTICE

SAS-01 Chiller Replacement Project

The National Research Council Canada, 110 Gymnasium Place, Saskatoon, SK, has a requirement for a project that includes:

Work under this contract covers Chiller Equipment Replacement at Building SAS-01 of the National Research Council of Canada located at the USask Campus in Saskatoon SK

Tender Destination

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

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

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

1. GENERAL:

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

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

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

2. MANDATORY SITE VISIT:

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

The site visits will be held on October 18th and October 19th, 2023 at **10:00**. Meet Terrance Williams at SAS Building, 110 Gymnasium Place, Saskatoon, SK. Bidders who, for any reason, cannot attend at the specified date and time will not be given an alternative appointment to view the site and their tenders, therefore, will be considered as non-responsive. **NO EXCEPTIONS WILL BE MADE.**

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

3. TENDER CLOSING DATE:

Tender closing date is November 7th, 2023 at 14:00.

4. TENDER RESULTS

Following the Tender closing, the tender results will be sent by e-mail to all Contractors who submitted a tender.

5. SECURITY REQUIREMENT FOR CANADIAN CONTRACTORS

5.1 MANDATORY SECURITY REQUIREMENT:

- .1 All personnel that will be involved with the project must be security screened to **RELIABILITY** status level as defined in the security policy of Canada.

6.0 WORKSAFE SASKATCHEWAN

- .1 All Bidders must provide a valid **WORKSAFE Saskatchewan** certificate with their Tender or prior to contract award.

7.0 OFFICE OF THE PROCUREMENT OMBUDSMAN

- .1 **Dispute Resolution Services**
The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1(1) of the *Department of Public Works and Government Services Act* will, on request or consent of the parties to participate in an alternative dispute resolution process to resolve any dispute between the parties respecting the interpretation or application of a term and condition of this contract and their consent to bear the cost of such process, provide to the parties a proposal for an alternative dispute resolution process to resolve their dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.
- .2 **Contract Administration**
The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1(1) of the *Department of Public Works and Government Services Act* will review a complaint filed by [*the supplier or the contractor or the name of the entity awarded this contract*] respecting administration of this contract if the requirements of Subsection 22.2(1) of the *Department of Public Works and Government Services Act* and Sections 15 and 16 of the *Procurement Ombudsman Regulations* have been met, and the interpretation and application of the terms and conditions and the scope of the work of this contract are not in dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca.
- .3 The Office of the Procurement Ombudsman (OPO) was established by the Government of Canada to provide an independent avenue for suppliers to raise complaints regarding

the award of contracts under \$25,000 for goods and under \$100,000 for services. You have the option of raising issues or concerns regarding the solicitation, or the award resulting from it, with the OPO by contacting them by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa-opo.gc.ca. You can also obtain more information on the OPO services available to you at their website at www.opo-boa.gc.ca.

The Departmental Representative or his designate for this project is: **Terry Williams**
Terrance.Williams@nrc-cnrc.gc.ca
Telephone: **(306) 491-4789**

Contracting Authority for this project is: **Collin Long**
Collin.Long@nrc-cnrc.gc.ca

INSTRUCTIONS TO BIDDERS

Article 1 – Receipt of Tender

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

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

Article 2 – Tender Form & Qualifications

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

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

Article 3 - Contract

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

Article 4 – Tender Destination

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

NRC.BidReceiving-ReceptiondesSoumissions.CNRC@nrc-cnrc.gc.ca

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

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

Article 5 - Security

- 1a) Bid Security is required and must be submitted in one of the following forms:
 - i) bonds of the Government of Canada, or bonds unconditionally guaranteed as to principal and interest by the Government of Canada; **OR**
 - ii) a bid bond.
- 1b) Regardless of the Bid Security submitted, it should never be more than \$250,000 maximum, calculated at 10% of the first \$250,000 of the tendered price, plus 5% of any amount in excess of \$250,000.
- 1c) Bid Security shall accompany each tender or, if forwarded separately from the tender, shall be provided not later than the specified tender closing time. Bid bond or E-bond Security must be in the ORIGINAL form. PDF via email is acceptable. **FAILURE TO PROVIDE THE REQUIRED BID SECURITY SHALL INVALIDATE THE TENDER.**
- 1d) The successful tenderer is required to provide security within 14 days of receiving notice of tender acceptance. The tenderer must furnish EITHER:

- i) a Security Deposit as described in 1(b) above together with a Labour and Material Payment Bond in the amount of at least 50% of the amount payable under the contract, OR
 - ii) a Performance Bond and a Labour and Material Payment Bond – each in the amount of 50% of the amount payable under the contract.
- 1e) Bonds must be in an approved form and from the companies whose

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

Article 7 – Sales Tax

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

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

Article 8 – Examination of Site

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

Article 9 – Discrepancies, Omissions, Etc.

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

Article 10 – No additional Payments for Increased Costs

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

Article 11 – Awards

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

Article 12 – Harmonized Sales Tax

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

Acceptable Bonding Companies

Published September 2010

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

1. Canadian Companies

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

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

2. Provincial Companies

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

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

3. Foreign Companies

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

Articles of Agreement

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

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

Articles of Agreement

These Articles of Agreement made in duplicate this day of .

Between

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

and

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

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

A1 Contract Documents

(23/01/2002)

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

Articles of Agreement

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

1.2 In the contract

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

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

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

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

A2 Date of Completion of Work and Description of Work

(23/01/2002)

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

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

Articles of Agreement

A3 Contract Amount

(23/01/2002)

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

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

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

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

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

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

A4 Contractor's Address

(23/01/2002)

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

Articles of Agreement

A5 Unit Price Table

(23/01/2002)

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

| Column 1 Item | Column 2 Class of Labour Plant Or Material | Column 3 Unit of Measurement | Column 4 Estimated Total Quantity | Column 5 Price per Unit | Column 6 Estimated Total Price |
|------------------|---|------------------------------------|---|----------------------------|--------------------------------------|
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5.2 The Unit Price Table that is set out in A5.1 designates the part of the work to which a Unit Price Arrangement is applicable.

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

Articles of Agreement

Signed on behalf of His Majesty by

as Senior Contracting Officer

and _____

as _____

of the **National Research Council Canada**

on the _____

day of _____

Signed, sealed and delivered by

as _____ and
Position

by _____

as _____
Position

of

on the _____

day of _____

Seal

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1. SCOPE OF WORK

- .1 Work under this contract covers the replacement of the SAS-01 Chiller system and associated components in the Council's Building 110 Gymnasium Place of the National Research Council.

2. DRAWINGS

- .1 The following drawings illustrate the work and form part of the contract documents:
 - .1 C-M1 Mechanical Site Plan and Schedules
 - .2 C-M2 Mechanical Roof Plans
 - .3 C-M3 Level 0 Mechanical Room Plans
 - .4 C-M4 Details, Schematics, and Schedules
 - .5 C-E1 Level 0 Electrical Plans
 - .6 C-E2 Roof Electrical Plans

3. COMPLETION

- .1 Complete all work within 52 week(s) after receipt of notification of acceptance of tender.

4. GENERAL

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

5. SPECIFIED ACCEPTABLE & ALTERNATIVE EQUIPMENT & MATERIALS

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

- .5 Any alternative manufacturers or materials submitted which are incomplete and cannot be evaluated, or are later than ten (10) working days before tender closing date or after the tender period, will not be considered.

6. MINIMUM STANDARDS

- .1 Conform to or exceed minimum acceptable standards of the various applicable federal, provincial and municipal codes such as The National Building Code, The National Fire Code, Canadian Plumbing Code, Canadian Electrical Code, Canadian Code for Construction Safety and the Provincial Construction Safety Act.
- .2 Work to conform to referenced standards and codes as reaffirmed or revised to date of specification.

7. WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)

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

8. DESIGNATED SUBSTANCES

- .1 Comply with Provincial legislation if encountering specifically listed designated substances on the work site while performing the work described in these contract documents:
 - .1 It is the responsibility of the Contractor to ensure that each prospective sub-contractor for this project has received a copy of the listed designated substances which may be present on site.

9. COST BREAKDOWN

- .1 Submit, for approval by the Departmental Representative, a cost breakdown of tender 72 hours after the contract is awarded.

- .2 Use the approved cost breakdown as the basis for submitting all claims.
- .3 Request Departmental Representative's verbal approval to amount of claim prior to preparing and submitting the claim in its final form.

10. SUB-TRADES

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

11. PERSONNEL SECURITY AND IDENTIFICATION

- .1 All persons employed by the Contractor, or by any sub-contractor and present on the site must be security cleared in accordance with the requirements of the Section entitled Special Instructions to Tenderers.
- .2 All such persons must wear and keep visible identification badges as issued by the Security Office of NRC.

12. WORKING HOURS AND ESCORTING REQUIREMENTS

- .1 Normal working hours on the NRC property are from 8:00 a.m. until 4:30 p.m., Monday to Friday inclusive, except statutory holidays.
- .2 At all other times, special written passes are required for access to the building site.
- .3 Before scheduling any work outside normal working hours, obtain permission from the Departmental Representative to perform the specific tasks.
- .4 An escort may be required whenever working outside normal hours. Contractor to bear the associated costs.

13. SCHEDULE

- .1 The Contractor shall prepare a detailed schedule, fixing the date for commencement and completion of the various parts of the work and update the said schedule. Such schedule shall be made available to the Departmental Representative not later than two weeks after the award of the contract and prior to commencement of any work on site.
- .2 Notify Departmental Representative in writing of any changes in the schedule.
- .3 14 day(s) before the scheduled completion date, arrange to do an interim inspection with the Departmental Representative.

14. PROJECT MEETINGS

- .1 Hold regular project meetings at times and locations approved by the Departmental Representative.

- .2 Notify all parties concerned of meetings to ensure proper coordination of work.
- .3 Departmental Representative will set times for project meetings and assume responsibility for recording and distributing minutes.

15. SHOP DRAWINGS

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

16. SAMPLES AND MOCK-UPS

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

17. MATERIALS AND WORKMANSHIP

- .1 Install only new materials on this project unless specifically noted otherwise.
- .2 Only first class workmanship will be accepted, not only with regard to safety, efficiency, durability, but also with regard to neatness of detail and performance.

18. WORK & MATERIALS SUPPLIED BY OWNER

- .1 Work and materials not included in this contract are described on drawings and in this specification.

- .2 Deliver to a storage place, as directed by the Departmental Representative, all materials returned to the Owner.
- .3 Unless otherwise specified, accept owner-supplied materials at their storage location and provide all transportation as required.
- .4 General Contractor's duties:
 - .1 Unload at site.
 - .2 Promptly inspect products and report damaged or defective items.
 - .3 Give written notification to the Departmental Representative for items accepted in good order.
 - .4 Handle at site, including uncrating and storage.
 - .5 Repair or replace items damaged on site.
 - .6 Install, connect finished products as specified.

19. SITE ACCESS

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

20. USE OF SITE

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

21. ACCEPTANCE OF SITE

- .1 Inspect the site before commencing work, review any unexpected conditions with the Departmental Representative.

- .2 Commencement of work will imply acceptance of existing conditions.

22. SITE OFFICE & TELEPHONE

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

23. SANITARY FACILITIES

- .1 Obtain permission from the Departmental Representative to use the existing washroom facilities in the building.

24. TEMPORARY SERVICES

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

25. DOCUMENTS REQUIRED AT WORK SITE

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

26. CO-OPERATION

- .1 Co-operate with NRC staff in order to keep disruption of normal research work to an absolute minimum.

- .2 Work out in advance, a schedule for all work which might disrupt normal work in the building.
- .3 Have schedule approved by the Departmental Representative.
- .4 Notify the Departmental Representative in writing, 72 hours prior to any intended interruption of facilities, areas, corridors, mechanical or electrical services and obtain requisite permission.

27. PROTECTION AND WARNING NOTICES

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

28. BILINGUALISM

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

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

29. LAYOUT OF WORK

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

30. DISCREPANCIES & INTERFERENCES

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

31. MANUFACTURER'S INSTRUCTIONS

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

32. TEMPORARY HEATING AND VENTILATING

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

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

33. CONNECTIONS TO AND INTERRUPTIONS TO EXISTING SERVICES

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

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

34. CUTTING AND PATCHING

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

35. FASTENING DEVICES

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

- .3 Do not use any kind of impact or percussion tool without first obtaining permission from the Departmental Representative.

36. OVERLOADING

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

37. DRAINAGE

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

38. ENCLOSURE OF STRUCTURES

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

39. STORAGE

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

40. GENERAL REVIEW

- .1 Periodic review of the Contractor's work by the Departmental Representative does not relieve the Contractor of the responsibility of making the work in accordance with contract documents. Contractor shall carry out his own quality control to ensure that the construction work is in accordance with contract documents.
- .2 Inform the Departmental Representative of any impediments to the installation and obtain his / her approval for actual location.

41. INSPECTION OF BURIED OR CONCEALED SERVICES

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

42. TESTING

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

43. PARTIAL OCCUPANCY

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

44. DISPOSAL OF WASTES

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

45. CLEAN-UP DURING CONSTRUCTION

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

46. FINAL CLEAN-UP

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

47. WARRANTY AND RECTIFICATION OF DEFECTS IN WORK

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

48. MAINTENANCE MANUALS

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

END OF SECTION

1. GENERAL CONSTRUCTION SAFETY REQUIREMENTS

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

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

2. FIRE SAFETY REQUIREMENTS

- .1 Authorities
 - .1 The Fire Commissioner of Canada (FC) is the authority for fire safety at NRC.
 - .2 For the purpose of this document, "Departmental Representative" will be deemed as the NRC person in charge of the project and who will enforce these Fire Safety Requirements.
 - .3 Comply with the following standards as published by the Office of the Fire Commissioner of Canada:
 - 1. Standard No. 301 - June 1982 "Standard for Construction Operations";
 - 2. Standard No. 302 - June 1982 "Standard for Welding and Cutting".
- .2 Smoking
 - .1 Smoking is prohibited inside all NRC buildings, as well as roof areas.
 - .2 Obey all "NO SMOKING" signs on NRC premises.
- .3 Hot Work
 - .1 Prior to commencement of any "Hot Work" involving welding, soldering, burning, heating, use of torches or salamanders or any open flame, obtain a Hot Work Permit from the Departmental Representative.
 - .2 Prior to commencement of "Hot Work", review the area of hot work with the Departmental Representative to determine the level of fire safety precautions to be taken.
- .4 Reporting Fires
 - .1 Know the exact location of the nearest Fire Alarm Pull Station and telephone, including the emergency phone number.
 - .2 REPORT immediately, all fire incidents as follows:
 - 1. Activate nearest fire alarm pull station and;
 - 2. Telephone the emergency phone numbers which will be provided at the project kick off meeting;

3. When reporting a fire by phone, give the location of fire, building number and be prepared to verify location.
 4. The person activating fire alarm pull station must remain at a safe distance from the scene of the fire but readily available to provide information and direction to the Fire Department personnel.
- .5 Interior and Exterior Fire protection & Alarm Systems
- .1 Do not obstruct or shut off fire protection equipment or systems, including but not limited to fire alarm systems, smoke/heat detectors, sprinkler system, pull stations, emergency call buttons and PA systems, without authorization from the departmental representative.
 - .2 When any fire protection equipment is temporarily shut down, alternative measures as prescribed by the departmental representative shall be taken to ensure that fire protection is maintained.
 - .3 Do not leave fire protection or alarm systems inactive at the end of a working day without notification and authorization from the departmental representative. The departmental representative will advise the (FPO) of the details of any such event.
 - .4 Do not use fire hydrants, standpipes and hose systems for other than fire fighting purposes unless authorized by departmental representative.
- .6 Fire Extinguishers
- .1 Provide a minimum of 1-20 lb. ABC Dry Chemical Fire Extinguisher at each hot work or open flame location.
 - .2 Provide fire extinguishers for hot asphalt and roofing operations as follows:
 1. Kettle area - 1-20 lb. ABC Dry Chemical;
 2. Roof - 1-20 lb. ABC Dry Chemical at each open flame location.
 - .3 Provide fire extinguishers equipped as below:
 1. Pinned and sealed;
 2. With a pressure gauge; and
 3. With an extinguisher tag signed by a fire extinguisher servicing company.
 - .4 Carbon Dioxide (CO₂) extinguishers will not be considered as substitutes for the above.
- .7 Roofing Operations
- .1 Kettles:
 1. Arrange for the location of asphalt kettles and material storage with the Departmental Representative before moving on site. Do not locate kettles on any roof or structure and keep them at least 10 metres (30 feet) away from a building.
 2. Equip kettles with 2 thermometers or gauges in good working order; a hand held and a kettle-mounted model.
 3. Do not operate kettles at temperatures in excess of 232°C (450°F).
 4. Maintain continuous supervision while kettles are in operation and provide metal covers for the kettles to smother any flames in case of fire. Provide fire extinguishers as required in article 2.6.

5. Demonstrate container capacities to Departmental Representative prior to start of work.
6. Store materials a minimum of 6 metres (20 feet) from the kettle.
- .2 Mops:
 1. Use only glass fibre roofing mops.
 2. Remove used mops from the roof site at the end of each working day.
- .3 Torch Applied Systems:
 1. Do not use torches next to walls.
 2. Do not torch membranes to exposed wood or cavity
 3. Provide a Fire Watch as required by article 2.9 of this section.
- .4 Store all combustible roofing materials at least 3 metres (10 feet) away from any structure.
- .5 Keep compressed gas cylinders a minimum of 6 metres (20 feet) away from the kettle, protected from mechanical damage and secured in an upright position.
- .8 Welding / Grinding Operations
 - .1 Contractor to provide fire blankets, portable fume extraction devices, screens or similar equipment to prevent exposure to welding flash, or sparks from grinding.
- .9 Fire Watch
 - .1 Provide a fire watch for a minimum of one hour after the termination of any hot work operation.
 - .2 For temporary heating, refer to General Instructions Section 00 010 00 - General Instructions.
 - .3 Equip fire watch personnel with fire extinguishers as required by article 2.6.
- .10 Obstruction of access/egress routes-roadways, halls, doors, or elevators
 - .1 Advise the Departmental Representative in advance of any work that would impede the response of Fire Department personnel and their apparatus. This includes violation of minimum overhead clearance, erection of barricades and the digging of trenches.
 - .2 Building exit routes must not be obstructed in any way without special permission from the Departmental Representative, who will ensure that adequate alternative routes are maintained.
 - .3 The Departmental Representative will advise the FPO of any obstruction that may warrant advanced planning and communication to ensure the safety of building occupants and the effectiveness of the Fire Department.
- .11 Rubbish and Waste Materials
 - .1 Keep rubbish and waste materials to a minimum and a minimum distance of 6 metres (20 feet) from any kettle or torches.
 - .2 Do not burn rubbish on site.

- .3 Rubbish Containers:
 - 1. Consult with the Departmental Representative to determine an acceptable safe location for any containers and the arrangement of chutes etc. prior to bringing the containers on site.
 - 2. Do not overfill the containers and keep area around the perimeter free and clear of any debris.
- .4 Storage:
 - 1. Exercise extreme care when storing combustible waste materials in work areas. Ensure maximum possible cleanliness, ventilation and that all safety standards are adhered to when storing any combustible materials.
 - 2. Deposit greasy or oily rags or materials subject to spontaneous combustion in CSA or ULC approved receptacles and remove at the end of the work day or shift, or as directed.
- .12 Flammable Liquids
 - .1 The handling, storage and use of flammable liquids is governed by the current National Fire Code of Canada.
 - .2 Flammable Liquids such as gasoline, kerosene and naphtha may be kept for ready use in quantities not exceeding 45 litres (10 imp gal), provided they are stored in approved safety cans bearing the ULC seal of approval and kept away from buildings, stockpiled combustible materials etc. Storage of quantities of flammable liquids exceeding 45 litres (10 imp gal) for work purposes, require the permission of the Departmental Representative.
 - .3 Flammable liquids are not to be left on any roof areas after normal working hours.
 - .4 Transfer of flammable liquids is prohibited within buildings.
 - .5 Do not transfer flammable liquids in the vicinity of open flames or any type of heat producing device.
 - .6 Do not use flammable liquids having a flash point below 38°C (100°F) such as naphtha or gasoline as solvents or cleaning agents.
 - .7 Store flammable waste liquids for disposal in approved container located in a safe, ventilated area. Waste flammable liquids are to be removed from the site on a regular basis.
 - .8 Where flammable liquids, such as lacquers or urethane are used, ensure proper ventilation, and eliminate all sources of ignition. Inform the Departmental Representative prior to, and at the cessation of such work.

3. QUESTIONS AND/OR CLARIFICATIONS

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

END OF SECTION

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Use only elevators existing in building for moving workers and material.
 - 1. Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
 - 2. Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

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

1.4 SPECIAL REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday from 18:00 to 07:00 hours
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

1.5 SECURITY

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

- .2 Security clearances:
1. Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.
 2. Obtain requisite clearance, as instructed, for each individual required to enter premises.
 3. Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.6 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted.
- 2. Products - Not Used.**
 - 3. Execution - Not Used.**

END OF SECTION

1.1 ADMINISTRATIVE

- .1 Schedule and administer project meetings
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Consultant, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 1. Appointment of official representative of participants in the Work.
 2. submittals in accordance with Section 01 33 00 - Submittal Procedures.
 3. Requirements for temporary facilities, site sign, offices
 4. Delivery schedule of specified equipment
 5. Site security
 6. Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 7. Owner provided products.
 8. Record drawings
 9. Maintenance manuals
 10. Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
 11. Monthly progress claims, administrative procedures, photographs, hold backs.
 12. Appointment of inspection and testing agencies or firms.
 13. Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

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

2. Products - Not Used.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 ADMINISTRATIVE

- .1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples, and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements and affected adjacent Work are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant review.
- .10 Keep one reviewed copy of each submission on site.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .3 Allow 3 days for review of each submission.
- .4 Adjustments made on shop drawings are not intended to change Contract Price. If adjustments affect value of Work, state such in writing prior to proceeding with Work.
- .5 Make changes in shop drawings consistent with Contract Documents. When resubmitting, notify in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, containing:
 1. Date.
 2. Project title and number.

3. Contractor's name and address.
4. Identification and quantity of each shop drawing, product data and sample.
5. Other pertinent data.
- .7 Submissions include:
 1. Date and revision dates.
 2. Project title and number.
 3. Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 4. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .8 After review, distribute copies.
- .9 Submit electronic copy shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 1. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 2. Testing must have been within [3] years of date of contract award for project.
- .12 Submit [electronic copies of certificates for requirements requested in specification Sections
 1. Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 2. Certificates must be dated after award of project contract complete with project name.
- .13 Submit electronic copies of manufacturers' instructions for requirements requested in specification Sections
 1. Pre-printed material describing installation of product, system or material, including special notices and Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .15 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections

- .16 Delete information not applicable to project.
- .17 Supplement standard information to provide details applicable to project.
- .18 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 CERTIFICATES AND TRANSCRIPTS

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

2. Products - Not Used.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
 - 2. Province of Saskatchewan
 - .1 Occupational Health and Safety Act, 1993, S.S. .

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - 1. Results of site specific safety hazard assessment.
 - 2. Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS Safety Data Sheets (SDS)
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 SAFETY ASSESSMENT

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

1.4 MEETINGS

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

1.5 REGULATORY REQUIREMENTS

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

1.6 PROJECT/SITE CONDITIONS

1.7 GENERAL REQUIREMENTS

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

1.8 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.

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Regulations, 1996.

1.10 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 Saskatchewan having jurisdiction and advise Departmental Representative verbally and in writing.

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 Saskatchewan having jurisdiction, and in consultation with Departmental Representative

1.12 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Consultant
- .2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Consultant 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.
2. **Products - Not used.**
3. **Execution - Not used.**

END OF SECTION

1. General

1.1 SUMMARY

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

1.2 REFERENCES TO REGULATORY REQUIREMENTS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
 - 1. Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Consultant
PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Consultant
- .3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Consultant

1.4 BUILDING SMOKING ENVIRONMENT

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

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - 1. Regulatory requirements and fees in force on date of Bid submission, and
 - 2. A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission.

2. Products

2.1 EASEMENTS AND NOTICES

- .1 Owner will obtain permanent easements and rights of servitude that may be required for performance of Work.
- .2 Contractor shall give notices required by regulatory requirements.

2.2 PERMITS

- .1 Building Permit:
 1. Contractor shall apply for, obtain and pay for building permit on behalf of Owner, and other permits required for Work and its various parts.
 2. Contractor will require that specific Subcontractor 's obtain and pay for permits required by authorities having jurisdiction, where their Work is affected by Work requiring permits including asbestos abatement and electrical permits
 3. Contractor shall display building permit and other permits in a conspicuous location at Place of Work.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.2 INSPECTION

- .1 Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.3 ACCESS TO WORK

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

1.4 PROCEDURES

- .1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

1.5 REJECTED WORK

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

1.6 REPORTS

- .1 Submit 2 copies of inspection and test reports to Consultant.

1.7 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- 2. Products - Not Used.**
- 3. Execution - Not Used.**

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.2 INSTALLATION AND REMOVAL

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

1.3 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.4 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.5 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Be responsible for damage incurred due to lack of or improper protection.

2. Products - Not Used.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Within text of each specifications section, reference may be made to reference standards.
- .4 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .5 If there is question as to whether products or systems are in conformance with applicable standards, Consultant reserves right to have such products or systems tested to prove or disprove conformance.
- .6 Cost for such testing will be born by the Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

- .2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Remove and replace damaged products at own expense
- .5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.

1.6 MANUFACTURER'S INSTRUCTIONS

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

1.7 QUALITY OF WORK

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

1.8 CO-ORDINATION

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

1.9 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Consultant Representative if there is interference. Install as directed by the Consultant

1.10 REMEDIAL WORK

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

1.11 LOCATION OF FIXTURES

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

1.12 FASTENINGS

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

1.13 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

2. Products - Not Used.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 MATERIALS

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

1.3 PREPARATION

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

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
 - .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
 - .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
 - .9 Restore work with new products in accordance with requirements of Contract Documents.
 - .10 Fit Work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - .11 Provide firestopping to maintain the integrity of fire separations, including:
 - 1. Protecting penetrations at fire-resistance rated wall, ceiling, or floor construction.
 - 2. Using construction joint fire stops and building perimeter fire stops to protect gaps at fire separations and between fire separations and other construction assemblies.
 - .12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
 - .13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.
- 2. Products - Not Used.**
- 3. Execution - Not Used.**

END OF SECTION

1. General

1.1 RELATED REQUIREMENTS

1.2 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.3 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Provide on-site containers for collection of waste materials and debris.
- .4 Dispose of waste materials and debris off site
- .5 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .6 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.4 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris other than that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
 - .8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
 - .9 Broom clean and wash exterior walks, steps, and surfaces; rake clean other surfaces of grounds.
 - .10 Remove dirt and other disfiguration from exterior surfaces.
 - .11 Clean and sweep roofs, gutters, areaways, and sunken wells.
 - .12 Sweep and wash clean paved areas.
 - .13 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
 - .14 Clean roofs, downspouts, and drainage systems.
- 2. Products - Not Used.**
- 3. Execution - Not Used.**

END OF SECTION

1. General

1.1 SUMMARY

- .1 Owner has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 RELATED REQUIREMENTS

- .1 Section 02 42 00 - Removal and Salvage of Construction Materials
- .2 Section 26 05 05 - Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. ASTM International (ASTM)
 - .1 ASTM E1609 - Standard Guide for Development and Implementation of a Pollution Prevention Program

1.4 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction [and Demolition] Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, [re modeling] operations [repair and demolition].
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.

- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:
 - 1. Solvents in paints and other coatings;
 - 2. Wood preservatives; strippers and household cleaners;
 - 3. Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.
 - 4. When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.
- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.5 ADMINISTRATIVE REQUIREMENTS

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

1.6 PROJECT CLOSEOUT SUBMISSIONS

- .1 Submit as constructed information in accordance with Section 01 78 00- Closeout Submittals as follows:

1.7 QUALITY ASSURANCE

- .1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:
 - 1. Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

- .2 Certifications: Provide proof of the following during the course of the Work:
 1. Compliance Certification: Provide proof that recycling center is third party verified and is listed as a Certified Facility through the registration and certification requirements of the Recycling Certification Institute.

1.8 DELIVERY, STORAGE AND HANDLING

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

2. Products - Not Used.

3. Execution

3.1 (CWM PLAN) IMPLEMENTATION

- .1 Manager: Contractor is responsible for designating an on site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.
- .2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Owner, the Consultant and other site personnel as required to maintain CWM Plan.
- .3 Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to [Subcontractor] 's at appropriate stages of the project.
- .4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:
 1. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
 2. Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.
- .5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:
 1. Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon
 2. Monthly waste summary shall contain the following information:
 - .1 The amount in tonnes or m³ and location of material landfilled,

- .2 The amount in tonnes or m³ and location of materials diverted from landfill, and
- .3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.2 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

- .1 Sample waste tracking form below can be used by the Contractor to establish their own forms for recording management of construction waste:

| SAMPLE [WASTE MANAGEMENT FORM] | | | | | | |
|---|-------------------------------|------|-----|------|-------------|----------------------|
| Material Stream | Diverted Waste by Report Date | | | | Total | Units |
| | Sept | Oct | Nov | Dec | | |
| Material Streams Contributing to Credit | | | | | | |
| Plastic | 1.25 | 2.5 | 10 | 5 | 18.75 | m ³ |
| Carpet | 2.5 | 2.5 | 2.5 | 0 | 7.5 | m ³ |
| Paper/Cardboard | 5 | 2.5 | 2.5 | 5 | 15 | m ³ |
| Clean Wood | 0 | 25 | 0 | 1.25 | 26.25 | m ³ |
| Metal | 1.25 | 2.5 | 5.5 | 7 | 16.25 | m ³ |
| Gypsum Board | 2.5 | 2.5 | 4 | 5 | 14 | m ³ |
| Brick/Concrete | 10.5 | 2.5 | 5.5 | 8.75 | 27.25 | m ³ |
| Asphalt Shingles | 10 | 0 | 0 | 0 | 10 | m ³ |
| Total Diverted Waste | | | | | 135 | m³ |
| Material Streams not Contributing to Credit | | | | | | |
| Landfill | 10.75 | 7.5 | 15 | 10 | 43.25 | m ³ |
| Screen Fines (ADC) | 5 | 1.25 | 0 | 2.5 | 8.75 | m ³ |
| 150 mm Minus (ADC) | 1.25 | 1.25 | 5 | 5.5 | 13 | m ³ |
| Total Landfill/ADC Waste | | | | | 65 | m³ |
| Total Waste | | | | | 200 | m³ |
| Percent Diverted | | | | | 67.5 | % |

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - 1. Contractor's Inspection: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - 2. Consultant's Inspection:
 - .1 Consultant and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - 3. Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, balanced and fully operational.
 - .4 Operation of systems: demonstrated to Owner's personnel.
 - .5 Work: complete and ready for final inspection.
 - 4. Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Consultant, and Contractor.
 - .2 When Work deemed incomplete, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - 1. Remove surplus materials, excess materials, rubbish, tools and equipment.

2. Products - Not Used.

3. Execution - Not Used.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.2 ADMINISTRATIVE REQUIREMENTS

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, 1 hard copy and 1 digital final copies of operating and maintenance manuals in English.
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.4 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf [219 x 279] mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - 1. Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

- .5 Arrange content under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
 - 1. Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - 1. Date of submission; names.
 - 2. Addresses, and telephone numbers Contractor and suppliers with name of responsible parties.
 - 3. Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - 1. List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - 1. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.6 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, one record copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Field test records.
 - 7. Inspection certificates.
 - 8. Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction.
 - 1. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - 1. Label each document "PROJECT RECORD" in neat, large, printed letters.

- .4 Maintain record documents in clean, dry, and legible condition.
 - 1. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for review by Consultant.

1.7 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .2 Record information concurrently with construction progress.
 - 1. Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
 - 1. Measured depths of elements of foundation in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - 4. Field changes of dimension and detail.
 - 5. Changes made by change orders.
 - 6. Details not on original Contract Drawings.
 - 7. Referenced Standards to related shop drawings and modifications.
- .4 Specifications: mark each item to record actual construction, including:
 - 1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - 2. Changes made by Addenda and change orders.
- .5 Other Documents: maintain as required by individual specifications sections.
- .6 Provide digital photos, if requested, for site records.

1.8 EQUIPMENT AND SYSTEMS

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

- .5 Maintenance Requirements: include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .12 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .13 Include test and balancing reports as specified Additional requirements: as specified in individual specification sections.

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - 1. Provide spare parts, in quantities specified in individual specification sections.
 - 2. Provide items of same manufacture and quality as items in Work.
 - 3. Deliver to site, place and store.
 - 4. Obtain receipt for delivered products and submit prior to final payment.
- .2 Special Tools:
 - 1. Provide special tools, in quantities specified in individual specification section.

1.10 DELIVERY, STORAGE AND HANDLING

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

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to DCC Representative approval.

- .3 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .4 Submit, warranty information made available during construction phase for approval prior to each monthly pay estimate.
- .5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 1. Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 2. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 3. Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
 4. Verify that documents are in proper form, contain full information, and are notarized.
 5. Co-execute submittals when required.
 6. Retain warranties and bonds until time specified for submittal.
- .6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .7 Include information contained in warranty management plan as follows:
 1. Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 2. Listing and status of delivery of Certificates of Warranty for extended warranty items.
 3. Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.

- .12 Typical response time and repair time expected for various warranted equipment.
- 4. Procedure and status of tagging of equipment covered by extended warranties.
- 5. Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .8 Respond in timely manner to oral or written notification of required construction warranty repair work.

1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - 1. Type of product/material.
 - 2. Model number.
 - 3. Serial number.
 - 4. Contract number.
 - 5. Warranty period.
 - 6. Inspector's signature.
 - 7. Construction Contractor.
- 2. Products - Not Used.**
- 3. Execution - Not Used.**

END OF SECTION

1. General

1.1 SUMMARY

- .1 This Section includes requirements for careful removal and salvage, and reconditioning of building components identified for storage at a designated remote site, for storage on site, and subsequent reinstallation forming a part of Project ready for re use at a later date.

1.2 RELATED REQUIREMENTS

- .1 Section 00 10 00 - General Instructions
- .2 Section 01 74 19 - Waste Management and Disposal
- .3 Section 23 05 05 – Selective Demolition for HVAC
- .4 Section 26 05 05 - Selective Demolition for Electrical

1.3 DEFINITIONS

- .1 Remove and Salvage: Detach items from existing construction and deliver them ready for reuse.
- .2 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination Existing Salvaged Work: Coordinate with Departmental Representative for confirmation of materials, components, and items of equipment identified for removal and salvage from their present existing locations and as follows:
 - 1. Items that are turned over to Departmental Representative.
 - 2. Off-site or on-site storage locations.
 - 3. Confirmation of items that are renovated or refurbished ready for reinstallation as a part of Work.
 - 4. Confirmation of items that Departmental Representative will not re use, but will retain as follows:
 - .1 Contractor is responsible for loading and handling identified salvaged items using their own forces and equipment.

2. Products

2.1 SALVAGED ITEMS

.1 Items salvaged by Contractor include, but are not limited to:

| Work | Deliver To |
|---|--|
| Lighting fixtures for salvage and re-installation | Departmental Representative approved storage location on-site for future re-installation |
| Diversion of miscellaneous metal mechanical equipment from landfill to appropriate recycling facility (ie. fan coil units, domestic cold water drinking fountains, mechanical piping (sprinkler, plumbing and chilled water), sheet metal ductwork and accessories, etc.) | Off-site applicable recycling facility |
| Diversion of miscellaneous metal electrical conduits and wiring from landfill through recycling | Off-site applicable recycling facility |
| Diversion of architectural elements from landfill through re-use/donation to appropriate recycling facility (ie. ceiling grids, metal blinds, metal studs, doors and associated hardware, glazing, etc.) | Off-site applicable re-use or recycling facility |
| Diversion of miscellaneous packaging materials and cardboard from landfill through recycling facilities (ie. plastic wrap, cardboard, wood pallets, etc.) | Off-site applicable re-use or recycle facility |

.2 Confirm with Departmental Representative additional items that appear salvageable prior to disposal.

3. Execution

3.1 SALVAGE

- .1 Remove and handle salvageable items from site to minimize damage and to ensure that usability is maintained.
- .2 Clean, decontaminate, or remediate hazardous substances (lead based paint, asbestos dust, PCB residue, and similar substances) from salvaged materials so they are safe for reuse or resale.
- .3 Place materials on pallets or wrap in protective film to ensure that loose pieces and projections do not cause injury to personnel, and that salvaged items remain as complete units.
- .4 Clean items of construction or building debris, or materials that are not a part of salvaged work before delivering to Departmental Representative.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Submit manufacturer's instructions, printed product literature and data sheets for and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
 - 1. Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - 2. 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.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - 1. Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
 - 2. 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.
 - 3. 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.
 - 4. 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*.
- 5. Approvals:
 - .1 Submit one copy of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.
 - .2 Make changes as required and re-submit as directed by Consultant.
- 6. Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- 7. As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Consultant for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- 8. Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Provide one set of special tools required to service equipment as recommended by manufacturers.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Replace defective or damaged materials with new.

2. Products - Not used.

3. Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.
 - 1. Inform Consultant of unacceptable conditions immediately upon discovery.
 - 2. Proceed with installation only after unacceptable conditions have been remedied.

3.2 PAINTING REPAIRS AND RESTORATION

- .1 Do painting in accordance with Section [09 91 23 - Interior Painting].
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged.

3.3 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers.

3.4 DEMONSTRATION

- .1 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.
- .2 Use operation and maintenance manual, and as-built drawings as part of instruction materials.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with *Section 01 74 00 - Cleaning*.
 - 1. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with *Section 01 74 00 - Cleaning*.
 - 1. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

1. General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of heating, ventilation and air conditioning systems, controls and automated automation components, and related mechanical components and incidentals required to complete work described in this Section.

1.2 RELATED REQUIREMENTS

- .1 Section 02 42 00 - Removal and Salvage of Construction Materials
- .2 Section 22 05 05- Selective Demolition for Plumbing
- .3 Section 26 05 05- Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. CSA Group (CSA)
 - .1 CSA S350 M1980 - Code of Practice for Safety in Demolition of Structures.

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following in accordance with *Section 01 33 00- Submittal Procedures* before starting work of this Section:
 - 1. Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with *Section 01 74 19- Waste Management and Disposal*.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.7 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on date that tender is accepted.
 - 1. Hazardous substances will be removed by a hazardous abatement specialist engaged by the Departmental Representative before start of the Work.
- .2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - 1. Refer to *Section 01 41 00 - Regulatory Requirements* for directives associated with specific material types.
 - 2. Hazardous substances will be as defined in the Hazardous Products Act.
 - 3. Stop work in the area of the suspected hazardous substances.
 - 4. Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - 5. Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to the Work.
 - 6. Proceed only after written instructions have been received from Departmental Representative.

1.8 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Departmental Representative's property.

- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with *Section 02 42 00- Removal and Salvage of Construction Materials*.

2. Products

2.1 MATERIAL

- .1 HVAC Repair Materials: Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.
- .2 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

3. Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - 1. Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - 2. Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - 3. Prevent debris from blocking drainage inlets.
 - 4. Protect mechanical systems that must remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:
 - 1. Prevent debris from endangering the safe access to and egress from occupied buildings.
 - 2. Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Disconnect and cap gas supply and electrical services in accordance with requirements of local Authority Having Jurisdiction.
- .2 Do not disrupt active or energized utilities without approval of the Departmental Representative.
- .3 Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.
- .4 Demolish parts of existing building to accommodate new construction and remedial work as indicated.
- .5 At end of each day's work, leave worksite in safe condition.
- .6 Perform demolition work in a neat and workmanlike manner:
 1. Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 2. Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre)
- .2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181 - Ready-Mixed Organic Zinc-Rich Coating.
 - 2. National Research Council Canada (NRC)
 - .1 National Fire Code of Canada (NFC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - 1. Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

2. Products - Not Used

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.
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer 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 isolating valve at each automatic air valve.
- .2 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 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material.
- .3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.
- .5 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.
- .6 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .7 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

- .8 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .9 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .10 Group piping wherever possible.
- .11 Ream pipes, remove scale and other foreign material before assembly.
- .12 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .13 Provide for thermal expansion as indicated.
- .14 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 butterfly valves at branch take-offs for isolating purposes except where specified.
 - 7. Install butterfly valves on chilled water and related condenser water systems only.
 - 8. Install butterfly valves between weld neck flanges to ensure full compression of liner.
 - 9. Install ball valves for glycol service.
- .15 Check Valves:
 - 1. Install silent check valves on discharge of pumps

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 Uninsulated unheated pipes not subject to movement: no special preparation.
- .3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.
- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.11 FLUSHING OUT OF PIPING SYSTEMS

- .1 Before start-up, clean interior of piping systems in accordance with requirements of *Section 01 74 00 - Cleaning* supplemented as specified in *Section 23 08 16 - Cleaning and Start Up of HVAC Piping Systems*.
- .2 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 Consultant 48 hours minimum prior to performance of pressure tests.
- .2 Piping: 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 Pay costs for repairs or replacement, retesting, and making good. Consultant to determine whether repair or replacement is appropriate.
- .6 Insulate or conceal work only after approval and certification of tests by Consultant.

3.13 EXISTING SYSTEMS

- .1 Connect into existing piping systems at times approved by Consultant.
- .2 Request written approval by Consultant 5 days minimum, prior to commencement of work.
- .3 Be responsible for damage to existing plant by this work.

3.14 CLEANING

- .1 Clean in accordance with *Section 01 74 00 - Cleaning*.
 1. Remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.60 - Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3 - Identification of Piping Systems.
 - 2. National Fire Protection Association (NFPA)
 - .1 NFPA 13 - Standard for the Installation of Sprinkler Systems.
 - .2 NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

2. Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
 - 1. Equipment: manufacturer's name, model, size, serial number, capacity.
 - 2. Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - 1. Hazardous: red letters, white background.
 - 2. Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
 - 1. 3 mm thick matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:
 - 1. Conform to following table:

| Size # mm | Sizes (mm) | No. of Lines | Height of Letters (mm) |
|-----------|------------|--------------|------------------------|
| 1 | 10 x 50 | 1 | 3 |
| 2 | 13 x 75 | 1 | 5 |
| 3 | 13 x 75 | 2 | 3 |

| Size # mm | Sizes (mm) | No. of Lines | Height of Letters (mm) |
|-----------|------------|--------------|------------------------|
| 4 | 20 x 100 | 1 | 8 |
| 5 | 20 x 100 | 2 | 5 |
| 6 | 20 x 200 | 1 | 8 |
| 7 | 25 x 125 | 1 | 12 |
| 8 | 25 x 125 | 2 | 8 |
| 9 | 35 x 200 | 1 | 20 |

2. Use maximum of 25 letters/numbers per line.

.4 Locations:

1. Terminal cabinets, control panels: use size # 5.
2. Equipment in Mechanical Rooms: use size # 9.

2.3 EXISTING IDENTIFICATION SYSTEMS

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

2.4 IDENTIFICATION OF PIPING SYSTEMS

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

1. Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

1. Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

1. Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
2. Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
3. Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

1. To full circumference of pipe or insulation.
2. Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

1. Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.7 Colours and Legends:

1. Where not listed, obtain direction from DCC Representative

2. Colours for legends, arrows: to following table:

| Background colour: | Legend, arrows: |
|--------------------|-----------------|
| Yellow | BLACK |
| Green | WHITE |
| Red | WHITE |

3. Background colour marking and legends for piping systems:

| Contents | Background colour marking | Legend |
|------------------------|---------------------------|------------------|
| Condenser water supply | Green | COND WTR. SUPPLY |
| Condenser water return | Green | COND WTR. RETURN |
| Chilled water supply | Green | CH WTR SUPPLY |
| Chilled water return | Green | CH WTR RETURN |
| Make-up water | Yellow | MAKE-UP WTR |
| Sanitary | Green | SAN |

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 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

3.3 NAMEPLATES

- .1 Locations:
1. In conspicuous location to facilitate easy reading and identification from operating floor.
- .2 Standoffs:
1. Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
1. Do not paint, insulate, or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 metre intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.

- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
 - 1. Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 CLEANING

- .1 Proceed in accordance with *Section 01 74 00 - Cleaning*.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION

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 Provide documentation confirming qualifications, successful experience.
- .2 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
 - 1. Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.
 - 2. National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.
 - 3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.
- .3 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .4 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .5 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .6 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .7 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 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.

1.7 OPERATION OF SYSTEMS DURING TAB

- .1 Operate systems for length of time required for TAB and as required for verification of TAB reports.

1.8 START OF TAB

- .1 Notify Consultant prior to start of TAB.
- .2 Start TAB when construction is essentially completed, including:
- .3 Pressure, leakage, other tests specified elsewhere Division 23.
- .4 Provisions for TAB installed and operational.
- .5 Start-up, verification for proper, normal, and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - 1. Proper thermal overload protection in place for electrical equipment.
 - 2. Air systems:
 - .1 Filters in place, clean.
 - .2 Duct systems clean.
 - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
 - .4 Correct fan rotation.
 - .5 Outlets installed, volume control dampers open.
 - 3. Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Correct pump rotation.
 - .3 Strainers in place, baskets clean.
 - .4 Isolating and balancing valves installed, open.

- .5 Calibrated balancing valves installed, at factory settings.
- .6 Chemical treatment systems complete, operational.

1.9 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
 - 1. HVAC systems: +5%, -5%.
 - 2. Hydronic systems: $\pm 10\%$.

1.10 INSTRUMENTS

- .1 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

1.11 PRELIMINARY TAB REPORT

- .1 Submit for checking and approval of Consultant, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
 - 1. Details of instruments used.
 - 2. Details of TAB procedures employed.
 - 3. Calculations procedures.
 - 4. Summaries.

1.12 TAB REPORT

- .1 TAB report to show results in SI units and to include:
 - 1. Project record drawings.
 - 2. System schematics.
- .2 Submit 2 copies of TAB Report to Consultant for verification and approval.

1.13 VERIFICATION

- .1 Pay costs to repeat TAB as required to satisfaction of Departmental Representative

1.14 SETTINGS

- .1 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

2. Products - Not used.

3. Execution - Not used.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
 2. Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma - Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53 - Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels, and Round Ducts

1.2 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.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 1. Submit manufacturer's printed product literature, specifications, and datasheet in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Installer:
 1. Specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards member of TIAC.

2. Products

2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
 1. Maximum flame spread rating: 25.

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°C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-3: rigid molded 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
- .2 Contact adhesive: quick setting.
- .3 Tie wire: stainless steel.
- .4 Bands: stainless steel

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - 1. Air drying on mineral wool, to ASTM C449/C449M.

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 OUTDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: fibrous glass, untreated 305 g/m².

2.8 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - 1. One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
 - 2. Colours: White
- .2 Aluminum:
 - 1. To ASTM B209.
 - 2. Thickness: 0.50 mm sheet.
 - 3. Finish: stucco embossed.

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 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.

3.3 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: [A-3].
 1. Securements: SS bands at 300 mm on centre.
 2. Seals: VR lap seal adhesive, VR lagging adhesive.
 3. Installation: TIAC Code: 1501-C.
- .3 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 | TIAC code | Pipe sizes (NPS) | Insulation thickness (mm) |
|--------------------------|-----------|------------------|---------------------------|
| Chilled Water or Glycol | [A-3] | All | 38 |
| Condenser Water Outdoors | [A-3] | All | 38 |
| Condenser Water Indoors | [A-3] | All | 38 |

- .4 Finishes:
 1. Exposed indoors: PVC jacket.
 2. Exposed in mechanical rooms: PVC jacket.
 3. Concealed, indoors: canvas on valves, fittings. No further finish.
 4. Use vapour retarder jacket compatible with insulation.

5. Outdoors: water-proof aluminum jacket.
6. Finish attachments: SS bands, at 300 mm on centre.

3.4 CLEANING

- .1 Proceed in accordance with *Section 01 74 00 - Cleaning*.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. ASTM International (ASTM)
 - .1 ASTM E202 - Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

1.2 CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS

- .1 In accordance with *Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems*.

1.3 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 24 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 Chiller operation.
 - .3 Pressure bypass open/closed.
 - .4 Control pressure failure.
 - .5 Maximum cooling demand.
 - .6 Chiller failure.
 - .7 Cooling tower fan failure.
 - .8 Outdoor reset. Re-check heat exchanger output supply temperature at 100% and 50% reset, maximum water temperature.

1.4 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 Submit sample of system water to approved testing agency to determine if chemical treatment is correct. Include cost.
- .6 Chilled water system capacity test:
 1. Perform capacity test when ambient temperature is within 10% of design conditions. Simulate design conditions by:
 - .1 Adding heat from building heating system or;
 - .2 Raising space temperature by turning off cooling and air systems for sufficient period of time before starting testing and pre-heating building to summer design space temperature (occupied) or above. Set OAD and RAD for minimum outside air if OAT is near outside design temperature or to maximum recirculation if RAT is greater than OAT. RAT to be at least 23°C minimum.
 2. Test procedures:
 - .1 Open fully cooling coil control valves.
 - .2 Set thermostats on associated AHU's for maximum cooling.
 - .3 Set AHU's for design maximum air flow rates.
 - .4 Set load or demand limiters on chillers to 100%.
 - .5 After system has stabilized, record chilled water, and condenser water flow rates and supply and return temperatures simultaneously.

1.5 CONDENSER WATER SYSTEMS

- .1 In addition to procedures specified above, perform following:
 1. Add chemicals once per week as required.
 2. Perform TAB as specified *Section 23 05 93 - Testing, Adjusting and Balancing for HVAC*.
 3. Set up and adjust drip feeders, timer controls, pump strokes as required to maintain required chemical feed rates.
 4. Inject inhibitor into cooling tower sump.

1.6 GLYCOL SYSTEMS

- .1 Test to prove concentration will prevent freezing to minus 40°C Test inhibitor strength and include in procedural report. Refer to ASTM E202.
2. **Products - Not Used.**
3. **Execution - Not Used.**

END OF SECTION

1. General

1.1 SUMMARY

.1 Section Includes:

1. Procedures and cleaning solutions for cleaning mechanical piping systems.

1.2 REFERENCE STANDARDS

.1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.

.2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

.3 Perform work in accordance with the following Standards, except where specified otherwise.

1. ASTM International (ASTM)

- .1 ASTM E202 - Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

2. Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Safety Data Sheets (SDS).

2. Products

2.1 CLEANING SOLUTIONS

.1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.

.2 Sodium carbonate: 0.40 kg per 100 L water in system.

.3 Low-foaming detergent: 0.01 kg per 100 L water in system.

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 CLEANING HYDRONIC AND STEAM SYSTEMS

.1 Timing: systems operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

.2 Cleaning Agency:

1. Retain qualified water treatment specialist to perform system cleaning.

.3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete.

- .4 Cleaning procedures:
 1. Provide detailed report outlining proposed cleaning procedures at least [4] weeks prior to proposed starting date. Report to include:
 - .1 Cleaning procedures, flow rates, elapsed time.
 - .2 Chemicals and concentrations used.
 - .3 Inhibitors and concentrations.
 - .4 Specific requirements for completion of work.
 - .5 Special precautions for protecting piping system materials and components.
 - .6 Complete analysis of water used to ensure water will not damage systems or equipment.
- .5 Conditions at time of cleaning of systems:
 1. Systems: free from construction debris, dirt and other foreign material.
 2. Control valves: operational, fully open to ensure that terminal units can be cleaned properly.
 3. Strainers: clean prior to initial fill.
 4. Install temporary filters on pumps not equipped with permanent filters.
 5. Install pressure gauges on strainers to detect plugging.
- .6 Report on Completion of Cleaning:
 1. When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.
- .7 Hydronic Systems:
 1. Fill system with water, ensure air is vented from system.
 2. Fill expansion tanks 1/3 to 1/2 full, charge system with compressed air to at least 35 kPa (does not apply to diaphragm type expansion tanks).
 3. Use water metre to record volume of water in system to $\pm 0.5\%$.
 4. Add chemicals under direct supervision of chemical treatment supplier.
 5. Closed loop systems: circulate system cleaner at 60°C for at least 36 h. Drain as quickly as possible. Refill with water and inhibitors. Test concentrations and adjust to recommended levels.
 6. Flush velocity in system mains and branches to ensure removal of debris. System pumps may be used for circulating cleaning solution provided that velocities are adequate.
 7. Add chemical solution to system.
- .8 Glycol Systems:
 1. In addition to procedures specified above perform specified procedures.
 2. Test to prove concentration will prevent freezing to minus 40°C. Test inhibitor strength and include in procedural report. Refer to ASTM E202.

3.3 START-UP OF HYDRONIC SYSTEMS

- .1 After cleaning is completed and system is filled:
 1. Establish circulation and expansion tank level, set pressure controls.
 2. Ensure air is removed.

3. Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
4. Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
5. Clean out strainers repeatedly until system is clean.
6. Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.
7. Repeat with water at design temperature.
8. Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
9. Bring system up to design temperature and pressure slowly.
10. Perform TAB as specified in *Section 23 05 93 - Testing, Adjusting and Balancing for HVAC*.
11. Adjust pipe supports, hangers, springs as necessary.
12. Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
13. Re-tighten bolts using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
14. Check operation of drain valves.
15. Adjust valve stem packings as systems settle down.
16. Fully open balancing valves (except those that are factory-set).
17. Check operation of over-temperature protection devices on circulating pumps.
18. Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.4 CLEANING

- .1 Proceed in accordance with *Section 01 74 00 - Cleaning*.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)
 - .1 ANSI/ASHRAE/IES Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
 - 2. CSA Group (CSA)
 - .1 CAN/CSA-B214 - Installation Code for Hydronic Heating Systems.
 - 3. Electrical Equipment Manufacturers Association of Canada (EEMAC)
 - 4. National Electrical Manufacturers' Association (NEMA)
 - .1 NEMA MG 1 - Motors and Generators.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Submit manufacturer's instructions, printed product literature and data sheets 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 Shop Drawings:
 - 1. 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 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Operation and Maintenance Data: submit operation and maintenance data for hydronic pumps for incorporation into manual.

1.4 QUALITY ASSURANCE

- .1 The pump control package shall be fully assembled by the manufacturer. The manufacturer shall be responsible for the complete pump control package, including system interface with pumps and VFDs, as well as the successful operation of all components supplied by the pump control system manufacturer.

- .2 All functions of the variable speed pump control system shall be thoroughly field tested prior to actual start-up. This test shall be conducted with motors connected to AFD output and it shall test all inputs, outputs, and program execution specific to this application.
- .3 Pump control package shall be listed by Underwriter's Laboratories and bear the UL label.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Exercise care to avoid damage during unloading and storing.
 - 3. Leave pump port protection plates in place until pumps are ready to connect to piping.
 - 4. Do not place cable slings around pump shaft or integrated control enclosure.
 - 5. Once installed the contractor must keep a dustproof cover over the drive, motor, and integral controller.

1.6 WARRANTY

- .1 Manufacturer's warranty: The entire package shall carry an 18-month parts warranty. The drive will carry a parts and labor warranty. The motor will carry a 12-month parts and labor warranty but must be delivered to a local authorized motor warranty shop by the installing contractor. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

2. Products

2.1 EQUIPMENT

- .1 Size and select components to: CAN/CSA-B214.

2.2 MANUFACTURED UNITS

- .1 The self-sensing product shall consist of a factory prepackaged and preprogrammed pump, drive, motor, and integral controls package.
- .2 The drive shall be mounted and integral to the motor. It shall be mounted with rubber vibration mounts. The mounting and packing of the drive shall be done in a manner that transmitted acceleration levels will be three times below the allowable limits published by the drive manufacturer. These limits will apply to a frequency range of 0-10,000 HZ.

- .3 The performance speed of this package shall 1750 RPM nominal as standard. Exceptions for 3600 RPM will be noted in the schedules. 3600 RPM shall NOT be an allowable substitution for a specified 1750 PRM package. 3600 RPM products might be considered as a substitution for 1750 RPM only if that manufacturer provides a spare motor, drive, and seal for each pumping unit.
- .4 Pump logic controller, variable frequency drives, sensor/transmitters and related equipment shall be installed by the mechanical contractor as shown on the plans.

2.3 COMPONENTS

- 1. Pump Logic Controller:
 - .1 The controller operation shall operate the system using a tested and proven program that safeguards against undesirable or damaging conditions including:
 - .2 Motor overload
 - .3 Pump flow surges
 - .4 Hydraulic cycling (hunting).
 - .5 End of curve unstable operation: The pump logic controller, through a factory pre- programmed algorithm, shall be capable of protecting the pumps from hydraulic damage due to operation beyond their published end-of-curve. This feature requires a flow meter for activation. The operator interface shall include an owner adjustable flow setpoint to set the parameters for this routine.
 - .2 The pump logic controller shall be capable of starting, unloading, and stopping pumps based on a system performance program that will minimize energy consumption, provide reliable performance and bumpless transitions.
 - .3 The package shall automatically run system distribution pumps to a user defined duty point and will recognize that duty point and hold the pumps at a speed that matches the actual installed system quadratic system curve. The package will then use this data to set up a new duty point as the max point for the quadratic control curve. Use of external balancing devices or contractors will not be needed.
 - .4 The package shall serve as a flow metering device and will display pump flow at the user interface.
 - .5 Shall have controller that automates pump balancing.

2.4 INLINE PUMPS (SEE PUMP SCHEDULE ON PLANS)

- .1 Vertical Split Coupled Pumps. above 10 HP to a max of 700 HP shall be split coupled.
 - 1. The pumps shall be single stage vertical inline design. The seal shall be serviceable without disturbing the piping connections. The capacities and characteristics shall be as called for in the plans/schedules.
 - 2. Pump casing shall be constructed of ASTM A48 class 30 cast iron.

3. The pump casing/volute shall be rated for 250 psi working pressure for all jobs. The pump flanges shall be matched to suit the working pressure of the piping components on the job, with either ANSI Class 125 flanges or ANSI class 250 flanges. The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections and for a drain port at the bottom of the casing. The casing shall have an additional tapping on the discharge connection to allow for the installation of a seal flush line. The pump cover shall be drilled and tapped to accommodate a seal flush line which can be connected to the corresponding tapping on the discharge connection, or to an external source to facilitate cooling and flushing of the seal faces.
4. All casings shall be flanged. Threaded casings not allowed unless extra unions and fittings are provided to allow servicing.
5. The pump shall have a factory installed vent/flush line to insure removal of trapped air from the casing and mechanical seal cooling. The vent/flush line shall run from the seal chamber to the pump discharge.
6. The impeller shall be ASTM B584-836/875 bronze and hydraulically balanced. The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted to the shaft with a key. The impeller shall be cast by the hydraulically efficient lost foam technique to ensure repeatability of high quality.
7. The pump shall be manufactured with AISI 416 Stainless Steel shaft.
8. The pump shall be fitted with a single mechanical seal, with EPT elastomers and Carbon/Ceramic faces, rated up to 250°F. The mechanical seal shall be an inside type seal yet engineered and applied in a manner that is as or more accessible than a specialty outside seal. This seal must be capable of being flushed externally via a tapping in the pump cover adjacent to the seal cavity. The entire pump line shall use no more than three different sizes of seals. Outside mechanical seals are NOT acceptable.
9. The pump shall be coupled via a high tensile aluminum split style coupling. The design must permit easy replacement of the mechanical shaft seal without removal of the motor. The motor mount must be designed to accept several different motor frame standards; CZ and HP. The motor shall be a TEFC, inverter rated motor with class F insulation and shaft grounding ring.
10. In order to both simplify and reduce the total cost of ownership, the manufacturer shall standardize on no more than three sizes of mechanical seals throughout the entire range of the family of pumps. The manufacturer shall not use multiple part numbers for the same part.

2.5 VARIABLE FREQUENCY DRIVES

- .1 The VFD shall convert incoming fixed frequency three-phase ac power into an adjustable frequency and voltage for controlling the speed of three-phase ac motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor derating. When properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted/coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.
- .2 The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load.
- .3 The VFD shall have a dual 5% impedance DC link reactor on the positive and negative rails of the dc bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. Swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable. VFDs with saturating (non-linear) dc link reactors shall require an additional 3% AC line reactor to provide acceptable harmonic performance at full load, where harmonic performance is most critical.
- .4 The VFD's full load output current rating shall meet or exceed nec table 430-150. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 120% of rated torque for up to 0.5 second while starting.
- .5 The VFD shall provide full motor torque at any selected frequency from 20 hz to base speed while providing a variable torque v/hz output at reduced speed. This is to allow driving direct drive fans without high-speed derating or low speed excessive Magnetization, as would occur if a constant torque v/hz curve was used at reduced speeds. Breakaway current of 160% shall be available.
- .6 A programmable automatic energy optimization selection feature shall be provided standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings.
- .7 The VFD must be able to produce full torque at low speed to operate direct drive fans.
- .8 Output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD.
- .9 An automatic motor adaptation algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test.
- .10 Galvanic isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog i/o and discrete digital i/o shall include additional isolation modules.

- .11 VFD shall minimize the audible motor noise using an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable.
- .12 All VFDs shall contain integral EMI filters to attenuate radio frequency interference conducted to the ac power line.
- .13 The drive enclosure shall be standard as NEMA 12 (IP 55) and optional shall be NEMA 4X (IP 66). See schedules for project requirements.
- .14 Protective features
 - 1. A minimum of class 20 i2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed.
 - .1 Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and motor over temperature. The VFD shall display all faults in plain language. Codes are not acceptable.
 - .2 Protect VFD from input phase loss. The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost.
 - .3 Protect from under voltage. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output, without faulting, with an input voltage as low as 70% of the nominal voltage.
 - .4 Protect from over voltage. The VFD shall continue to operate without faulting with a momentary input voltage as high as 130% of the nominal voltage.
 - .5 The VFD shall incorporate a programmable motor preheat feature to keep the motor warm and prevent condensation build up in the motor when it is stopped in a damp environment by providing the motor stator with a controlled level of current.
 - .6 VFD shall include a "signal loss detection" algorithm with adjustable time delay to sense the loss of an analog input signal. It shall also include a programmable time delay to eliminate nuisance signal loss indications. The functions after detection shall be programmable.
 - .7 VFD shall function normally when the keypad is removed while the VFD is running. No warnings or alarms shall be issued as a result of removing the keypad.
 - .8 VFD shall catch a rotating motor operating forward or reverse up to full speed without VFD fault or component damage.
 - .9 Selectable over-voltage control shall be provided to protect the drive from power regenerated by the motor while maintaining control of the driven load.

- .10 VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost.
 - .11 If the temperature of the VFD's heat sink rises to 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD's temperature becomes too high.
 - .12 To ensure operation during periods of overload, it must be possible to program the VFD to automatically reduce its output current to a programmed value during periods of excessive load. This allows the VFD to continue to run the load without tripping.
 - .13 The VFD shall have temperature-controlled cooling fan(s) for quiet operation, minimized losses, and increased fan life. At low loads or low ambient temperatures, the fan(s) may be off even when the VFD is running.
 - .14 The VFD shall store in memory the last 10 alarms. A description of the alarm, and the date and time of the alarm shall be recorded.
 - .15 When used with a pumping system, the VFD shall be able to detect no-flow situations, dry pump conditions, and operation off the end of the pump curve. It shall be programmable to take appropriate protective action when one of the above situations is detected.
- .15 Internal Control Algorithm
- 1. This is a standard HVAC drive that has been upgraded and modified by pump experts for Hydronic applications. It is set up with a closed loop internal control sequence that will optimize life cycle, system comfort, and minimize energy consumption.
- .16 Interface Features
- 1. Hand, off and auto keys shall be provided to start and stop the VFD and determine the source of the speed reference. It shall be possible to either disable these keys or password protect them from undesired operation.
 - .1 There shall be an "info" key on the keypad. The info key shall include "on-line" context sensitive assistance for programming and troubleshooting.
 - .2 The VFD shall be programmable to provide a digital output signal to indicate whether the VFD is in hand or auto mode. This is to alert the building automation system whether the VFD is being controlled locally or by the building automation system.
 - .3 Password protected keypad with alphanumeric, graphical, backlit display can be remotely mounted. Two levels of password protection shall be provided to guard against unauthorized parameter changes.
 - .4 All VFDs shall have the same customer interface. The keypad and display shall be identical and interchangeable for all sizes of VFDs.

- .5 To set up multiple VFDs, it shall be possible to upload all setup parameters to the VFD's keypad, place that keypad on all other VFDs in turn and download the setup parameters to each VFD. To facilitate setting up VFDs of various sizes, it shall be possible to download from the keypad only size independent parameters. Keypad shall provide visual indication of copy status.
- .6 Display shall be programmable to communicate in multiple languages including English, Spanish and French.
- .7 A red fault light, a yellow warning light and a green power-on light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
- .8 A quick setup menu with factory preset typical HVAC parameters shall be provided on the VFD. The VFD shall also have individual fan, pump, and compressor menus specifically designed to facilitate start-up of these applications.
- .9 A four-feedback PID controller to control the speed of the VFD shall be standard. This controller shall accept up to four feedback signals. It shall be programmable to compare the feedback signals to a common setpoint or to individual setpoints and to automatically select either the maximum or the feedback signal as the controlling signal. It shall also be possible to calculate the controlling feedback signal as the average of all feedback signals or the difference between a pair of feedback signals.
- .10 The VFD shall be able to apply individual scaling to each feedback signal.
- .11 For fan flow tracking applications, the VFD shall be able to calculate the square root of any or all individual feedback signals so that a pressure sensor can be used to measure air flow.
- .12 The VFD's PID controller shall be able to actively adjust its setpoint based on flow. This allows the VFD to compensate for a pressure feedback sensor which is located near the output of the pump rather than out in the controlled system.
- .13 The VFD shall have three additional PID controllers which can be used to control damper and valve positioners in the system and to provide setpoint reset.
- .14 Floating point control interface shall be provided to increase/decrease speed in response to contact closures.
- .15 Five simultaneous meter displays shall be available. They shall include at a minimum, frequency, motor current, motor voltage, VFD output power, VFD output energy, VFD temperature in degrees, among others.

- .16 Programmable sleep mode shall be able to stop the VFD. When its output frequency drops below set "sleep" level for a specified time, when an external contact commands that the VFD go into sleep mode, or when the VFD detects a no-flow situation, the VFD may be programmed to stop. When the VFD's speed is being controlled by its PID controller, it shall be possible to program a "wake-up" feedback value that will cause the VFD to start. To avoid excessive starting and stopping of the driven equipment, it shall be possible to program a minimum run time before sleep mode can be initiated and a minimum sleep time for the VFD.
 - .17 A run permissive circuit shall be provided to accept a "system ready" signal to ensure that the VFD does not start until dampers or other auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of initiating an output "run request" signal to indicate to the external equipment that the VFD has received a request to run.
 - .18 VFD shall be programmable to display feedback signals in appropriate units.
 - .19 VFD shall be programmable to sense the loss of load and signal this condition via a keypad warning, relay output and/or over the serial communications bus. To ensure against nuisance indications, this feature must be based on motor torque, not current, and must include a proof timer to keep brief periods of no load from falsely triggering this indication.
- .17 Standard Control and Monitoring Inputs And Outputs
- 1. Six dedicated, programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
 - .1 Two terminals shall be programmable to act as either as digital outputs or additional digital inputs.
 - .2 Two programmable relay outputs, Form C 240 V AC, 2 A, shall be provided for remote indication of VFD status.
 - .3 Each relay shall have an adjustable on delay / off delay time.
 - .4 Two programmable analog inputs shall be provided that can be either direct-or-reverse acting.
 - .5 Each shall be independently selectable to be used with either an analog voltage or current signal.
 - .6 The maximum and minimum range of each shall be able to be independently scalable from 0 to 10 V dc and 0 to 20 mA.
 - .7 A programmable low-pass filter for either or both of the analog inputs must be included to compensate for noise.
 - .8 The VFD shall provide front panel meter displays programmable to show the value of each analog input signal for system set-up and troubleshooting,

- .9 One programmable analog current output (0/4 to 20 mA) shall be provided for indication of VFD status. This output shall be programmable to show the reference or feedback signal supplied to the VFD and for VFD output frequency, current and power. It shall be possible to scale the minimum and maximum values of this output.
- .10 It shall be possible through serial bus communications to read the status of all analog and digital inputs of the VFD.
- .11 It shall be possible to command all digital and analog output through the serial communication bus.
- .18 Standard programmable firefighter's override mode allows a digital input to control the VFD and override all other local or remote commands. It shall be possible to program the VFD so that it will ignore most normal VFD safety circuits including motor overload.
- .19 The VFD shall be able to store load profile data to assist in analyzing the system demand and energy consumption over time.
- .20 The VFD shall include a sequential logic controller to provide advanced control interface capabilities. This shall include:
 - 1. Comparators for comparing VFD analog values to programmed trigger values.
 - 2. Logic operators to combine up to three logic expressions using Boolean algebra.
 - 3. Delay timers
 - 4. A 20-step programmable structure
- .21 The VFD shall include a cascade controller which allows the VFD to operate in closed loop setpoint (PID) control mode one motor at a controlled speed and control the operation of 3 additional constant speed motor starters.

3. Execution

3.1 INSTALLATION

- .1 Install equipment in accordance with manufacturer's instructions and all applicable codes.
 - 1. Ensure that pump is pipe-mounted and free to float with any movement, expansion, and contraction of piping system.
 - 2. Support pump using floor mounted saddle as required.
 - 3. For vertical in-line pumps supported from structure, ensure no pipe strain is imposed on pump flanges.
 - 4. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instructions and all applicable codes.
 - 5. Control wiring for remote mounted switches and sensor/transmitters shall be the responsibility of the control's contractor. All wiring shall be performed per manufacturer's instructions and all applicable codes.

3.2 START UP

- .1 The control package manufacturer's factory trained representative shall provide start-up of the packaged pumping system. This start-up shall include verification of proper installation, system initiation, adjustment, and fine tuning. Start-up shall not be considered complete until the sequence of operation, including all alarms, has been sufficiently demonstrated to the Owner or Owner's designated representative. This jobsite visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed-off on the manufacturer's start-up request form.
- .2 The pump control package manufacturer's factory trained representative shall provide on-site training for owner's personnel. This training shall fully cover maintenance and operation of all system components.

3.3 PERFORMANCE VERIFICATION (PV)

- .1 Verify that manufacturer's performance curves are accurate.
- .2 Ensure valves on pump suction and discharge provide tight shut-off.

END OF SECTION

1. General

1.1 DESCRIPTION

.1 Work Includes:

1. Furnish all labor, materials, tools, equipment, and services for condenser water treatment system as indicated, in accordance with provisions of the contract documents.
2. Completely coordinate with work of all other trades.
3. See Division 01 for General Requirements.
4. Manufacturer's representative company will provide automatically controlled water treatment program and equipment as specified herein.
5. Provide monthly service for the condenser water treatment program designed to minimize corrosion, scale formation and biological growth in the following mechanical systems:
 - .1 Condenser Water Piping System

.2 Description of System:

1. Riser mounted purification chamber with shielded cable by equipment manufacturer.
2. Unit mounted Panel by equipment manufacturer.
3. Factory mounted (by equipment manufacturer) conductivity controller and bleed valve as specified below. System shall be self-draining to minimize the need for heat trace and insulation.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.

.2 Shop drawings: Show all water treatment equipment, including the following:

1. Conductivity control panel and wiring diagrams (show all field wiring required). Include bill of materials showing model number, manufacturer, physical layout drawings, panel, and equipment catalogue cuts.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.

.2 Operation and Maintenance Data: submit operation and maintenance data for HVAC water treatment systems for incorporation into manual.

.3 Laboratory analysis of project site make-up water: Submit a copy of a laboratory analysis documenting the quality of the project's make-up water. Make-up water analysis to include the following analytes as a minimum:

1. Calcium Hardness (as ppm CaCO₃)
2. Total Hardness (as ppm CaCO₃)
3. Total Alkalinity or m-Alkalinity (as ppm CaCO₃)
4. pH
5. Silica (as SiO₂)
6. Specific Conductivity (micro S/cm)
7. Sulfate (as SO₄)

8. Chloride (as Cl⁻)
9. Phosphate (as PO₄)

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 1. Store and protect HVAC water treatment systems from nicks, scratches, and blemishes.
 2. Replace defective or damaged materials with new.

1.5 QUALITY ASSURANCE

- .1 The water treatment supplier shall:
 1. Obtain water samples from the site and furnish a laboratory analysis of the water supply with submittal.
 2. Review the make-up water analysis to ensure compatibility with the water treatment program.
 3. Propose water treatment methods and appropriate non chemical treatment required to minimize scale, corrosion and biological growth. Submit all of the above with shop drawings and other required submittals.
- .2 Methods selected shall comply with all the requirements of the American Public Health Association (APHA), the Environmental Protection Agency (EPA) and local environmental agencies.

1.6 PERFORMANCE CRITERIA

- .1 Maintain the conditions listed below in the water system(s):
 1. Conductivity range of 300 to 5,000 micro S/cm.
 2. pH range of 7.0 to 8.8
 3. Local environmental regulations may dictate the highest pH permitted for blowdown. The conductivity setting can be adjusted up or down to change the pH by the balancing of fresh make-up water.
 4. Total bacteria count (TBC) of less than 10,000 CFU/ml.
 5. Keep condenser water system scale free and corrosion to levels acceptable by AWT guidelines.

2. Products

2.1 WATER TREATMENT SYSTEM

- .1 Acceptable Products:
 1. Non-Chemical Water Treatment System
 - .1 Factory mounted purification chamber
 - .2 Factory mounted electrical Pulse Panel

3. Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for HVAC water treatment systems installation in accordance with manufacturer's written instructions.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.3 INSTALLATION

- .1 Installation of water system will include:
 - 1. All components shall be mounted by the evaporative equipment manufacturer during unit construction and prior to shipment from the factory.
 - 2. Supply all components (coils, transformers, conductivity meters, blow down valves etc) necessary for a completely automated stand-alone system. Blow down valves shall be motorized ball valves power open, spring return factory mounted during unit construction.
 - 3. Immediately after hydrostatic testing of piping is completed the mechanical contractor shall drain, flush, clean and passivate all systems. Subsequent to the cleaning process, each system shall be re-filled with clean water prior to the system being placed into operation. Once filled the condenser water pump and cooling tower fans shall be operated until conductivity set point is achieved.
- .2 Provide all consulting services, for a period of 1-year from start-up of the cooling system, which will include:
 - 1. Installation and system start-up procedure recommendations.
 - 2. Pre-operation system clean-out procedure supervision.
 - 3. Initial water analysis and recommendations.
 - 4. Training of operating personnel on proper feeding and control techniques.
 - 5. Monthly field service visits during wet operation.
 - 6. Any necessary log sheets and record forms.
- .3 All services will be provided by a factory authorized service provider of the evaporative condenser or closed circuit cooler manufacturer.

3.4 FIELD QUALITY CONTROL

- .1 Start-up:
 - 1. Start-up water treatment systems in accordance with manufacturer's instructions.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with *Section 01 74 00 - Cleaning*.
 - 1. Leave Work area clean at end of each day.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. Air-Conditioning, Heating and Refrigeration Institute (AHRI)
 - .1 AHRI-550/590 - Performance Rating of Water Chilling Packages Using the Vapor Compression Cycle.
 2. ASTM International (ASTM)
 - .1 ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 3. CSA Group (CSA)
 - .1 CSA B52 - Mechanical Refrigeration Code.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 1. Submit manufacturer's instructions, printed product literature and data sheets for modular water chillers and include product characteristics, performance criteria, physical size, finish, and limitations.
- .2 Shop Drawings:
 1. Indicate:
 - .1 Equipment including connections, piping and fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
 - .2 Wiring as assembled and schematics.
 - .3 Dimensions, construction details, recommended installation and support, mounting bolt hole sizes and locations and point loads.
 - .4 Space requirements for operation and maintenance.
 - .5 Type of refrigerant used.
 - .6 Chiller control hardware layout, wiring diagrams depicting factory installed wiring, field installed wiring with points of connection, and points of connection for BAS control/interface points.
 - .7 Sequence of operation depicting overview of control logic used.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

- .3 Data to include:
 - 1. Description of equipment giving manufacturers name, model type and capacity and serial numbers.
 - 2. Submit part load performance curves.
 - 3. Details on operation servicing and maintenance.
 - 4. Recommended spare parts list.
 - 5. Manufacturer certified performance data at full load in addition to either IPLV or NPLV.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Installing contractor to comply with the manufacturer's instructions for transporting, rigging, and assembly of modular chiller.
- .4 Chiller to be broken down on site within the maximum rated capacity of the elevator for transport to basement mechanical room.

2. Products

2.1 GENERAL

- .1 Provide complete packaged unit including: centrifugal compressor; evaporator; motor and motor starters; controls; control centre; piping; wiring; refrigeration and oil charge; mounted on isolated steel base ready for connection to system chilled water piping; [cooling water]; external control circuitry and electrical power source.

2.2 CAPACITY

- .1 Certified ratings based on AHRI 550:
 - 1. Provide water-cooled liquid chiller with the capacity as scheduled on drawings at job site elevation.
 - 2. Chiller shall be designed to operate using 513a Refrigerant.
 - 3. Chiller shall be designed for parallel evaporator water flow.
 - 4. The liquid to be chilled will be 35% PG containing corrosion inhibitors.
 - 5. Chiller shall be designed to operate using 575 volt, 3 phase, 60 Hz electrical power supply.

2.3 WATER COOLED PACKAGED CHILLER

- .1 Chiller shall incorporate a two stage centrifugal Compressor with magnetic bearings and consist of a single refrigerant circuit. The compressor shall utilize its integrated variable speed drive in conjunction with the compressor's inlet guide vanes to optimize the chiller's part load efficiency. Each refrigerant circuit shall consist of an individual compressor, condenser, evaporator, electronic expansion valve, and control system. Each circuit shall be constructed to be independent of other circuits from a refrigeration and electrical standpoint. The chiller system must be able to produce chilled water even in the event of a failure of one or more refrigerant circuits.
- .2 General
 1. Chiller Modules shall be ETL listed in accordance with UL Standard 1995, CSA certified per Standard C22.2#236.
 2. Modules shall ship wired and charged with refrigerant. All modules shall be factory run tested prior to shipment on an AHRI certified or 3rd party verified test stand.
 3. Compressors, heat exchangers, piping and controls shall be mounted on a heavy gauge, powder coated steel frame. Electrical controls, and associated components for each module shall be mounted within that module.
- .3 Chilled and Condenser Water Mains: Each module shall include supply and return mains for both chilled and condenser water. Module piping will be rated for 150 psi working pressure. Cut grooved type end connections are provided for interconnection to piping with grooved type couplings. Water Mains shall be installed such that they are not above any power or control wiring so as to insure for safe operation in the event of condensation or minor piping leaks.
- .4 Evaporators and condensers: Each evaporator and condenser shall be tube in shell heat exchangers constructed with copper tubes in a carbon steel shell; built in accordance with Section VIII of the ASME code. Both the condenser and evaporator heat exchanger shall be mounted below the compressor, to eliminate the effect of migration of refrigerant to the cold evaporator with consequent liquid slugging on start-up.
- .5 Total Access Design: Isolation valves shall be installed between the heat exchangers and water supply mains for heat exchanger isolation and removal without the requirement to remove a module or shut down the entire chiller allowing for total access to all serviceable components.
- .6 Variable Flow Operation - Chilled and/or Condenser Water
 1. Chiller shall incorporate integral condenser and/or evaporator motorized butterfly valves.

2. Compressor:
 - .1 Unit shall have a direct drive oil-free two-stage semi-hermetic centrifugal compressor complete with an active / passive magnetic bearing system. Casing shall be constructed from aluminum and shall not weigh more than 300 lbs each. The electronic soft starters, compressor controls, inverter power electronics, bearing and motor control shall be fully integrated into the compressor and shall be digitally controlled. The magnetic bearing system must be fully protected in the case of a power outage with its own inbuilt power generation system.
 - .2 The impeller shall be statically and dynamically balanced. The compressor shall be vibration tested and not exceed a level of 0.14 IPS.
 - .3 The capacity control should primarily be achieved by varying the compressors operating speed and a movable inlet guide vane shall only be used in the case of a surge or choke condition arising during normal operation. The moveable inlet guide vane shall be of the electro-mechanical type.
 - .4 Bearing System: The compressor shall use an oil-free bearing system of the digitally controlled homo-pole magnetic bearing type. The bearings shall have a fully integrated back up bearing system and shall have a self generating power system so that the bearings shall be able to stay levitated in the case of a power failure. No sump heater is to be required. The bearing system shall use no more than 500 watts of energy during its normal operation, and it must also have an auto balance capability in the case of any external vibration or out of balance event occurring.
 - .5 Prime Mover: A direct drive synchronous permanent magnet brushless DC motor of the hermetic type of sufficient size to efficiently fulfill compressor horsepower requirements. Motor shall be liquid refrigerant cooled with internal thermal overload protection devices embedded in the winding of each phase.
 - .6 Motor Starter: The main motor starter is to be fully integrated into the compressor and shall be of the soft-start type with a maximum starting current of 20% of the full load current of the compressor. It must be fully integrated with the motors variable speed control system, and it must be factory tested during the run test of the unit.
 - .7 Variable Frequency Drive: The chiller shall be equipped with a fully integrated Variable Frequency Drive (VFD) to automatically regulate compressor speed in response to cooling load and compressor pressure lift. The chiller control shall coordinate compressor speed and guide vane position to optimize chiller efficiency.
 - .1 A digital regulator shall provide V/Hz control.

- .2 The VFD shall have 110% continuous overload of continuous amp rating with no time limit, PWM (pulse width modulated) output, IGBT (insulated gate bipolar transistors) power technology, full power rating at 2kHz, DC bus inductor (choke), and wireless construction. The inverter unit shall be refrigerant cooled and shall be fully integrated into the compressor package.
- .7 Control System.
1. The unit shall have an industrial grade CPU with an ARM Cortex A-8 processor FlexSys™ Controller. All chiller and compressor I/O to be controlled via 10/100 Ethernet (2), RS-485 (2), and USB (2). Controller to have 19.5 inch TFT touch screen interface that can be disconnected and chillers still runs properly.
 2. Controller to use natural progression control algorithms which properly define the compressors operating range to optimize loading, unloading, and control of multiple MagLev compressors. User shall operate chiller via HMI located on touch screen or remote web connection. All system parameters, compressor status, alarms, and faults, trend graphing, fault logging, bas communication window, logbook, and control set points shall be viewable. Shall be able to fully commission and adjust all components on the chiller, including the compressors without an auxiliary computer or software.
 3. The chiller controller shall include the necessary I/O for proper chiller operation including:
 - .1 Hardware
 - .1 Dedicated EXV Output for each liquid level EXV and/or Economizer Valve Chiller LP Safety input
 - .2 Chiller HP Safety input Chilled Water Safety input Condenser Water Safety input
 - .3 E-Stop input
 - .4 Chilled Water Reset input
 - .5 Load Limit input
 - .6 Tower Setpoint output Chiller kW output
 - .7 Chiller Amps output
 - .8 Chiller Run Contact output
 - .9 Chiller Fault output
 - .10 Compressor Lockout Fault Status output
 - .11 Dedicated Compressor Enable output (no relay or paralleled signal)
 - .12 Chilled Water In and Out Temperatures
 - .13 Condenser Water In and Out Temperatures
 - .14 Liquid Line Temperature(s)
 - .15 Standard pump and tower control
 - .16 Dedicated RS-485 communication to each compressor
 - .17 Dedicated RS-232 communication to each compressor

- .18 Linux based operating system with embedded PC utilizing Windows.
- .19 DC Powered to ensure maximum resistance to EMI and RFI noise
- .20 Built in 2-port Ethernet Switch for easy integration to BAS interface and web control feature.
- .21 On board USB drives to support external peripheral devices including, keyboard, mouse, and printer
- .22 19.5 "TFT display featuring 1024 X 768 Resolution. All hardware, including I/O is CE and UL Certified
- .23 All wiring utilizes spring capture technology to prevent loose connections or wires from falling out.
- .24 RS-485 communication at baud rate of 38,400 bps
- .2 Software
 - .1 Controls shall have the capability of controlling different size and model compressors for maximum efficiency and turn down
 - .2 HMI interface allows the user the following options: definable points list, tag names, and functions without special software. With this feature, end user can scale an all inputs and outputs, change what controls it, change the functionality, the name of it etc.
 - .3 Chiller controller has the Danfoss Turbocor Compressor Software on board. This allows for no laptops for a service tech in addition to advanced remote troubleshooting.
 - .4 Control System features easy to use web interface. This allows the user to do anything remotely that could be done in front of the chiller/
 - .5 Over 200 data points are recorded in five (5) second intervals. Data can be analyzed with zoom feature. Data stored on separate 32 GB drive. Trend graph images can be exported. Trend graphs can be exported to csv files as well.
 - .6 Advanced Fault Logging featuring calendar capability for ease of use. Data can be sorted by alarm type, time stamp, or compressor.
 - .7 Color coded data. Green data means good, yellow means alarm, red means fault or off
 - .8 Controller logs when user makes any type of change
 - .9 Controller has onboard maintenance log to store system information Controller offers real time capacity and efficiency data
 - .10 BAS Interfaces include:
 - .1 Modbus RTU standard
 - .2 Modbus TCP/IP standard
 - .3 BAC Net TCP/IP
 - .4 BACNET MSTP

- .11 BAS interface dashboard shown on HMI. This allows the user to view what data is being written to the BAS system. Also shows if there is an error, last com, and how many times the data was sent or received.
- .12 Control system uses proprietary natural progression control algorithms to perform accurate energy balance on all systems for maximum system performance.
- .13 Control System features an optimum start function to ensure initial lift is always made. This prevents nuisance check valve flutter and compressor faults.

3. Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for water chiller installation in accordance with manufacturer's written instructions.
 - 1. Visually inspect substrate
 - 2. Inform Consultant of unacceptable conditions immediately upon discovery.

3.2 INSTALLATION

- .1 Provide appropriate protection apparatus.
- .2 Install unit as indicated, to manufacturer's recommendations, and in accordance with EPS1/RA/2.
- .3 Ensure adequate clearances for servicing and maintenance.
- .4 Manufacturer to approve installation, to supervise start up and to instruct operators.
 - 1. Include 3 days minimum per unit.

3.3 PIPING SYSTEM FLUSHING PROCEDURE

- .1 Prior to connecting the chiller to the condenser and chilled water loop, the piping loops shall be flushed with a detergent and hot water (110-130° F) mixture to remove previously accumulated dirt and other organics. In old piping systems with heavy encrustation of inorganic materials, consult a water treatment specialist for proper passivation and/or removal of these contaminants.
- .2 During the flushing, a 30 mesh (max.) Y-strainers (or acceptable equivalent) shall be in place in the system piping and examined periodically as necessary to remove collected residue. The flushing process shall take no less than 6 hours or until the strainers when examined after each flushing are clean. Old systems with heavy encrustation shall be flushed for a minimum of 24 hours and may take as long as 48 hours before the filters run clean. Detergent and acid concentrations shall be used in strict accordance with the respective chemical manufacturer's instructions. After flushing with the detergent and/or dilute acid concentrations the system loop shall be purged with clean water for at least one hour to ensure that all residual cleaning chemicals have been flushed out.

- .3 Prior to supplying water to the chiller, the Water Treatment Specification shall be consulted for requirements regarding the water quality during chiller operation. The appropriate chiller manufacturer's service literature shall be available to the operator and/or service contractor and consulted for guidelines concerning preventative maintenance and off-season shutdown procedures.

3.4 WATER TREATMENT REQUIREMENTS

- .1 Supply water (glycol) for both the chilled water and condenser water circuits shall be analyzed and treated by a professional water treatment specialist who is familiar with the operating conditions and materials of construction specified for the chiller's heat exchangers, headers, and associated piping. Cycles of concentration shall be controlled such that recirculated water quality for modular chillers using 316 stainless steel brazed plate heat exchangers and carbon steel headers is maintained within the following parameters:

| | |
|----------------------------------|--------------------------------|
| pH | Greater than 7 and less than 9 |
| Total Dissolved Solids (TDS) | Less than 1000 ppm |
| Hardness as CaCO ₃ | 30 to 500 ppm |
| Alkalinity as Ca CO ₃ | 30 to 500 ppm |
| Chlorides | Less than 200 ppm |
| Sulfates | Less than 200 ppm |

3.5 WARRANTY AND STARTUP

- .1 Manufacturer's Warranty: Manufacturer shall provide full parts-only warranty coverage for entire chiller for a period of one year. All parts shall be warranted against defects in material and workmanship. Similar parts-only coverage shall be provided for the chiller's compressors for a period of five years.
- .2 Manufacturer shall provide the services of a Factory Authorized Service Engineer to provide complete start-up supervision. Factory Authorized Service Engineer shall also be responsible for assembly of the chillers cabinetry package and electrical bus bar system. After start-up a Manufacturer's Representative shall provide a minimum of 8-hours of operator training to the owner's designated representative(s).

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. ASTM International (ASTM)
 - .1 ASTM A48/A48M - Standard Specification for Grey Iron Castings.
 - .2 ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .4 ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - .5 ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - .6 ASTM D520 - Standard Specification for Zinc Dust Pigment.
 2. CSA Group (CSA)
 - .1 CSA B52 - Mechanical Refrigeration Code.
 - .2 CAN/CSA-Z809 - Sustainable Forest Management.
 3. Cooling Technology Institute (CTI)
 - .1 CTI-ATC-105 - Acceptance Test Code.
 - .2 CTI-STD-201 - Standard for the Certification of Commercial Water Cooling Tower Thermal Performance.
 4. National Electrical Manufacturers Association (NEMA)
 - .1 NEMA MG 1 - Motors and Generators.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 1. Submit manufacturer's instructions, printed product literature and data sheets for closed circuit coolers and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
 1. Indicate on drawings:
 - .1 Connections, piping, fittings, valves, strainers, control assemblies and ancillaries, identifying factory and field assembled.
 - .2 Wiring as assembled and schematically.
 - .3 Dimensions, construction details, recommended installation and support, mounting bolt hole sizes and locations and point loads.

- .4 Vibration and seismic control measures.
- .5 Manufacturers recommended clearances.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Test reports:
 - 1. Submit certified test reports for cooling towers, closed circuit coolers from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
- .6 Manufacturer's Field Reports:
 - 1. Submit manufacturer's field reports specified.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Operation and Maintenance Data: submit operation and maintenance data for closed circuit coolers for incorporation into manual.
- .3 Include:
 - 1. Description of equipment giving manufacturers name, type, model year, capacity.
 - 2. Start-up and commissioning procedures.
 - 3. Details of operation, servicing, and maintenance.

1.4 MAINTENANCE

- .1 Extra Materials:
 - 1. Furnish following spare parts: belts and bearings.
 - 2. Furnish spare parts data for each different item of equipment specified, after approval of detail drawings, submit with operation and maintenance manual.
 - 3. Include with data complete list of parts and supplies, source of supply, recommended spare parts list for 1 year of operation, and list of parts recommended by manufacturer to be replaced on routine basis.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Store and protect condensers and cooling equipment from nicks, scratches, and blemishes.
 - 3. Replace defective or damaged materials with new.

1.6 QUALITY ASSURANCE

1. The thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance Test Code ATC-105, by a Licensed CTI Thermal Testing Agency.
2. Unit Sound Performance ratings shall be tested according to CTI ATC-128 standard. Sound ratings shall not exceed specified ratings.
3. Unit shall meet or exceed energy efficiency per ASHRAE 90.1-2019.

1.7 WARRANTY

1. Submit a written warranty executed by the manufacturer, agreeing to repair or replace components of the unit that fail in materials and workmanship within the specified warranty period.
2. The Entire Unit shall have a comprehensive five year warranty against defects in materials and workmanship from date of shipment.
3. Fan Motor/Drive System: Warranty Period shall be five years from date of unit shipment from Factory (fan motor(s), fan(s), fan shaft(s), bearings, mechanical support, sheaves, bushings, and belt(s)).
4. Heat Transfer Coil: Warranty Period shall be one year

2. Products

2.1 PERFORMANCE REQUIREMENTS

- .1 Performance certified in accordance with CTI-STD-201.
- .2 Closed Circuit Cooler:
 1. Capacity: 96.84 L/s of 35% Ethylene Glycol from 32°C to 26.6°C with 18.89°C ambient wet bulb temperature.
 2. Pressure drop: 48.2 kPa.
- .3 Electrical: maximum full load running amps 23.6 per motor.
- .4 Sound pressure level measured at top: maximum 83/72 dBA.

2.2 COMPONENTS

- .1 Factory assembled and tested, induced draft counter flow closed circuit cooler complete with fan, coil, louvers, accessories, and rigging supports.
- .2 Materials of Construction
 1. All cold water basin components including vertical supports, air inlet louver frames and panels up to rigging seam shall be constructed of Type 316 Stainless Steel. All factory cold water basin seams shall be welded for watertight construction. "Series 300" stainless steel shall not be acceptable as equivalent to Type 316 Stainless Steel.

2. Upper Casing, channels and angle supports shall be constructed of heavy gauge mill hot-dip galvanized steel. Fan cowl and guard shall be constructed of galvanized steel. All galvanized steel shall be coated with a minimum of 2.35 ounces of zinc per square foot of area (G-235 Hot-Dip Galvanized Steel designation). During fabrication, all galvanized steel panel edges shall be coated with a 95% pure zinc-rich compound.
 3. All evaporative cooling equipment utilizing galvanized construction require initial passivation to maximize the service life of the equipment. The site's water treatment vendor should be contacted several weeks prior to adding any water to the system to provide a passivation plan along with associated passivation plan costs.
- .3 Fan(s):
1. Fan(s) shall be high efficiency axial propeller type with aluminum wide chord blade construction. Each fan shall be dynamically balanced and installed in a closely fitted cowl with venturi air inlet for maximum fan efficiency.
- .4 Drift Eliminators
1. Drift eliminators shall be constructed entirely of Polyvinyl Chloride (PVC) in easily handled sections. Design shall incorporate three changes in air direction and limit the water carryover to a maximum of 0.001% of the recirculating water rate. Drift eliminators shall be self-extinguishing, have a flame spread of less than 25 under ASTM E84, and shall be resistant to rot, decay, and biological attack.
- .5 Water Distribution System
1. Spray nozzles shall be zero-maintenance precision molded ABS with large 1-1/4" diameter orifice threaded into branch piping with internal sludge ring to eliminate clogging. Spray header, branches, and riser shall be Schedule 40 Polyvinyl Chloride (PVC) for corrosion resistance.
- .6 Heat Transfer Media
1. Heat transfer coil shall be elliptical tubes of prime surface steel, encased in steel framework with entire assembly hot dip galvanized after fabrication. All coil rows shall feature extended surface fins designed with sloping tubes for liquid drainage. Coil shall have design pressure of 300 psi and shall be in compliance with ASME/ANSI B31.5, Refrigeration Piping and Heat Transfer Components. The coil assembly shall be strength tested in accordance with ASME/ANSI B31.5 and subsequently leak tested using air under water.
 2. All evaporative cooling equipment utilizing galvanized construction require initial passivation to maximize the service life of the equipment. The site's water treatment vendor should be contacted several weeks prior to adding any water to the system to provide a passivation plan along with associated passivation plan costs.
 3. The Canadian Registered Number shall identify that the design has been accepted and registered for use in Saskatchewan.

- .7 Pump
 - 1. Unit shall have EISA close-coupled centrifugal pump with mechanical seal. The pump shall be installed in a vertical position so that water will drain from the pump when the cold-water basin is emptied. Pump motor shall be totally enclosed with protective canopy for outdoor operation.
- .8 Bleed-off
 - 1. Unit shall have a waste water bleed line with a manual adjustable valve provided.
- .9 Air Inlet Louvers
 - 1. The air inlet louvers shall be constructed from UV inhibited Polyvinyl Chloride (PVC) and incorporate a framed interlocking design that allows for easy removal of air inlet louvers for access to the entire basin area for maintenance. The air inlet louvers shall have a minimum of two changes in air direction and shall be of a non-planar design to prevent splash-out and block direct sunlight & debris from entering the basin. Air inlet louvers shall be self-extinguishing, have a flame spread of less than 25 under ASTM E84, and shall be resistant to rot, decay, and biological attack.
- .10 Electronic Water Level Control
 - 1. Electronic water level control package shall have five stainless steel water level sensors (one high level, one high level alarm, one low level, one low level alarm and one ground) with a NEMA 4x enclosure mounted in a cleanable Schedule 40 PVC external standpipe with slow closing solenoid valve(s) and "y" strainer(s). Wiring is not included and components must be field mounted. Valves shall be sized for 25 psi minimum to 125 psi maximum pressure. Standpipe will require heat tracing by others in cold weather applications.
- .11 Pan Strainer
 - 1. Pan Strainer(s) shall be all Type 304 Stainless Steel construction with large area removable perforated screens.
- .12 Pipe Connection Type
 - 1. Any connections provided with a Groove (GVD) or Beveled for Welding/Grooved (BFW/GVD) shall conform to standard groove specification (SGS).

2.3 MOTORS AND DRIVES

- .1 General requirements for motors are specified in Division 23 Section "Motors"
- .2 Fan Motor
 - 1. Fan motor(s) shall be totally enclosed, ball bearing type electric motor(s) suitable for moist air service. Motor(s) are Premium Efficient, Class F insulated, 1.15 service factor design. Inverter rated per NEMA MG1 Part 31.4.4.2 and suitable for variable torque applications and constant torque speed range with properly sized and adjusted variable frequency drives.
 - 2. Fan motor(s) shall include strip-type space heaters with separate leads brought to the motor conduit box.

- .3 Fan Drive
 - 1. The fan drive shall be multigroove, solid back V-belt type with QD tapered bushings designed for 150% of the motor nameplate power. The belt material shall be neoprene reinforced with polyester cord and specifically designed for evaporative equipment service. Fan sheave shall be aluminum alloy construction. Belt adjustment shall be accomplished from the exterior of the unit.
- .4 Fan Shaft
 - 1. Fan shaft shall be solid and polished stainless steel.
- .5 Fan Shaft Bearings
 - 1. Fan Shaft Bearings shall be heavy-duty, self-aligning ball type bearings with extended lubrication lines to grease fittings located on access door frame. Bearings shall be designed for a minimum L-10 life of 100,000 hours.
- .6 Vibration Switch
- .7 Unit shall be provided with a Vibration Cutout Switch, operating on 120 VAC feed, to protect the fan and drive assembly from damage in the event of excess vibration. Vibration switch shall be DPDT.

2.4 MAINTENANCE ACCESS

- .1 Fan Section
 - 1. Access door shall be hinged and located in the fan section for fan drive and water distribution system access.
- .2 Basin Section
 - 1. Framed removable louver panels shall be on all four sides of the unit for pan and sump access.
- .3 Internal Working Platform
 - 1. Internal working platform shall provide easy access to the fans, belts, motors, sheaves, bearings, all mechanical equipment, and complete water distribution system. The coil surface shall be an acceptable means of accessing these components.
- .4 External Service Platform with Ladder
 - 1. An external service platform compliant with OSHA shall be provided at the motor access door of the unit extending the full length of the access door. Each platform shall have at least a 36 in wide walking surface. The platforms shall have galvanized steel grating, supported by galvanized steel framework attached to the unit and surrounded by a handrail, knee rail and toe plate system that is compliant with OSHA. Mounting channels shall be the same material as the casing section (galvanized or stainless steel). A vertical ladder shall be provided from the base of the unit to the platform.
- .5 Safety cage(s) shall be provided on all vertical ladder(s) and ship mounted. Safety cage(s) shall begin between 7 feet (minimum) and 8 feet (maximum) above grade.

- .6 Motor Davit with Base
 - 1. Unit shall be provided with mechanical external motor davit assembly which facilitates in removal of larger fan section components. Davit arm shall be constructed of aluminum and base shall be galvanized steel.

2.5 ACCESSORIES

- .1 Basin Heater Package
 - 1. Cold water basin shall be fitted with Type 304 Stainless Steel element, electric immersion heater(s) with a separate thermostat and low water protection device. Heaters shall be selected to maintain +40° F pan water at -40 °F ambient temperature.
 - 2. Electric immersion heater package shall include a factory-supplied NEMA 4x enclosure containing a magnetic contactor with 120 VAC control circuit, transformer, and main power disconnect. Control package wired by others.
- .2 Sump Sweeper Piping
 - 1. Cold water basin shall be fitted with schedule 80 PVC sump sweeper piping complete with high-flow eductor nozzles to facilitate basin cleaning. The system shall contain one inlet connection and one outlet connection per basin. ACCESSORIES

3. Execution

3.1 GENERAL

- .1 Mount on structural supports and vibration isolators and to manufacturer's recommendations.
- .2 Ensure clearance for servicing and maintenance as recommended by manufacturer.
- .3 Manufacturers field service representative to approve installation, start up and to instruct operators.

3.2 FIELD QUALITY CONTROL

- .1 Site Tests:
 - 1. Test under actual operating conditions in accordance with CTI-ATC-105 to verify specified performance.
- .2 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
 - 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

3.3 ADJUSTING

- .1 Lubricate bearings with oil or grease as recommended by the manufacturer.

- .2 Tighten belts to manufacturer's specified tension.

3.4 CLEANING

- .1 Progress Cleaning:
 - 1. Leave Work area clean at end of each day.
- .2 Wipe equipment clean, and remove traces of oil, dust, dirt, or paint spots.
- .3 Maintain system in clean condition until final acceptance.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. American National Standards Institute (ANSI)/The Instrumentation, Systems and Automation Society (ISA).
 - .1 ANSI/ISA 5.5 - Graphic Symbols for Process Displays.
 2. American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE).
 - .1 ANSI/IEEE 260.1 - American National Standard Letter Symbols Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).
 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
 - .1 ASHRAE STD 135 - BACNET - Data Communication Protocol for Building Automation and Control Network.
 4. CSA Group (CSA).
 - .1 CAN/CSA-Z234.1 - Canadian Metric Practice Guide.
 5. Consumer Electronics Association (CEA).
 - .1 CEA-709.1 - Control Network Protocol Specification.
 6. Department of Justice Canada (Jus).
 - .1 Canadian Environmental Assessment Act (CEAA), c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), c. 33.
 7. Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety Data Sheets (SDS).
 8. Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.2 ABBREVIATIONS AND ACRONYMS

- .1 Acronyms used in EMCS:
 1. AEL - Average Effectiveness Level
 2. AI - Analog Input
 3. AIT - Agreement on International Trade
 4. AO - Analog Output
 5. BACnet - Building Automation and Control Network.
 6. BC(s) - Building Controller(s).
 7. BECC - Building Environmental Control Centre.

8. CAD - Computer Aided Design.
9. CDL - Control Description Logic.
10. CDS - Control Design Schematic.
11. COSV - Change of State or Value.
12. CPU - Central Processing Unit.
13. DI - Digital Input.
14. DO - Digital Output.
15. DP - Differential Pressure.
16. ECU - Equipment Control Unit.
17. EMCS - Energy Monitoring and Control System.
18. HVAC - Heating, Ventilation, Air Conditioning.
19. IDE - Interface Device Equipment.
20. I/O - Input/Output.
21. ISA - Industry Standard Architecture.
22. LAN - Local Area Network.
23. LCU - Local Control Unit.
24. MCU - Master Control Unit.
25. NAFTA - North American Free Trade Agreement.
26. NC - Normally Closed.
27. NO - Normally Open.
28. OS - Operating System.
29. O&M - Operation and Maintenance.
30. OWS - Operator Work Station.
31. PC - Personal Computer.
32. PCI - Peripheral Control Interface.
33. PCMCIA - Personal Computer Micro-Card Interface Adapter.
34. PID - Proportional, Integral and Derivative.
35. RAM - Random Access Memory.
36. SP - Static Pressure.
37. ROM - Read Only Memory.
38. TCU - Terminal Control Unit.
39. USB - Universal Serial Bus.
40. UPS - Uninterruptible Power Supply.
41. VAV - Variable Air Volume.

1.3 DEFINITIONS

- .1 Point: may be logical or physical.
 1. Logical points: values calculated by system such as setpoints, totals, counts, derived corrections and may include, but not limited to result of and statements in CDL's.

2. Physical points: inputs or outputs which have hardware wired to controllers which are measuring physical properties, or providing status conditions of contacts or relays which provide interaction with related equipment (stop, start) and valve or damper actuators.
- .2 Point Name: composed of two parts, point identifier and point expansion.
 1. Point identifier: comprised of three descriptors, "area" descriptor, "system" descriptor and "point" descriptor, for which database to provide 25 character field for each point identifier. "System" is system that point is located on.
 - .1 Area descriptor: building or part of building where point is located.
 - .2 System descriptor: system that point is located on.
 - .3 Point descriptor: physical or logical point description. For point identifier "area", "system" and "point" will be shortforms or acronyms. Database must provide 25 character field for each point identifier.
 2. Point expansion: comprised of three fields, one for each descriptor. Expanded form of shortform or acronym used in "area", "system" and "point" descriptors is placed into appropriate point expansion field. Database must provide 32 character field for each point expansion.
 3. Bilingual systems to include additional point identifier expansion fields of equal capacity for each point name for second language.
 - .1 System to support use of numbers and readable characters including blanks, periods or underscores to enhance user readability for each of the above strings.
- .3 Point Object Type: points fall into following object types:
 1. AI (analog input).
 2. AO (analog output).
 3. DI (digital input).
 4. DO (digital output).
 5. Pulse inputs.
- .4 Symbols and engineering unit abbreviations utilized in displays: to ANSI/ISA S5.5.
 1. Printouts: to ANSI/IEEE 260.1.

1.4 **SYSTEM DESCRIPTION**

- .1 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
 1. Building Controllers.
 2. Control devices as listed in I/O point summary tables.
 3. OWS(s).
 4. Data communications equipment necessary to effect EMCS data transmission system.
 5. Field control devices.
 6. Software/Hardware complete with full documentation.
 7. Complete operating and maintenance manuals.

8. Training of personnel.
 9. Acceptance tests, technical support during commissioning, full documentation.
 10. Wiring interface co-ordination of equipment supplied by others.
 11. Miscellaneous work as specified in these sections and as indicated.
- .2 Design Requirements:
1. Design and provide conduit and wiring linking elements of system.
 2. Supply sufficient programmable controllers of types to meet project requirements. Quantity and points contents as reviewed by Departmental Representative prior to installation.
 3. Location of controllers as reviewed by Departmental Representative. Provide utility power to EMCS and emergency power to EMCS.
 4. Metric references: in accordance with CAN/CSA Z234.1.
- .3 Language Operating Requirements:
1. Provide English operator selectable access codes.
 2. Use non-linguistic symbols for displays on graphic terminals.
 3. Operating system executive: provide primary hardware-to-software interface with associated documentation to be in English.
 4. System manager software: include in [French] [English] system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency.
 5. Include, in English:
 - .1 Input and output commands and messages from operator-initiated functions as defined in CDL's or assigned limits (i.e. commands relating to day-to-day operating functions and not related to system modifications, additions, or logic redefinitions).
 - .2 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points. To be in English at specified OWS and to be able to operate one terminal in English and second in French. Point name expansions in both languages.
 - .3 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Quality Control:
1. Provide equipment and material from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.
 2. Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.
 3. Submit proof of compliance to specified standards with shop drawings and product data

4. For materials whose compliance with organizational standards/codes/specifications is not regulated by organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.
5. Permits and fees: in accordance with general conditions of contract.
6. Existing devices intended for re-use: submit test report.

1.6 EXISTING- CONTROL COMPONENTS

- .1 Utilize existing control wiring and piping where possible.
- .2 Re-use field control devices that are usable in their original configuration provided that they conform to applicable codes, standards specifications.
 1. Do not modify original design of existing devices without written permission from Departmental Representative
 2. Provide for new, properly designed device where re-usability of components is uncertain.
- .3 Inspect and test existing devices intended for re-use within 30 days of award of contract, and prior to installation of new devices.
- .4 Non-functioning items:
 1. Provide with report specification sheets or written functional requirements to support findings.
 2. Departmental Representative will repair or replace existing items judged defective yet deemed necessary for EMCS.
- .5 Submit written request for permission to disconnect controls and to obtain equipment downtime before proceeding with Work.
- .6 Assume responsibility for controls to be incorporated into EMCS after written receipt of approval from Departmental Representative
 1. Be responsible for items repaired or replaced by Departmental Representative
 2. Be responsible for repair costs due to negligence or abuse of equipment.
 3. Responsibility for existing devices terminates.
- .7 Remove existing controls not re-used or not required. Place in approved storage for disposition as directed.

2. Products

2.1 EQUIPMENT

- .1 Complete list of equipment and materials to be used on project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

2.2 ADAPTORS

- .1 Provide adaptors between metric and imperial components.

3. Execution

3.1 QUALIFIED CONTRACTORS

.1 EMCS contractor shall be Johnson Controls

3.2 MANUFACTURER'S RECOMMENDATIONS

.1 Installation: to manufacturer's recommendations.

END OF SECTION

1. General

1.1 SUMMARY

.1 Section Includes.

1. Requirements and procedures for identification of devices, sensors, wiring tubing, conduit, and equipment, for building Energy Monitoring and Control System (EMCS) Work and nameplates materials, colours and lettering sizes.

1.2 REFERENCE STANDARDS

.1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.

.2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

.3 Perform work in accordance with the following Standards, except where specified otherwise.

1. CSA Group (CSA).
 - .1 CSA C22.1 - The Canadian Electrical Code, Part I (Latest Edition), Safety Standard for Electrical Installations.

1.3 DEFINITIONS

.1 For acronyms and definitions refer to *Section 25 05 01 - EMCS: General Requirements*.

1.4 SYSTEM DESCRIPTION

.1 Language Operating Requirements: provide identification for control items in English.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with *Section 01 33 00 - Submittal Procedures* supplemented and modified by requirements of this Section.

2. Products

2.1 NAMEPLATES FOR PANELS

.1 Identify by Plastic laminate, lettering accurately aligned and engraved into core.

.2 Sizes: 5 x 67 mm minimum.

.3 Lettering: minimum 7 mm high, black.

.4 Inscriptions: machine engraved to identify function.

2.2 NAMEPLATES FOR FIELD DEVICES

.1 Identify by plastic encased cards attached by plastic tie.

.2 Sizes: 50 x 100 mm minimum.

.3 Lettering: minimum 5 mm high produced from laser printer in black.

- .4 Data to include: point name and point address.
- .5 Companion cabinet: identify interior components using plastic enclosed cards with point name and point address.

2.3 WIRING

- .1 Supply and install numbered tape markings on wiring at panels, junction boxes, splitters, cabinets, and outlet boxes.
- .2 Colour coding: to CSA C22.1. Use colour coded wiring in communications cables, matched throughout system.
- .3 Power wiring: identify circuit breaker panel/circuit breaker number inside each EMCS panel.

2.4 PNEUMATIC TUBING

- .1 Numbered tape markings on tubing to provide uninterrupted tracing capability.

2.5 CONDUIT

- .1 Colour code EMCS conduit.
- .2 Pre-paint box covers and conduit fittings.

3. Execution

3.1 NAMEPLATES AND LABELS

- .1 Ensure that manufacturer's nameplates, CSA labels and identification nameplates are visible and legible at all times.

3.2 EXISTING PANELS

- .1 Correct existing nameplates and legends to reflect changes made during Work.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. American National Standards Institute (ANSI)
 - .1 ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressures Fittings.
 - .2 ANSI C2 - National Electrical Safety Code.
 - .3 ANSI/NFPA 70 - National Electrical Code.
 2. CSA Group (CSA)
 - .1 CSA C22.1 - Canadian Electrical Code,
 - .2 CAN/CSA C22.2 No. 45.1 - Electrical Rigid Metal Conduit.
 - .3 CAN/CSA C22.2 No. 56 - Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CAN/CSA C22.2 No. 83 - Electrical Metallic Tubing.

1.2 SYSTEM DESCRIPTION

- .1 Electrical:
 1. Provide power wiring from existing emergency power panels to EMCS field panels. Circuits to be for exclusive use of EMCS equipment. Panel breakers to be identified on panel legends tagged and locks applied to breaker switches.
 2. Hard wiring between field control devices and EMCS field panels.
 3. Communication wiring between EMCS field panels and OWS's including main control centre BECC.
 4. Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.
 5. Refer to wiring diagrams included as part of flow diagrams. Trace existing control wiring installation and provide updated wiring schematics including additions and/or deletions to control circuits for approval by engineer before commencing work.
- .2 Mechanical:
 1. Pipe taps required for EMCS equipment will be supplied and installed by Division 23.
 2. Wells and control valves shall be supplied by EMCS Contractor and Installed by Division 23

1.3 PERSONNEL QUALIFICATIONS

- .1 Qualified supervisory personnel to:
 - 1. Continuously direct and monitor all work.
 - 2. Attend site meetings.

1.4 EXISTING CONDITIONS

- .1 Repair all surfaces damaged during execution of work.
- .2 Turn over to DCC Representative existing materials removed from work not identified for re-use.

2. Products

2.1 WIRING

- .1 As per requirements of Division 26.
- .2 For 70V and above copper conductor with chemically cross-linked thermosetting polyethylene insulation rated RW90 and 600V. Colour code to CSA 22.1.
- .3 For wiring under 70 volts use FT6 rated wiring where wiring is not run in conduit. All other cases use FT4 wiring.
- .4 Sizes:
 - 1. 120V Power supply: to match or exceed breaker, size #12 minimum.
 - 2. Wiring for safeties / interlocks for starters, motor control centres, to be stranded, #14 minimum.
 - 3. Field wiring to digital device: [#18 AWG] [20 AWG stranded twisted pair].
 - 4. Analog input and output: shielded [#18 minimum solid copper] [#20 minimum stranded twisted pair]. Wiring must be continuous without joints.
 - 5. More than 4 conductors: #22 minimum solid copper.
- .5 Terminations:
 - 1. Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.

2.2 CONDUIT

- .1 As per requirements of Division 26.
- .2 Electrical metallic tubing to CAN/CSA C22.2 No. 83. Flexible and liquid tight flexible metal conduit to CAN/CSA C22.2 No. 56. Rigid steel threaded conduit to CAN/CSA C22.2 No. 45.1.
- .3 Junction and pull boxes: welded steel.
 - 1. Surface mounting cast FS: screw-on flat covers.
 - 2. Flush mounting: covers with 25 mm minimum extension all round.
- .4 Cabinets: sheet steel, for surface mounting, with hinged door, latch lock, 2 keys, complete with perforated metal mounting backboard. Panels to be keyed alike for similar functions and or entire contract as approved.
- .5 Outlet boxes: 100 mm minimum, square.

- .6 Conduit boxes, fittings:
 - 1. Bushings and connectors: with nylon insulated throats.
 - 2. With push pennies to prevent entry of foreign materials.
- .7 Fittings for rigid conduit:
 - 1. Couplings and fittings: threaded type steel.
 - 2. Double locknuts and insulated bushings: use on sheet metal boxes.
 - 3. Use factory "ells" where 90 degree bends required for 25 mm and larger conduits.
- .8 Fittings for thin wall conduit:
 - 1. Connectors and couplings: steel, set screw type.

2.3 WIRING DEVICES, COVER PLATES

- .1 Conform to CSA.
- .2 Receptacles:
 - 1. Duplex: CSA type 5-15R.
 - 2. Single: CSA type 5-15R.
 - 3. Cover plates and blank plates: finish to match other plates in area.

2.4 STARTERS, CONTROL DEVICES

- .1 Across-the-line magnetic starters:
 - 1. Enclosures: CSA Type 1, except where otherwise specified.
 - 2. Size, type, and rating: to suit motors.
- .2 Starter diagrams:
 - 1. Provide copy of wiring and schematic diagrams - mount one copy in each starter with additional copies for operation and maintenance manual.
- .3 Auxiliary Control Devices:
 - 1. Control transformers: 60 Hz, primary voltage to suit supply, 120 V single phase secondary, VA rating to suit load plus 20% margin.
 - 2. Auxiliary contacts: one "Normally Open" and one "Normally Closed" spare auxiliary contact in addition to maintained auxiliary contacts as indicated.
 - 3. Hand-Off-Automatic switch: heavy duty type, knob lever operator.
 - 4. Double voltage relays: with barrier to separate relay contacts from operating magnet. Operating coil voltage and contact rating as indicated.
- .4 Finish for starters:
 - 1. Exterior: in accordance with *Section 26 05 00 - Common Work Results for Electrical*.
 - 2. Interior: white.

2.5 SUPPORTS FOR CONDUIT, FASTENINGS, EQUIPMENT

- .1 Solid masonry, tile, and plastic surfaces: lead anchors or nylon shields.
 - 1. Hollow masonry walls, suspended drywall ceilings: toggle bolts.

- .2 Exposed conduits or cables:
 - 1. 50 mm diameter and smaller: one-hole steel straps.
 - 2. Larger than 50 mm diameter: two-hole steel straps.
- .3 Suspended support systems:
 - 1. Individual cable or conduit runs: support with 6 mm diameter threaded rods and support clips.
 - 2. Two or more suspended cables or conduits: support channels supported by 6 mm diameter threaded rod hangers.

3. Execution

3.1 INSTALLATION

- .1 Install equipment and components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.

3.2 ELECTRICAL GENERAL

- .1 Do complete installation in accordance with requirements of:
 - 1. Division 26, this specification.
 - 2. CSA 22.1 Canadian Electrical Code.
 - 3. ANSI/NFPA 70.
 - 4. ANSI C2.
- .2 Fully enclose or properly guard electrical wiring, terminal blocks, high voltage contacts and mark to prevent accidental injury.
- .3 Conform to manufacturer's recommendations for storage, handling and installation.
- .4 Check factory connections and joints. Tighten where necessary to ensure continuity.
- .5 Install electrical equipment between 1000 and 2000 mm above finished floor wherever possible and adjacent to related equipment.
- .6 Protect exposed live equipment such as panel, mains, outlet wiring during construction for personnel safety.
- .7 Shield and mark live parts "LIVE 120 VOLTS" or other appropriate voltage.
- .8 Install conduits, and sleeves prior to pouring of concrete.
- .9 Holes through exterior wall and roofs: flash and make weatherproof.
- .10 Make necessary arrangements for cutting of chases, drilling holes and other structural work required to install electrical conduit, cable, pull boxes, outlet boxes.
- .11 Install cables, conduits and fittings which are to be embedded or plastered over, neatly and closely to building structure to minimize furring.

3.3 CONDUIT SYSTEM

- .1 Communication wiring shall be installed in conduit. Provide complete conduit system to link Building Controllers to BECC. Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems. Maximum conduit fill not to exceed 40%. Design drawings do not show conduit layout.
- .2 Install conduits parallel or perpendicular to building lines, to conserve headroom and to minimize interference.
- .3 Locate conduits at least 150 mm from parallel steam or hot water pipes and at least 50 mm at crossovers.
- .4 Bend conduit so that diameter is reduced by less than 1/10th original diameter.
- .5 Field thread on rigid conduit to be of sufficient length to draw conduits up tight.
- .6 Limit conduit length between pull boxes to less than 30 m.
- .7 Use conduit outlet boxes for conduit up to 32 mm diameter and pull boxes for larger sizes.
- .8 Fastenings and supports for conduits, cables, and equipment:
 1. Provide metal brackets, frames, hangers, clamps and related types of support structures as indicated and as required to support cable and conduit runs.
 2. Provide adequate support for raceways and cables, sloped vertically to equipment.
 3. Use supports or equipment installed by other trades for conduit, cable and raceway supports only after written approval from [DCC Representative] [Consultant] [Departmental Representative].
- .9 Install polypropylene fish cord in empty conduits for future use.
- .10 Where conduits become blocked, remove and replace blocked sections.
- .11 Conduits may be run in flanged portion of structural steel.
- .12 Group conduits wherever possible on suspended or surface channels.
- .13 Pull boxes:
 1. Install in inconspicuous but accessible locations.
 2. Support boxes independently of connecting conduits.
 3. Fill boxes with paper or foam to prevent entry of construction material.
 4. Provide correct size of openings. Reducing washers not permitted.
 5. Mark location of pull boxes on record drawings.
 6. Identify AC power junction boxes, by panel and circuit breaker.
- .14 Install terminal blocks or strips indicated in cabinets
- .15 Install bonding conductor for 120 volt and above in conduit.

3.4 WIRING

- .1 Do not pull spliced wiring inside conduits or ducts.
- .2 Use CSA certified lubricants of type compatible with insulation to reduce pulling tension.

- .3 Tests: use only qualified personnel. Demonstrate that:
 - 1. Circuits are continuous, free from shorts, unspecified grounds.
 - 2. Resistance to ground of all circuits is greater than 50 Megohms.
- .4 Remove insulation carefully from ends of conductors and install to manufacturer's recommendations. Accommodate all strands in lugs. Where insulation is stripped in excess, neatly tape so that only lug remains exposed.
- .5 Wiring in main junction boxes and pull boxes to terminate on terminal blocks only, clearly and permanently identified. Junctions or splices not permitted for sensing or control signal covering wiring.
- .6 Do not allow wiring to come into direct physical contact with compression screw.
- .7 Install ALL strands of conductor in lugs of components. Strip insulation only to extent necessary for installation.

3.5 WIRING DEVICES, COVER PLATES

- .1 Receptacles:
 - 1. Install vertically in gang type outlet box when more than one receptacle is required in one location.
 - 2. Cover plates:
 - .1 Install suitable common cover plate where wiring devices are grouped.
 - .2 Use flush type cover plates only on flush type outlet boxes.

3.6 STARTERS, CONTROL DEVICES

- .1 Install and make power and control connections as indicated.
- .2 Install correct over-current devices.
- .3 Identify each wire, terminal for external connections with permanent number marking identical to diagram.
- .4 Performance Verification:
 - 1. Operate switches and controls to verify functioning.
 - 2. Perform start and stop sequences of contactors and relays.
 - 3. Check that interlock sequences, with other separate related starters, equipment and auxiliary control devices, operate as specified.

3.7 GROUNDING

- .1 Install complete, permanent, continuous grounding system for equipment, including conductors, connectors, and accessories.
- .2 Install separate grounding conductors in conduit within building.
- .3 Install ground wire in all PVC ducts and in tunnel conduit systems.
- .4 Tests: perform ground continuity and resistance tests, using approved method appropriate to site conditions.

3.8 TESTS

.1 General:

1. Perform following tests in addition to tests specified *Section 25 08 20 - EMCS: Warranty and Maintenance*.
2. Give [14] days written notice of intention to test.
3. Conceal work only after tests satisfactorily completed.
4. Preliminary tests:
 - .1 Conduct as directed to verify compliance with specified requirements.
 - .2 Make needed changes, adjustments, replacements.
 - .3 Insulation resistance tests:
 - .1 Megger all circuits, feeders, equipment for 120 - 600V with 1000V instrument. Resistance to ground to be more than required by Code before energizing.

3.9 IDENTIFICATION

- .1 Refer to *Section 25 05 54 - EMCS: Identification*.

END OF SECTION

1. General

1.1 SUMMARY

.1 Section Includes.

1. Requirements and procedures for warranty and activities during warranty period and service contracts, for building Energy Monitoring and Control System (EMCS).

1.2 REFERENCES.

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Consultant for instruction.

1.3 DEFINITIONS

- .1 BC(s) - Building Controller(s).
- .2 OWS - Operator Work Station.
- .3 For additional acronyms and definitions refer to *Section 25 05 01 - EMCS: General Requirements*.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Submit detailed preventative maintenance schedule for system components to Consultant
- .3 Submit detailed inspection reports to Departmental Representative
- .4 Submit dated, maintenance task lists to Departmental Representative and include the following sensor and output point detail, as proof of system verification:
 1. Point name and location.
 2. Device type and range.
 3. Measured value.
 4. System displayed value.
 5. Calibration detail
- .5 Submit network analysis report showing results with detailed recommendations to correct problems found.
- .6 Records and logs: in accordance with *Section 01 78 00 - Closeout Submittals*.
 1. Maintain records and logs of each maintenance task on site.
 2. Organize cumulative records for each major component and for entire EMCS chronologically.

1.5 MAINTENANCE SERVICE DURING WARRANTY PERIOD

- .1 Provide services, materials, and equipment to maintain EMCS for specified warranty period. Provide detailed preventative maintenance schedule for system components as described in Submittal article.

- .2 Emergency Service Calls:
 1. Initiate service calls when EMCS is not functioning correctly.
 2. Qualified control personnel to be available during warranty period to provide service to "CRITICAL" components whenever required at no extra cost.
 3. Furnish DCC Representative with telephone number where service personnel may be reached at any time.
 4. Perform Work continuously until EMCS restored to reliable operating condition.
- .3 Operation: foregoing and other servicing to provide proper sequencing of equipment and satisfactory operation of EMCS based on original design conditions and as recommended by manufacturer.
- .4 Work requests: record each service call request, when received separately on approved form and include:
 1. Serial number identifying component involved.
 2. Location, date and time call received.
 3. Nature of trouble.
 4. Names of personnel assigned.
 5. Instructions of work to be done.
 6. Amount and nature of materials used.
 7. Time and date work started.
 8. Time and date of completion.
- .5 Provide system modifications in writing.
 1. No system modification, including operating parameters and control settings, to be made without prior written approval of DCC Representative

2. Products - Not used

3. Execution

3.1 FIELD QUALITY CONTROL

- .1 Perform as minimum three minor inspections and one major inspection (more often if required by manufacturer) per year. Provide detailed written report to Departmental Representative.
- .2 Perform inspections during regular working hours, 0800 to 1630 h, Monday through Friday, excluding statutory holidays.
- .3 Following inspections are minimum requirements and should not be interpreted to mean satisfactory performance:
 1. Perform calibrations using test equipment having traceable, certifiable accuracy at minimum 50% greater than accuracy of system displaying or logging value.
 2. Check each field input/output device
 3. Provide dated, maintenance task lists, as described in Submittal article, as proof of execution of complete system verification.

- .4 Minor inspections to include, but not limited to:
 1. Perform visual, operational checks to BC's, peripheral equipment, interface equipment and other panels.
- .5 Major inspections to include, but not limited to:
 1. Minor inspection.
 2. Check signal, voltage and system isolation of BC(s), peripherals, interface, and other panels.
 3. Verify calibration/accuracy of each input and output device and recalibrate or replace as required.
 4. Run system software diagnostics as required.
 5. Install software and firmware enhancements to ensure components are operating at most current revision for maximum capability and reliability.
 - .1 Perform network analysis and provide report as described in Submittal article.
- .6 Rectify deficiencies revealed by maintenance inspections and environmental checks.
- .7 Continue system debugging and optimization.
- .8 Testing/verification of occupancy and seasonal-sensitive systems to take place during four consecutive seasons, after facility has been accepted, taken over and fully occupied.
 1. Test weather-sensitive systems twice: first at near winter design conditions and secondly under near summer design conditions.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. CSA Group
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 1. Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop drawings:
 1. Submit drawings stamped and signed by professional engineer registered or licensed in Saskatchewan, 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 co-ordinated 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. If changes are required, notify Consultant of these changes before they are made.
- .4 Certificates:
 1. Provide CSA certified equipment & material.
 2. Where CSA certified material & equipment is not available, submit such material & equipment to authority having jurisdiction for 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 Consultant.

- .5 Manufacturer's Field Reports: submit to Consultant 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.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.
 - 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.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with *Section 01 61 00 - Common Product Requirements*.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials indoors off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Store and protect equipment from nicks, scratches, and blemishes.
 - 3. Replace defective or damaged materials with new.
- .4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with *Section 01 74 19 - Waste Management and Disposal*.

2. Products

2.1 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 for control items in English & French.
- .4 Use one nameplate for each language.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide equipment and material in accordance with *Section 01 61 00 - Common Product Requirements*.
- .2 Material and equipment to be CSA certified. Where CSA certified equipment is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 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: Control conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings shall be the responsibility of the mechanical controls contractor.

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction.
- .2 Porcelain enamel signs and decals, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - 1. Nameplates: lamicoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core and mechanically attached with self tapping screws.

2. Sizes as follows:

NAMEPLATE SIZES

| | | | |
|--------|-------------|---------|--------------------|
| Size 1 | 10 x 50 mm | 1 line | 3 mm high letters |
| Size 2 | 12 x 70 mm | 1 line | 5 mm high letters |
| Size 3 | 12 x 70 mm | 2 lines | 3 mm high letters |
| Size 4 | 20 x 90 mm | 1 line | 8 mm high letters |
| Size 5 | 20 x 90 mm | 2 lines | 5 mm high letters |
| Size 6 | 25 x 100 mm | 1 line | 12 mm high letters |
| Size 7 | 25 x 100 mm | 2 lines | 6 mm high letters |

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates to be approved by Consultant prior to manufacture.
- .4 Allow for minimum of twenty-five 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 as directed by Consultant.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes & numbered, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

| Type | Prime | Auxiliary |
|-------------|--------|-----------|
| up to 250 V | Yellow | |
| up to 600 V | Yellow | Green |
| Fire Alarm | Red | |

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 CAN/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: plastic, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.6 FIELD QUALITY CONTROL

- .1 Load Balance:
 - 1. Measure phase current to panelboards with normal loads 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 - ACTION AND INFORMATIONAL 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 in accordance with *Section 01 45 00 - Quality Control*.
 - 1. Power distribution system including phasing, voltage, grounding, and load balancing.
 - 2. Circuits originating from branch distribution panels.
 - 3. Motors, heaters, and associated control equipment including sequenced operation of systems where applicable.

4. 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 Departmental 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 - ACTION AND INFORMATIONAL 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.

3.7 SYSTEM STARTUP

- .1 Instruct Departmental Representative 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 with aspects of its care and operation.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with *Section 01 74 00 - Cleaning*.
 1. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment.
- .3 Waste Management: separate waste materials for reuse & recycling in accordance with *Section 01 74 19 - Waste Management and Disposal*.
 1. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical, communications and safety and security components including removal of conduit, junction boxes, and panels to source (home run removal) and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

- .1 Section 00 10 00 - General Instructions
- .2 Section 01 74 19 - Waste Management and Disposal
- .3 Section 02 42 00 - Removal and Salvage of Construction Materials

1.3 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 - 1. CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003) - Code of Practice for Safety in Demolition of Structures

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling, and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide in accordance with *Section 00 10 00 – General Instructions* before starting work of this Section:
 1. Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with *Section 01 74 19 - Waste Management and Disposal*.
 2. Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Departmental Representative continued occupancy requirements during selective demolition

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
 1. Federal Workers' Compensation Service.
 2. Government of Canada, Labour Program: Workplace Safety.

1.8 SITE CONDITIONS

- .1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition on their observed condition at time of site examination before tendering.
- .2 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform following activities:
 1. Refer to *Section 00 10 00 - General Instructions* for directives associated with specific material types.
 2. Hazardous substances will be as defined in Hazardous Products Act.
 3. Stop work in area of suspected hazardous substances.
 4. Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 5. Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to Work.
 6. Proceed only after written instructions have been received from Departmental Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Departmental Representative's property.

- .2 Carefully remove materials and items designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with *Section 02 42 00 - Removal and Salvage of Construction Materials*.
 1. Leave main electrical distribution panel in place; panel can be used for temporary construction power for this and subsequent contracts in accordance with *Section 00 10 00 - General Instructions*; coordinate temporary power connections with Departmental Representative.

2. Products

2.1 MATERIALS

- .1 General Patching and Repair Materials: listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

3. Execution

3.1 EXAMINATION

- .1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 1. Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 2. Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 3. Prevent debris from blocking drainage inlets.
 4. Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:
 1. Prevent debris from endangering safe access to and egress from occupied buildings.

2. Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and Removal: Coordinate requirements of this Section and as follows:
 1. Maintain electrical service and main distribution panel as is, ready for subsequent Work.
 2. Remove existing luminaires, electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 3. Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 4. Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.
 5. Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
 6. Perform demolition work in a neat and workmanlike manner:
 - .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
 7. Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
 8. Remove existing conduits, boxes, cabling, and wiring associated with removed luminaires, electrical devices and equipment.
 9. Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
 10. Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with *Section 02 42 00 - Removal and Salvage of Construction Materials*.

END OF SECTION

1. General

1.1 PRODUCT DATA

- .1 Provide product data in accordance with *Section 01 33 00 - Submittal Procedures*.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Packaging Waste Management: remove for reuse and recycle of packaging materials, padding, crates, pallets in accordance with *Section 01 74 19 - Waste Management and Disposal*.

2. Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
.2 Copper or Aluminum conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, Jacketted.
.3 Aluminum or Copper conductors: size as indicated, with thermoplastic insulation type T90 Nylon rated at 600 V.

2.2 TECK 90 CABLE

- .1 Cable: in accordance with *Section 26 05 00 - Common Work Results for Electrical*.
.2 Conductors:
1. Grounding conductor: as indicated.
2. Circuit conductors: as indicated, size as indicated.
.3 Insulation:
1. Ethylene propylene rubber EP.
2. Cross-linked polyethylene XLPE.
3. Rating: 600 V.
.4 Inner jacket: polyvinyl chloride material.
.5 Armour: interlocking.
.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.
.7 Fastenings:
1. One hole steel 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.
3. Threaded rods: 6 mm diameter to support suspended channels.
.8 Connectors:
1. Watertight, explosion-proof approved for TECK cable.

2.3 ARMoured CABLES

- .1 Conductors: insulated, aluminum or 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.

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 Lay cable in cable trays as applicable.
- .2 Terminate cables in accordance with manufacturer's instructions.
- .3 Cable Colour Coding: to *Section 26 05 00 - Common Work Results for Electrical*.
- .4 Conductor length for parallel feeders to be identical.
- .5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .6 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.
- .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 exposed, securely supported by hangers and straps.

3.5 INSTALLATION OF ARMOURED CABLES

- .1 Group cables wherever possible on channels.

END OF SECTION

1. General

1.1 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with *Section 01 61 00 - Common Product Requirements* and manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Store and protect grounding equipment from nicks, scratches, and blemishes.
 - 3. Replace defective or damaged materials with new.

2. Products

2.1 EQUIPMENT

- .1 Grounding conductors: bare stranded copper, soft annealed, size as indicated.
- .2 Insulated grounding conductors: green, copper conductors, size as indicated.

3. Execution

3.1 INSTALLATION GENERAL

- .1 Install connectors in accordance with manufacturer's instructions.
- .2 Protect exposed grounding conductors from mechanical injury.
- .3 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .4 Soldered joints not permitted.
- .5 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

3.2 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, elevators and escalators, distribution panels, outdoor lighting, cable trays.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with *Section 26 05 00 - Common Work Results for Electrical*.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Consultant and local authority having jurisdiction over installation.

- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with *Section 01 74 00 - Cleaning*.
 - 1. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish, and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with *Section 01 61 00 - Common Product Requirements* and manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - 1. Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - 2. Store and protect hangers and supports from nicks, scratches, and blemishes.
 - 3. Replace defective or damaged materials with new.

2. Products

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

3. Execution

3.1 INSTALLATION

- .1 Secure equipment to solid masonry, tile, and plaster surfaces with nylon shields.
- .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 steel 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 diameter threaded rods and spring clips.
 - 2. Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .8 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.
- .12 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with *Section 01 74 00 - Cleaning*.
 - 1. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment.

END OF SECTION

1. General

1.1 REFERENCE STANDARDS

- .1 All Code and Standard references refer to current updates, revisions, and adjustments in effect as of date of contract.
- .2 Withdrawn or obsolete Standards may still apply unless it has been replaced with a different Standard, in which case the new Standard shall apply. Report any withdrawn Standards to the Departmental Representative for instruction.
- .3 Perform work in accordance with the following Standards, except where specified otherwise.
 1. CSA Group (CSA)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, Latest Edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 1. Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Provide shop drawings: in accordance with *Section 01 33 00 - Submittal Procedures*.
 1. Submit drawings stamped and signed by professional engineer registered or licensed in Saskatchewan, Canada.

1.3 DELIVERY, STORAGE AND HANDLING

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

2. Products

2.1 SPLITTERS

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 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 turned edge covers.

3. Execution

3.1 SPLITTER INSTALLATION

- .1 Mount plumb, true and square to building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.3 IDENTIFICATION

- .1 Equipment Identification: to *Section 26 05 00 - Common Work Results for Electrical.*
- .2 Identification Labels: size 2 indicating voltage and phase or as indicated.

END OF SECTION

1. General

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 00 - Common Work Results for Electrical.

2. Products

2.1 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, hot dipped galvanized steel threaded.
- .2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .3 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .4 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

- .1 One hole steel 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.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 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.

2.4 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.

2.5 FISH CORD

- .1 Polypropylene.

3. Execution

3.1 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 and in unfinished areas.
- .3 Use rigid hot dipped galvanized steel threaded conduit in areas susceptible to mechanical injury.
- .4 Use electrical metallic tubing (EMT) except in cast concrete.
- .5 Use rigid pvc conduit underground & in corrosive areas.
- .6 Use flexible metal conduit for connection to motors in dry areas.
- .7 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.
- .8 Use explosion proof flexible connection for connection to explosion proof motors.
- .9 Install conduit sealing fittings in hazardous areas.
 1. Fill with compound.
- .10 Bend conduit cold:
 1. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .11 Mechanically bend steel conduit over 19 mm diameter.
- .12 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .13 Install fish cord in empty conduits.
- .14 Run 2-25 mm spare conduits up to ceiling space and 2-25 mm spare conduits down to ceiling space from each flush panel.
 1. Terminate these conduits in 152 x 152 x 102 mm junction boxes in ceiling space or in case of an exposed concrete slab, terminate each conduit in surface type box.
- .15 Remove and replace blocked conduit sections.
 1. Do not use liquids to clean out conduits.
- .16 Dry conduits out before installing wire.

3.2 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 surface or suspended 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.

3.3 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.

3.4 CONDUITS IN CAST-IN-PLACE CONCRETE

- .1 Locate to suit reinforcing steel.
 - 1. Install in centre one third of slab.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Provide oversized sleeve for conduits passing through waterproof membrane before membrane is installed.
 - 1. Use cold mastic between sleeve and conduit.
- .5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .6 Encase conduits completely in concrete with minimum 25 mm concrete cover.
- .7 Organize conduits in slab to minimize cross-overs.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Submit manufacturer's instructions, printed product literature and data sheets for circuit breakers and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Include time-current characteristic curves for breakers with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

2. Products

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers, Circuit breakers, and ground-fault circuit-interrupters: to CSA C22.2 No. 5
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation.
- .3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation.
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - 1. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .6 Circuit breakers with interchangeable trips as indicated.
- .7 Circuit breakers to have minimum symmetrical rms interrupting capacity rating to match the system they are installed in.

2.2 THERMAL MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

3. Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish, and limitations.

2. Products

2.1 DISCONNECT SWITCHES

- .1 Non-fusible, Fusible, Horsepower rated disconnect switch in CSA enclosure, to CAN/CSA-C22.2 No.4 size as indicated.
- .2 Provision for padlocking in off switch position by 3 locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated.
- .5 Fuseholders: relocatable and to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.
- .6 Quick-make, quick-break action.
- .7 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 for Electrical*.
- .2 Indicate name of load controlled on size 4 nameplate.

3. Execution

3.1 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable.

END OF SECTION

1. General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with *Section 01 33 00 - Submittal Procedures*.
- .2 Product Data:
 - 1. Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.
- .3 Shop Drawings:
 - 1. Provide shop drawings: in accordance with *Section 01 33 00 - Submittal Procedures*.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Saskatchewan, 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.

1.2 CLOSEOUT SUBMITTALS

- .1 Provide maintenance materials in accordance with *Section 01 78 00 - Closeout Submittals*.
- .2 Submit operation and maintenance data for each type and style of motor starter for incorporation into maintenance manual.

2. Products

2.1 MANUAL MOTOR STARTERS

- .1 Single and 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 or Three overload heaters, manual reset, trip indicating handle.
- .2 Accessories:
 - 1. Toggle switch: standard labelled as indicated.
 - 2. Indicating light: standard type and colour as indicated.
 - 3. Locking tab to permit padlocking in "ON" or "OFF" position.

2.2 FULL VOLTAGE MAGNETIC STARTERS

- .1 Combination magnetic starters of size, type, rating, and enclosure type as indicated with components as follows:
 - 1. Contactor solenoid operated, rapid action type.

2. Motor overload protective device in each phase, manually reset from outside enclosure.
 3. Wiring and schematic diagram inside starter enclosure in visible location.
 4. Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Combination type starters to include circuit breaker with operating lever on outside of enclosure to control circuit breaker, and provision for:
1. Locking in "OFF" position with up to 3 padlocks.
 2. Independent locking of enclosure door.
 3. Provision for preventing switching to "ON" position while enclosure door open.
- .3 Accessories:
1. Selector switches and Pushbuttons: standard labelled as indicated.
 2. Indicating lights: standard type and Colour as indicated.
 3. 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.

2.3 CONTROL TRANSFORMER

- .1 Single phase, dry type, control transformer with primary voltage as indicated and 120 V secondary, complete with secondary fuse, installed in with starter as indicated.
- .2 Size control transformer for control circuit load plus 20% spare capacity.

2.4 ACCESSORIES

- .1 Pushbutton: heavy duty, oil tight as required.
- .2 Selector switches: heavy duty, oil tight as required.
- .3 Indicating lights: heavy duty, oil tight, type and colour as indicated.

2.5 FINISHES

- .1 Apply finishes to enclosure in accordance with *Section 26 05 00 - Common Work Results for Electrical*.

2.6 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, engraved as indicated.

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.

END OF SECTION



TP1 Amount Payable – General

1.1 Subject to any other provisions of the contract, Her Majesty shall pay the Contractor, at the times and in the manner hereinafter set out, the amount by which

1.1.1 the aggregate of the amounts described in TP2 exceeds

1.1.2 the aggregate of the amounts described in TP3

and the Contractor shall accept that amount as payment in full satisfaction for everything furnished and done by him in respect of the work to which the payment relates.

TP2 Amounts Payable to the Contractor

2.1 The amounts referred to in TP1.1.1 are the aggregate of

2.1.1 the amounts referred to in the Articles of Agreement, and

2.1.2 the amounts, if any, that are payable to the Contractor pursuant to the General Conditions.

TP3 Amounts Payable to Her Majesty

3.1 The amounts referred to in TP1.1.2 are the aggregate of the amounts, in any, that the Contractor is liable to pay Her Majesty pursuant to the contract.

3.2 When making any payments to the Contractor, the failure of Her Majesty to deduct an amount referred to in TP3.1 from an amount referred to in TP2 shall not constitute a waiver of the right to do so, or an admission of lack of entitlement to do so in any subsequent payment to the Contractor.

TP4 Time of Payment

4.1 In these Terms of Payment

4.1.1 The “payment period” means a period of 30 consecutive days or such other longer period as is agreed between the Contractor and the Departmental Representative.

4.1.2 An amount is “due and payable” when it is due and payable by Her Majesty to the Contractor according to TP4.4, TP4.7 or TP4.10.

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

4.1.4 The “date of payment” means the date of the negotiable instrument of an amount due and payable by the Receiver General for Canada and given for payment.

4.1.5 The “Bank Rate” means the discount rate of interest set by the Bank of Canada in effect at the opening of business on the date of payment.



- 4.2 The Contractor shall, on the expiration of a payment period, deliver to the Departmental Representative in respect of that payment period a written progress claim that fully describes any part of the work that has been completed, and any material that was delivered to the work site but not incorporated into the work during that payment period.
- 4.3 The Departmental Representative shall, not later than ten days after receipt by him of a progress claim referred to in TP4.2,
- 4.3.1 inspect the part of the work and the material described in the progress claim; and
- 4.3.2 issue a progress report, a copy of which the Departmental Representative will give to the Contractor, that indicates the value of the part of the work and the material described in the progress claim that, in the opinion of the Departmental Representative,
- 4.3.2.1 is in accordance with the contract, and
- 4.3.2.2 was not included in any other progress report relating to the contract.
- 4.4 Subject to TP1 and TP4.5 Her Majesty shall, not later than 30 days after receipt by the Departmental Representative of a progress claim referred to in TP4.2, pay the Contractor
- 4.4.1 an amount that is equal to 95% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has been furnished by the Contractor, or
- 4.4.2 an amount that is equal to 90% of the value that is indicated in the progress report referred to in TP4.3.2 if a labour and material payment bond has not been furnished by the Contractor.
- 4.5 It is a condition precedent to Her Majesty's obligation under TP4.4 that the Contractor has made and delivered to the Departmental Representative,
- 4.5.1 a statutory declaration described in TP4.6 in respect of a progress claim referred to in TP4.2,
- 4.5.2 in the case of the Contractor's first progress claim, a construction schedule in accordance with the relevant sections of the Specifications, and
- 4.5.3 if the requirement for a schedule is specified, an update of the said schedule at the times identified in the relevant sections of the Specifications.
- 4.6 A statutory declaration referred to in TP4.5 shall contain a deposition by the Contractor that
- 4.6.1 up to the date of the Contractor's progress claim, the Contractor has complied with all his lawful obligations with respect to the Labour Conditions; and
- 4.6.2 up to the date of the Contractor's immediately preceding progress claim, all lawful obligations of the Contractor to subcontractors and suppliers of material in respect of the



work under the contract have been fully discharged.

- 4.7 Subject to TP1 and TP4.8, Her Majesty shall, not later than 30 days after the date of issue of an Interim Certificate of Completion referred to in GC44.2, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.7.1 the sum of all payments that were made pursuant to TP4.4;
 - 4.7.2 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty or rectifying defects described in the Interim Certificate of Completion; and
 - 4.7.3 an amount that is equal to the Departmental Representative's estimate of the cost to Her Majesty of completing the parts of the work described in the Interim Certificate of Completion other than the defects referred to in TP4.7.2.
- 4.8 It is a condition precedent to Her Majesty's obligation under TP4.7 that the Contractor has made and delivered to the Departmental Representative,
- 4.8.1 a statutory declaration described in TP4.9 in respect of an Interim Certificate of Completion referred to in GC44.2, and
 - 4.8.2 if so specified in the relevant sections of the Specifications, and update of the construction schedule referred to in TP4.5.2 and the updated schedule shall, in addition to the specified requirements, clearly show a detailed timetable that is acceptable to the Departmental Representative for the completion of any unfinished work and the correction of all defects.
- 4.9 A statutory declaration referred to in TP4.8 shall contain a deposition by the contractor that up to the date of the Interim Certificate of Completion the Contractor has
- 4.9.1 complied with all of the Contractor's lawful obligations with respect to the Labour Conditions;
 - 4.9.2 discharged all of the Contractor's lawful obligations to the subcontractors and suppliers of material in respect of the work under the contract; and
 - 4.9.3 discharged the Contractor's lawful obligations referred to in GC14.6.
- 4.10 Subject to TP1 and TP4.11, Her Majesty shall, not later than 60 days after the date of issue of a Final Certificate of Completion referred to in GC44.1, pay the Contractor the amount referred to in TP1 less the aggregate of
- 4.10.1 the sum of all payments that were made pursuant to TP4.4; and
 - 4.10.2 the sum of all payments that were made pursuant to TP4.7.
- 4.11 It is a condition precedent to Her Majesty's obligation under TP4.10 that the Contractor has made and delivered a statutory declaration described in TP4.12 to the Departmental Representative.



- 4.12 A statutory declaration referred to in TP4.11 shall, in addition to the depositions described in TP4.9, contain a deposition by the Contractor that all of the Contractor's lawful obligations and any lawful claims against the Contractor that arose out of the performance of the contract have been discharged and satisfied.

TP5 Progress Report and Payment Thereunder Not Binding on Her Majesty

- 5.1 Neither a progress report referred to in TP4.3 nor any payment made by Her Majesty pursuant to these Terms of Payment shall be construed as an admission by Her Majesty that the work, material or any part thereof is complete, is satisfactory or is in accordance with the contract.

TP6 Delay in Making Payment

- 6.1 Notwithstanding GC7 any delay by Her Majesty in making any payment when it is due pursuant to these Terms of Payment shall not be a breach of the contract by Her Majesty.

- 6.2 Her Majesty shall pay, without demand from the Contractor, simple interest at the Bank Rate plus 1 -1/4 per centum on any amount which is overdue pursuant to TP4.1.3, and the interest shall apply from and include the day such amount became overdue until the day prior to the date of payment except that

- 6.2.1 interest shall not be payable or paid unless the amount referred to in TP6.2 has been overdue for more than 15 days following

6.2.1.1 the date the said amount became due and payable, or

6.2.1.2 the receipt by the Departmental Representative of the Statutory Declaration referred to in TP4.5, TP4.8 or TP4.11,

whichever is the later, and

- 6.6.2 interest shall not be payable or paid on overdue advance payments if any.

TP7 Right of Set-off

- 7.1 Without limiting any right of set-off or deduction given or implied by law or elsewhere in the contract, Her Majesty may set off any amount payable to Her Majesty by the Contractor under this contract or under any current contract against any amount payable to the Contractor under this contract.

- 7.2 For the purposes of TP7.1, "current contract" means a contract between Her Majesty and the Contractor

7.2.1 under which the Contractor has an undischarged obligation to perform or supply work, labour or material, or

7.2.2 in respect of which Her Majesty has, since the date of which the Articles of Agreement were made, exercised any right to take the work that is the subject of the contract out of the Contractor's hands.



TP8 Payment in Event of Termination

- 8.1 If the contract is terminated pursuant to GC41, Her Majesty shall pay the Contractor any amount that is lawfully due and payable to the Contractor as soon as is practicable under the circumstances.

TP9 Interest on Settled Claims

- 9.1 Her Majesty shall pay to the Contractor simple interest on the amount of a settled claim at an average Bank Rate plus 1 ¼ per centum from the date the settled claim was outstanding until the day prior to the date of payment.
- 9.2 For the purposes of TP9.1,
- 9.2.1 a claim is deemed to have been settled when an agreement in writing is signed by the Departmental Representative and the Contractor setting out the amount of the claim to be paid by Her Majesty and the items or work for which the said amount is to be paid.
- 9.2.2 an "average Bank Rate" means the discount rate of interest set by the Bank of Canada in effect at the end of each calendar month averaged over the period the settled claim was outstanding.
- 9.2.3 a settled claim is deemed to be outstanding from the day immediately following the date the said claim would have been due and payable under the contract had it not been disputed.
- 9.3 For the purposes of TP9 a claim means a disputed amount subject to negotiation between Her Majesty and the Contractor under the contract.



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GC1 Interpretation

1.1 In the contract

- 1.1.1 where reference is made to a part of the contract by means of numbers preceded by letters, the reference shall be construed to be a reference to the particular part of the contract that is identified by that combination of letters and numbers and to any other part of the contract referred to therein;
- 1.1.2 “contract” means the contract document referred to in the Articles of Agreement;
- 1.1.3 “contract security” means any security given by the Contractor to Her Majesty in accordance with the contract;
- 1.1.4 “Departmental Representative” means the officer or employee of Her Majesty who is designated pursuant to the Articles of Agreement and includes a person specially authorized by him to perform, on his behalf, any of his functions under the contract and is so designated in writing to the Contractor;
- 1.1.5 “material” includes all commodities, articles and things required to be furnished by or for the Contractor under the contract for incorporation into the work;
- 1.1.6 “Minister” includes a person acting for, or if the office is vacant, in place of the Minister and his successors in the office, and his or their lawful deputy and any of his or their representatives appointed for the purposes of the contract;
- 1.1.7 “person” includes, unless the context otherwise requires, a partnership, proprietorship, firm, joint venture, consortium and a corporation;
- 1.1.8 “plant” includes all animals, tools, implements, machinery, vehicles, buildings, structures, equipment and commodities, articles and things other than material, that are necessary for the due performance of the contract;
- 1.1.9 “subcontractor” means a person to whom the Contractor has, subject to GC4, subcontracted the whole or any part of the work;
- 1.1.10 “superintendent” means the employee of the Contractor who is designated by the Contractor to act pursuant to GC19;
- 1.1.11 “work includes, subject only to any express stipulation in the contract to the contrary, everything that is necessary to be done, furnished or delivered by the Contractor to perform the contract.

1.2 The headings in the contract documents, other than in the Plans and Specifications, form no part of the contract but are inserted for convenience of reference only.

1.3 In interpreting the contract, in the event of discrepancies or conflicts between anything in the Plans and Specifications and the General Conditions, the General Conditions govern.



- 1.4 In interpreting the Plans and Specifications, in the event of discrepancies or conflicts between
- 1.4.1 the Plans and Specifications, the Specifications govern;
 - 1.4.2 the Plans, the Plans drawn with the largest scale govern; and
 - 1.4.3 figured dimensions and scaled dimensions, the figured dimensions govern.

GC2 Successors and Assigns

- 2.1 The contract shall inure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and assigns.

GC3 Assignment of Contract

- 3.1 The contract may not be assigned by the Contractor, either in whole or in part, without the written consent of the Minister.

GC4 Subcontracting by Contractor

- 4.1 Subject to this General Condition, the Contractor may subcontract any part of the work.
- 4.2 The Contractor shall notify the Departmental Representative in writing of his intention to subcontract.
- 4.3 A notification referred to in GC4.2 shall identify the part of the work, and the subcontractor with whom it is intended to subcontract.
- 4.4 The Departmental Representative may object to the intended subcontracting by notifying the Contractor in writing within six days of receipt by the Departmental Representative of a notification referred to in GC4.2.
- 4.5 If the Departmental Representative objects to a subcontracting pursuant to GC4.4, the Contractor shall not enter into the intended subcontract.
- 4.6 The contractor shall not, without the written consent of the Departmental Representative, change a subcontractor who has been engaged by him in accordance with this General Condition.
- 4.7 Every subcontract entered into by the Contractor shall adopt all of the terms and conditions of this contract that are of general application.
- 4.8 Neither a subcontracting nor the Departmental Representative's consent to a subcontracting by the Contractor shall be construed to relieve the Contractor from any obligation under the contract or to impose any liability upon Her Majesty.

GC5 Amendments



- 5.1 No amendment or change in any of the provisions of the contract shall have any force or effect until it is reduced to writing.

GC6 No Implied Obligations

- 6.1 No implied terms or obligations of any kind by or on behalf of Her Majesty shall arise from anything in the contract and the express covenants and agreements therein contained and made by Her Majesty are the only covenants and agreements upon which any rights against Her Majesty are to be founded.
- 6.2 The contract supersedes all communications, negotiations and agreements, either written or oral, relating to the work that were made prior to the date of the contract.

GC7 Time of Essence

- 7.1 Time is of the essence of the contract.

GC8 Indemnification by Contractor

- 8.1 The Contractor shall indemnify and save Her Majesty harmless from and against all claims, demand, losses, costs, damages, actions, suits, or proceedings by whomever made, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by or attributable to the activities of the Contractor, his servants, agents, subcontractors and sub-subcontractors in performing the work including an infringement or an alleged infringement of a patent of invention or any other kind of intellectual property.
- 8.2 For the purpose of GC8.1, "activities" includes any act improperly carried out, any omission to carry out an act and any delay in carrying out an act.

GC9 Indemnification by Her Majesty

- 9.1 Her Majesty shall, subject to the Crown Liability Act, the Patent Act, and any other law that affects Her Majesty's rights, powers, privileges or obligations, indemnify and save the Contractor harmless from and against all claims, demands, losses, costs, damage, actions, suits or proceedings arising out of his activities under the contract that are directly attributable to
- 9.1.1 lack of or a defect in Her Majesty's title to the work site whether real or alleged; or
- 9.1.2 an infringement or an alleged infringement by the Contractor of any patent of invention or any other kind of intellectual property occurring while the Contractor was performing any act for the purposes of the contract employing a model, plan or design or any other thing related to the work that was supplied by Her Majesty to the Contractor.

GC10 Members of House of Commons Not to Benefit



- 10.1 As required by the Parliament of Canada Act, it is an express condition of the contract that no member of the House of Commons shall be admitted to any share of part of the contract or to any benefit arising therefrom.

GC11 Notices

- 11.1 Any notice, consent, order, decision, direction or other communication, other than a notice referred to in GC11.4, that may be given to the Contractor pursuant to the contract may be given in any manner.
- 11.2 Any notice, consent, order, decision, direction or other communication required to be given in writing, to any party pursuant to the contract shall, subject to GC11.4, be deemed to have been effectively given
- 11.2.1 to the Contractor, if delivered personally to the Contractor or the Contractor's superintendent, or forwarded by mail, telex or facsimile to the Contractor at the address set out in A4.1, or
- 11.2.2 to Her Majesty, if delivered personally to the Departmental Representative, or forwarded by mail, telex or facsimile to the Departmental Representative at the address set out in A1.2.1.
- 11.3 Any such notice, consent, order, decision, direction or other communication given in accordance with GC11.2 shall be deemed to have been received by either party
- 11.3.1 if delivered personally, on the day that it was delivered,
- 11.3.2 if forwarded by mail, on the earlier of the day it was received and the sixth day after it was mailed, and
- 11.3.3 if forwarded by telex or facsimile, 24 hours after it was transmitted.
- 11.4 A notice given under GC38.1.1, GC40 and GC41, if delivered personally, shall be delivered to the Contractor if the Contractor is doing business as sole proprietor or, if the Contractor is a partnership or corporation, to an officer thereof.

GC12 Material, Plant and Real Property Supplied by Her Majesty

- 12.1 Subject to GC12.2, the Contractor is liable to Her Majesty for any loss of or damage to material, plant or real property that is supplied or placed in the care, custody and control of the Contractor by Her Majesty for use in connection with the contract, whether or not that loss or damage is attributable to causes beyond the Contractor's control.
- 12.2 The Contractor is not liable to Her Majesty for any loss or damage to material, plant or real property referred to in GC12.1 if that loss or damage results from and is directly attributable to reasonable wear and tear.
- 12.3 The Contractor shall not use any material, plant or real property referred to in GC12.1 except for



the purpose of performing this contract.

- 12.4 When the Contractor fails to make good any loss or damage for which he is liable under GC12.1 within a reasonable time after being required to do so by the Departmental Representative, the Departmental Representative may cause the loss or damage to be made good at the Contractor's expense, and the Contractor shall thereupon be liable to Her Majesty for the cost thereof and shall, on demand, pay to Her Majesty an amount equal to that cost.
- 12.5 The Contractor shall keep such records of all material, plant and real property referred to in GC12.1 as the Departmental Representative from time to time requires and shall satisfy the Departmental Representative, when requested, that such material, plant and real property are at the place and in the condition which they ought to be.

GC13 Material, Plant and Real Property Become Property of Her Majesty

- 13.1 Subject to GC14.7 all material and plant and the interest of the Contractor in all real property, licenses, powers and privileges purchased, used or consumed by the Contractor for the contract shall, after the time of their purchase, use or consumption be the property of Her Majesty for the purposes of the work and they shall continue to be the property of Her Majesty.
- 13.1.1 in the case of material, until the Departmental Representative indicates that he is satisfied that it will not be required for the work, and
- 13.1.2 in the case of plant, real property, licenses, powers and privileges, until the Departmental Representative indicates that he is satisfied that the interest vested in Her Majesty therein is no longer required for the purposes of the work.
- 13.2 Material or plant that is the property of Her Majesty by virtue of GC13.1 shall not be taken away from the work site or used or disposed of except for the purposes of the work without the written consent of the Departmental Representative.
- 13.3 Her Majesty is not liable for loss of or damage from any cause to the material or plant referred to in GC13.1 and the Contractor is liable for such loss or damage notwithstanding that the material or plant is the property of Her Majesty.

GC14 Permits and Taxes Payable

- 14.1 The Contractor shall, within 30 days after the date of the contract, tender to a municipal authority an amount equal to all fees and charges that would be lawfully payable to that municipal authority in respect of building permits as if the work were being performed for a person other than Her Majesty.
- 14.2 Within 10 days of making a tender pursuant to GC14.1, the Contractor shall notify the Departmental Representative of his action and of the amount tendered and whether or not the municipal authority has accepted that amount.
- 14.3 If the municipal authority does not accept the amount tendered pursuant to GC14.1 the Contractor shall pay that amount to Her Majesty within 6 days after the time stipulated in GC14.2.



- 14.4 For the purposes of GC14.1 to GC14.3 “municipal authority” means any authority that would have jurisdiction respecting permission to perform the work if the owner were not Her Majesty.
- 14.5 Notwithstanding the residency of the Contractor, the Contractor shall pay any applicable tax arising from or related to the performance of the work under the contract.
- 14.6 In accordance with the Statutory Declaration referred to in TP4.9, a Contractor who has neither residence nor place of business in the province in which work under the contract is being performed shall provide Her Majesty with proof of registration with the provincial sales tax authorities in the said province.
- 14.7 For the purpose of the payment of any applicable tax or the furnishing of security for the payment of any applicable tax arising from or related to the performance of the work under the contract, the Contractor shall, notwithstanding the fact that all material, plant and interest of the Contractor in all real property, licenses, powers and privileges, have become the property of Her Majesty after the time of purchase, be liable, as a user or consumer, for the payment or for the furnishing of security for the payment of any applicable tax payable, at the time of the use or consumption of that material, plant or interest of the Contractor in accordance with the relevant legislation.

GC15 Performance of Work under Direction of Departmental Representative

- 15.1 The Contractor shall
- 15.1.1 permit the Departmental Representative to have access to the work and its site at all times during the performance of the contract;
 - 15.1.2 furnish the Departmental Representative with such information respecting the performance of the contract as he may require; and
 - 15.1.3 give the Departmental Representative every possible assistance to enable the Departmental Representative to carry out his duty to see that the work is performed in accordance with the contract and to carry out any other duties and exercise any powers specially imposed or conferred on the Departmental Representative under the contract.

CG16 Cooperation with Other Contractors

- 16.1 Where, in the opinion of the Departmental Representative, it is necessary that other contractors or workers with or without plant and material, be sent onto the work or its site, the Contractor shall, to the satisfaction of the Departmental Representative, allow them access and cooperate with them in the carrying out of their duties and obligation.
- 16.2 If
- 16.2.1 the sending onto the work or its site of other contractors or workers pursuant to GC16.1 could not have been reasonably foreseen or anticipated by the Contractor when entering into the contract, and



16.2.2 the Contractor incurs, in the opinion of the Departmental Representative, extra expense in complying with GC16.1, and

16.2.3 The Contractor has given the Departmental Representative written notice of his claim for the extra expense referred to in GC16.2.2 within 30 days of the date that the other contractors or workers were sent onto the work or its site,

Her Majesty shall pay the Contractor the cost, calculated in accordance with GC48 to GC50, of the extra labour, plant and material that was necessarily incurred.

GC17 Examination of Work

17.1 If, at any time after the commencement of the work but prior to the expiry of the warranty or guarantee period, the Departmental Representative has reason to believe that the work or any part thereof has not been performed in accordance with the contract, the Departmental Representative may have that work examined by an expert of his choice.

17.2 If, as a result of an examination of the work referred to in GC17.1, it is established that the work was not performed in accordance with the contract, then, in addition to and without limiting or otherwise affecting any of Her Majesty's rights and remedies under the contract either at law or in equity, the Contractor shall pay Her Majesty, on demand, all reasonable costs and expenses that were incurred by Her Majesty in having that examination performed.

GC18 Clearing of Site

18.1 The Contractor shall maintain the work and its site in a tidy condition and free from the accumulation of waste material and debris, in accordance with any directions of the Departmental Representative.

18.2 Before the issue of an interim certificate referred to in GC44.2, the Contractor shall remove all the plant and material not required for the performance of the remaining work, and all waste material and other debris, and shall cause the work and its site to be clean and suitable for occupancy by Her Majesty's servants, unless otherwise stipulated in the contract.

18.3 Before the issue of a final certificate referred to in GC44.1, the Contractor, shall remove from the work and its site all of the surplus plant and material and any waste material and other debris.

18.4 The Contractor's obligations described in GC18.1 to GC18.3 do not extend to waste material and other debris caused by Her Majesty's servants or contractors and workers referred to in GC16.1.

GC19 Contractor's Superintendent

19.1 The Contractor shall, forthwith upon the award of the contract, designate a superintendent.

19.2 The Contractor shall forthwith notify the Departmental Representative of the name, address and telephone number of a superintendent designate pursuant to GC19.1.



- 19.3 A superintendent designated pursuant to GC19.1 shall be in full charge of the operations of the Contractor in the performance of the work and is authorized to accept any notice, consent, order, direction, decision or other communication on behalf of the Contractor that may be given to the superintendent under the contract.
- 19.4 The Contractor shall, until the work has been completed, keep a competent superintendent at the work site during working hours.
- 19.5 The Contractor shall, upon the request of the Departmental Representative, remove any superintendent who, in the opinion of the Departmental Representative, is incompetent or has been conducting himself improperly and shall forthwith designate another superintendent who is acceptable to the Departmental Representative.
- 19.6 Subject to GC19.5, the Contractor shall not substitute a superintendent without the written consent of the Departmental Representative.
- 19.7 A breach by the Contractor of GC19.6 entitles the Departmental Representative to refuse to issue any certificate referred to in GC44 until the superintendent has returned to the work site or another superintendent who is acceptable to the Departmental Representative has been substituted.

GC20 National Security

- 20.1 If the Minister is of the opinion that the work is of a class or kind that involves the national security, he may order the Contractor
- 20.1.1 to provide him with any information concerning persons employed or to be employed by him for purposes of the contract; and
 - 20.1.2 to remove any person from the work and its site if, in the opinion of the Minister, that person may be a risk to the national security.
- 20.2 The Contractor shall, in all contracts with persons who are to be employed in the performance of the contract, make provision for his performance of any obligation that may be imposed upon him under GC19 to GC21.
- 20.3 The Contractor shall comply with an order of the Minister under GC20.1

GC21 Unsuitable Workers

- 21.1 The Contractor shall, upon the request of the Departmental Representative, remove any person employed by him for purposes of the contract who, in the opinion of the Departmental Representative, is incompetent or has conducted himself improperly, and the Contractor shall not permit a person who has been removed to return to the work site.

GC22 Increased or Decreased Costs



- 22.1 The amount set out in the Articles of Agreement shall not be increased or decreased by reason of any increase or decrease in the cost of the work that is brought about by an increase or decrease in the cost of labour, plant or material or any wage adjustment arising pursuant to the Labour Conditions.
- 22.2 Notwithstanding GC22.1 and GC35, an amount set out in the Articles of Agreement shall be adjusted in the manner provided in GC22.3, if any change in a tax imposed under the Excise Act, the Excise Tax Act, the Old Age Security Act, the Customs Act, the Customs Tariff or any provincial sales tax legislation imposing a retail sales tax on the purchase of tangible personal property incorporated into Real Property
- 22.2.1 occurs after the date of the submission by the Contractor of his tender for the contract,
- 22.2.2 applies to material, and
- 22.2.3 affects the cost to the Contractor of that material.
- 22.3 If a change referred to in GC22.2 occurs, the appropriate amount set out in the Articles of Agreement shall be increased or decreased by an amount equal to the amount that is established by an examination of the relevant records of the Contractor referred to in GC51 to be the increase or decrease in the cost incurred that is directly attributable to that change.
- 22.4 For the purpose of GC22.2, where a tax is changed after the date of submission of the tender but public notice of the change has been given by the Minister of Finance before that date, the change shall be deemed to have occurred before the date of submission of the tender.

GC23 Canadian Labour and Material

- 23.1 The Contractor shall use Canadian labour and material in the performance of the work to the full extent to which they are procurable, consistent with proper economy and expeditious carrying out of the work.
- 23.2 Subject to GC23.1, the Contractor shall, in the performance of the work, employ labour from the locality where the work is being performed to the extent to which it is available, and shall use the offices of the Canada Employment Centres for the recruitment of workers wherever practicable.
- 23.3 Subject to GC23.1 and GC23.2, the Contractor shall, in the performance of the work, employ a reasonable proportion of persons who have been on active service with the armed forces of Canada and have been honourably discharged therefrom.

GC24 Protection of Work and Documents

- 24.1 The Contractor shall guard or otherwise protect the work and its site, and protect the contract, specifications, plans, drawings, information, material, plant and real property, whether or not they are supplied by Her Majesty to the Contractor, against loss or damage from any cause, and he shall not use, issue, disclose or dispose of them without the written consent of the Minister, except as may be essential for the performance of the work.



- 24.2 If any document or information given or disclosed to the Contractor is assigned a security rating by the person who gave or disclosed it, the Contractor shall take all measures directed by the Departmental Representative to be taken to ensure the maintenance of the degree of security that is ascribed to that rating.
- 24.3 The Contractor shall provide all facilities necessary for the purpose of maintaining security, and shall assist any person authorized by the Minister to inspect or to take security measures in respect of the work and its site.
- 24.4 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure compliance with or to remedy a breach of GC24.1 to GC24.3.

GC25 Public Ceremonies and Signs

- 25.1 The Contractor shall not permit any public ceremony in connection with the work without the prior consent of the Minister.
- 25.2 The Contractor shall not erect or permit the erection of any sign or advertising on the work or its site without the prior consent of the Departmental Representative.

GC26 Precautions against Damage, Infringement of Rights, Fire, and Other Hazards

- 26.1 The Contractor shall, at his own expense, do whatever is necessary to ensure that
- 26.1.1 no person, property, right, easement or privilege is injured, damaged or infringed by reasons of the Contractor's activities in performing the contract;
 - 26.1.2 pedestrian and other traffic on any public or private road or waterway is not unduly impeded, interrupted or endangered by the performance or existence of the work or plant;
 - 26.1.3 fire hazards in or about the work or its site are eliminated and, subject to any direction that may be given by the Departmental Representative, any fire is promptly extinguished;
 - 26.1.4 the health and safety of all persons employed in the performance of the work is not endangered by the method or means of its performance;
 - 26.1.5 adequate medical services are available to all persons employed on the work or its site at all times during the performance of the work;
 - 26.1.6 adequate sanitation measures are taken in respect of the work and its site; and
 - 26.1.7 all stakes, buoys and marks placed on the work or its site by or under the authority of the Departmental Representative are protected and are not removed, defaced, altered or destroyed.
- 26.2 The Departmental Representative may direct the Contractor to do such things and to perform such additional work as the Departmental Representative considers reasonable and necessary to ensure



compliance with or to remedy a breach of GC26.1.

- 26.3 The Contractor shall, at his own expense, comply with a direction of the Departmental Representative made under GC26.2.

GC27 Insurance

- 27.1 The Contractor shall, at his own expense, obtain and maintain insurance contracts in respect of the work and shall provide evidence thereof to the Departmental Representative in accordance with the requirements of the Insurance Conditions "E".

- 27.2 The insurance contracts referred to in GC27.1 shall

27.2.1 be in a form, of the nature, in the amounts, for the periods and containing the terms and conditions specified in Insurance Conditions "E", and

27.2.2 provide for the payment of claims under such insurance contracts in accordance with GC28.

GC28 Insurance Proceeds

- 28.1 In the case of a claim payable under a Builders Risk/Installation (All Risks) insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid directly to Her Majesty, and

28.1.1 the monies so paid shall be held by Her Majesty for the purposes of the contract, or

28.1.2 if Her Majesty elects, shall be retained by Her Majesty, in which event they vest in Her Majesty absolutely.

- 28.2 In the case of a claim payable under a General Liability insurance contract maintained by the Contractor pursuant to GC27, the proceeds of the claim shall be paid by the insurer directly to the claimant.

- 28.3 If an election is made pursuant to GC28.1, the Minister may cause an audit to be made of the accounts of the Contractor and of Her Majesty in respect of the part of the work that was lost, damaged or destroyed for the purpose of establishing the difference, if any, between

28.3.1 the aggregate of the amount of the loss or damage suffered or sustained by Her Majesty, including any cost incurred in respect of the clearing and cleaning of the work and its site and any other amount that is payable by the Contractor to Her Majesty under the contract, minus any monies retained pursuant to GC28.12, and

28.3.2 the aggregate of the amounts payable by Her Majesty to the Contractor pursuant to the contract up to the date of the loss or damage.

- 28.4 A difference that is established pursuant to GC28.3 shall be paid forthwith by the party who is determined by the audit to be the debtor to the party who is determined by the audit to be the



creditor.

- 28.5 When payment of a deficiency has been made pursuant to GC28.4, all rights and obligations of Her Majesty and the Contractor under the contract shall, with respect only to the part of the work that was the subject of the audit referred to in GC28.3, be deemed to have been expended and discharged.
- 28.6 If an election is not made pursuant to GC28.1.2 the Contractor shall, subject to GC28.7, clear and clean the work and its site and restore and replace the part of the work that was lost, damaged or destroyed at his own expense as if that part of the work had not yet been performed.
- 28.7 When the Contractor clears and cleans the work and its site and restores and replaces the work referred to in GC 28.6, Her Majesty shall pay him out of the monies referred to in GC28.1 so far as they will thereunto extend.
- 28.8 Subject to GC28.7, payment by Her Majesty pursuant to GC28.7 shall be made in accordance with the contract but the amount of each payment shall be 100% of the amount claimed notwithstanding TP4.4.1 and TP4.4.2.

GC29 Contract Security

- 29.1 The Contractor shall obtain and deliver contract security to the Departmental Representative in accordance with the provisions of the Contract Security Conditions.
- 29.2 If the whole or a part of the contract security referred to in GC29.1 is in the form of a security deposit, it shall be held and disposed of in accordance with GC43 and GC45.
- 29.3 If a part of the contract security referred to in GC29.1 is in the form of a labour and material payment bond, the Contractor shall post a copy of that bond on the work site.

GC30 Changes in the Work

- 30.1 Subject to GC5, the Departmental Representative may, at any time before he issues his Final Certificate of Completion,
- 30.1.1 order work or material in addition to that provided for in the Plans and Specifications;
and
- 30.1.2 delete or change the dimensions, character, quantity, quality, description, location or position of the whole or any part of the work or material provided for in the Plans and Specifications or in any order made pursuant to GC30.1.1,
- if that additional work or material, deletion, or change is, in his opinion, consistent with the general intent of the original contract.
- 30.2 The Contractor shall perform the work in accordance with such orders, deletions and changes that are made by the Departmental Representative pursuant to GC30.1 from time to time as if they had appeared in and been part of the Plans and Specifications.



- 30.3 The Departmental Representative shall determine whether or not anything done or omitted by the Contractor pursuant to an order, deletion or change referred to in GC30.1 increased or decreased the cost of the work to the Contractor.
- 30.4 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been increased, Her Majesty shall pay the Contractor the increased cost that the Contractor necessarily incurred for the additional work calculated in accordance with GC49 or GC50.
- 30.5 If the Departmental Representative determines pursuant to GC30.3 that the cost of the work to the Contractor has been decreased, Her Majesty shall reduce the amount payable to the Contractor under the contract by an amount equal to the decrease in the cost caused by the deletion or change referred to in GC30.1.2 and calculated in accordance with GC49.
- 30.6 GC30.3 to GC30.5 are applicable only to a contract or a portion of a contract for which a Fixed Price Arrangement is stipulated in the contract.
- 30.7 An order, deletion or change referred to in GC30.1 shall be in writing, signed by the Departmental Representative and given to the Contractor in accordance with GC11.

GC31 Interpretation of Contract by Departmental Representative

- 31.1 If, at any time before the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, any question arises between the parties about whether anything has been done as required by the contract or about what the Contractor is required by the contract to do, and, in particular but without limiting the generality of the foregoing, about
- 31.1.1 the meaning of anything in the Plans and Specification,
 - 31.1.2 the meaning to be given to the Plans and Specifications in case of any error therein, omission therefrom, or obscurity or discrepancy in their working or intention,
 - 31.1.3 whether or not the quality or quantity of any material or workmanship supplied or proposed to be supplied by the Contractor meets the requirements of the contract,
 - 31.1.4 whether or not the labour, plant or material provided by the Contractor for performing the work and carrying out the contract are adequate to ensure that the work will be performed in accordance with the contract and that the contract will be carried out in accordance with its terms,
 - 31.1.5 what quantity of any kind of work has been completed by the Contractor, or
 - 31.1.6 the timing and scheduling of the various phases of the performance of the work,
- the question shall be decided by the Departmental Representative whose decision shall be final and conclusive in respect of the work.
- 31.2 The Contractor shall perform the work in accordance with any decisions of the Departmental



Representative that are made under GC31.1 and in accordance with any consequential directions given by the Departmental Representative.

GC32 Warranty and Rectification of Defects in Work

32.1 Without restricting any warranty or guarantee implied or imposed by law or contained in the contract documents, the Contractor shall, at his own expense,

32.1.1 rectify and make good any defect or fault that appears in the work or comes to the attention of the Minister with respect to those parts of the work accepted in connection with the Interim Certificate of Completion referred to GC44.2 within 12 months from the date of the Interim Certificate of Completion;

32.1.2 rectify and make good any defect or fault that appears in or comes to the attention of the Minister in connection with those parts of the work described in the Interim Certificate of Completion referred to in GC44.2 within 12 months from the date of the Final Certificate of Completion referred to in GC44.1.

32.2 The Departmental Representative may direct the Contractor to rectify and make good any defect or fault referred to in GC32.1 or covered by any other expressed or implied warranty or guarantee.

32.3 A direction referred to in GC32.2 shall be in writing, may include a stipulation in respect of the time within which a defect or fault is required to be rectified and made good by the Contractor, and shall be given to the Contractor in accordance with GC11.

32.4 The Contractor shall rectify and make good any defect or fault described in a direction given pursuant to GC32.2 within the time stipulated therein.

GC33 Non-Compliance by Contractor

33.1 If the Contractor fails to comply with any decision or direction given by the Departmental Representative pursuant to GC18, GC24, GC26, GC31 or GC32, the Departmental Representative may employ such methods as he deems advisable to do that which the Contractor failed to do.

33.2 The Contractor shall, on demand, pay Her Majesty an amount that is equal to the aggregate of all cost, expenses and damage incurred or sustained by Her Majesty by reason of the Contractor's failure to comply with any decision or direction referred to in GC33.1, including the cost of any methods employed by the Departmental Representative pursuant to GC33.1.

GC34 Protesting Departmental Representative's Decisions

34.1 The Contractor may, within ten days after the communication to him of any decision or direction referred to in GC30.3 or GC33.1, protest that decision or direction.

34.2 A protest referred to in GC34.1 shall be in writing, contain full reasons for the protest, be signed



by the Contractor and be given to Her Majesty by delivery to the Departmental Representative.

- 34.3 If the Contractor gives a protest pursuant to GC34.2, any compliance by the Contractor with the decision or direction that was protested shall not be construed as an admission by the Contractor of the correctness of that decision or direction, or prevent the Contractor from taking whatever action he considers appropriate in the circumstances.
- 34.4 The giving of a protest by the Contractor pursuant to GC34.2 shall not relieve him from complying with the decision or direction that is the subject of the protest.
- 34.5 Subject to GC34.6, the Contractor shall take any action referred to in GC34.3 within three months after the date that a Final Certificate of Completion is issued under GC44.1 and not afterwards.
- 34.6 The Contractor shall take any action referred to in GC34.3 resulting from a direction under GC32 within three months after the expiry of a warranty or guarantee period and not afterwards.
- 34.7 Subject to GC34.8, if Her Majesty determines that the Contractor's protest is justified, Her Majesty shall pay the Contractor the cost of the additional labour, plant and material necessarily incurred by the Contractor in carrying out the protested decision or direction.
- 34.8 Costs referred to in GC34.7 shall be calculated in accordance with GC48 to GC50.

GC35 Changes in Soil Conditions and Neglect or Delay by Her Majesty

35.1 Subject to GC35.2 no payment, other than a payment that is expressly stipulated in the contract, shall be made by Her Majesty to the Contractor for any extra expense or any loss or damage incurred or sustained by the Contractor.

35.2 If the Contractor incurs or sustains any extra expense or any loss or damage that is directly attributable to

35.2.1 a substantial difference between the information relating to soil conditions at the work site that is contained in the Plans and Specifications or other documents supplied to the Contractor for his use in preparing his tender or a reasonable assumption of fact based thereon made by the Contractor, and the actual soil conditions encountered by the Contractor at the work site during the performance of the contract, or

35.2.2 any neglect or delay that occurs after the date of the contract on the part of Her Majesty in providing any information or in doing any act that the contract either expressly requires Her Majesty to do or that would ordinarily be done by an owner in accordance with the usage of the trade,

he shall, within ten days of the date the actual soil conditions described in GC35.2.1 were encountered or the neglect or delay described in GC35.2.2 occurred, give the Departmental Representative written notice of his intention to claim for that extra expense or that loss or damage.

35.3 When the Contractor has given a notice referred to in GC35.2, he shall give the Departmental Representative a written claim for extra expense or loss or damage within 30 days of the date that



a Final Certificate of Completion referred to in GC44.1 is issued and not afterwards.

- 35.4 A written claim referred to in GC35.3 shall contain a sufficient description of the facts and circumstances of the occurrence that is the subject of the claim to enable the Departmental Representative to determine whether or not the claim is justified and the Contractor shall supply such further and other information for that purpose as the Departmental Representative requires from time to time.
- 35.5 If the Departmental Representative determines that a claim referred to in GC35.3 is justified, Her Majesty shall make an extra payment to the Contractor in an amount that is calculated in accordance with GC47 to GC50.
- 35.6 If, in the opinion of the Departmental Representative, an occurrence described in GC35.2.1 results in a savings of expenditure by the Contractor in performing the contract, the amount set out in the Articles of Agreement shall, subject to GC35.7, be reduced by an amount that is equal to the saving.
- 35.7 The amount of the saving referred to in GC35.6 shall be determined in accordance with GC47 to GC49.
- 35.8 If the Contractor fails to give a notice referred to in GC35.2 and a claim referred to in GC35.3 within the times stipulated, an extra payment shall not be made to him in respect of the occurrence.

GC36 Extension of Time

- 36.1 Subject to GC36.2, the Departmental Representative may, on the application of the Contractor made before the day fixed by the Articles of Agreement for completion of the work or before any other date previously fixed under this General Condition, extend the time for its completion by fixing a new date if, in the opinion of the Departmental Representative, causes beyond the control of the Contractor have delayed its completion.
- 36.2 An application referred to in GC36.1 shall be accompanied by the written consent of the bonding company whose bond forms part of the contract security.

GC37 Assessments and Damages for Late Completion

- 37.1 For the purposes of this General Condition
- 37.1.1 the work shall be deemed to be completed on the date that an Interim Certificate of Completion referred to in GC44.2 is issued, and
- 37.1.2 "period of delay" means the number of days commencing on the day fixed by the Articles of Agreement for completion of the work and ending on the day immediately preceding the day on which the work is completed but does not include any day within a period of extension granted pursuant to GC36.1, and any other day on which, in the opinion of the Departmental Representative, completion of the work was delayed for reasons beyond the control of the Contractor.



- 37.2 If the Contractor does not complete the work by the day fixed for its completion by the Articles of Agreement but completes it thereafter, the Contractor shall pay Her Majesty an amount equal to the aggregate of
- 37.2.1 all salaries, wages and travelling expenses incurred by Her Majesty in respect of persons overseeing the performance of the work during the period of delay;
 - 37.2.2 the cost incurred by Her Majesty as a result of the inability to use the completed work for the period of delay; and
 - 37.2.3 all other expenses and damages incurred or sustained by Her Majesty during the period of delay as a result of the work not being completed by the day fixed for its completion.
- 37.3 The Minister may waive the right of Her Majesty to the whole or any part of the amount payable by the Contractor pursuant to GC37.2 I, in the opinion of the Minister, it is in the public interest to do so.

GC38 Taking the Work Out of the Contractor's Hands

- 38.1 The Minister may, at his sole discretion, by giving a notice in writing to the Contractor in accordance with GC11, take all or any part of the work out of the Contractor's hands, and may employ such means as he sees fit to have the work completed if the Contractor
- 38.1.1 Has not, within six days of the Minister or the Departmental Representative giving notice to the Contractor in writing in accordance with GC11, remedied any delay in the commencement or any default in the diligent performance of the work to the satisfaction of the Departmental Representative;
 - 38.1.2 has defaulted in the completion of any part of the work within the time fixed for its completion by the contract;
 - 38.1.3 has become insolvent;
 - 38.1.4 has committed an act of bankruptcy;
 - 38.1.5 has abandoned the work;
 - 38.1.6 has made an assignment of the contract without the consent required by GC3.1; or
 - 38.1.7 has otherwise failed to observe or perform any of the provisions of the contract.
- 38.2 If the whole or any part of the work is taken out of the Contractor's hands pursuant to GC38.1,
- 38.2.1 the Contractor's right to any further payment that is due or accruing due under the contract is, subject only to GC38.4, extinguished, and
 - 38.2.2 the Contractor is liable to pay Her Majesty, upon demand, an amount that is equal to the amount of all loss and damage incurred or sustained by Her Majesty in respect of the



Contractor's failure to complete the work.

- 38.3 If the whole or any part of the work that is taken out of the Contractor's hands pursuant to GC38.1 is completed by Her Majesty, the Departmental Representative shall determine the amount, if any, of the holdback or a progress claim that had accrued and was due prior to the date on which the work was taken out of the Contractor's hands and that is not required for the purposes of having the work performed or of compensating Her Majesty for any other loss or damage incurred or sustained by reason of the Contractor's default.
- 38.4 Her Majesty may pay the Contractor the amount determined not to be required pursuant to GC38.3.

GC39 Effect of Taking the Work Out of the Contractor's Hands

- 39.1 The taking of the work or any part thereof out of the Contractor's hands pursuant to GC38 does not operate so as to relieve or discharge him from any obligation under the contract or imposed upon him by law except the obligation to complete the performance of that part of the work that was taken out of his hands.
- 39.2 If the work or any part thereof is taken out of the Contractor's hands pursuant to GC38, all plant and material and the interest of the Contractor is all real property, licenses, powers and privileges acquired, used or provided by the Contractor under the contract shall continue to be the property of Her Majesty without compensation to the Contractor.
- 39.3 When the Departmental Representative certifies that any plant, material, or any interest of the Contractor referred to in GC39.2 is no longer required for the purposes of the work, or that it is not in the interest of Her Majesty to retain that plant, material or interest, it shall revert to the Contractor.

G40 Suspension of Work by Minister

- 40.1 The Minister may, when in his opinion it is in the public interest to do so, require the Contractor to suspend performance of the work either for a specified or an unspecified period by giving a notice of suspension in writing to the Contractor in accordance with GC11.
- 40.2 When a notice referred to in GC40.1 is received by the Contractor in accordance with GC11, he shall suspend all operations in respect of the work except those that, in the opinion of the Departmental Representative, are necessary for the care and preservation of the work, plant and material.
- 40.3 The Contractor shall not, during a period of suspension, remove any part of the work, plant or material from its site without the consent of the Departmental Representative.
- 40.4 If a period of suspension is 30 days or less, the Contractor shall, upon the expiration of that period, resume the performance of the work and he is entitled to be paid the extra cost, calculated in accordance with GC48 to GC50, of any labour, plant and material necessarily incurred by him as a result of the suspension.



- 40.5 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor agree that the performance of the work will be continued by the Contractor, the Contractor shall resume performance of the work subject to any terms and conditions agreed upon by the Minister and the Contractor.
- 40.6 If, upon the expiration of a period of suspension of more than 30 days, the Minister and the Contractor do not agree that performance of the work will be continued by the Contractor or upon the terms and conditions under which the Contractor will continue the work, the notice of suspension shall be deemed to be a notice of termination pursuant to GC41.

GC41 Termination of Contract

- 41.1 The Minister may terminate the contract at any time by giving a notice of termination in writing to the Contractor in accordance with GC11.
- 41.2 When a notice referred to in GC41.1 is received by the Contractor in accordance with GC11, he shall, subject to any conditions stipulated in the notice, forthwith cease all operations in performance of the contract.
- 41.3 If the contract is terminated pursuant to GC41.1, Her Majesty shall pay the Contractor, subject to GC41.4, an amount equal to
- 41.3.1 the cost to the contractor of all labour, plant and material supplied by him under the contract up to the date of termination in respect of a contract or part thereof for which a Unit Price Arrangement is stipulated in the contract, or
 - 41.3.2 the lesser of
 - 41.3.2.1 an amount, calculated in accordance with the Terms and Payment, that would have been payable to the Contractor had he completed the work, and
 - 41.3.2.2 an amount that is determined to be due to the Contractor pursuant to GC49 in respect of a contract or part thereof for which a Fixed Price Arrangement is stipulated in the contract
- less the aggregate of all amounts that were paid to the Contractor by Her Majesty and all amounts that are due to Her Majesty from the Contractor pursuant to the contract.
- 41.4 If Her Majesty and the Contractor are unable to agree about an amount referred to in GC41.3 that amount shall be determined by the method referred to in GC50.

GC42 Claims Against and Obligations of the Contractor or Subcontractor

- 42.1 Her Majesty may, in order to discharge lawful obligations of and satisfy claims against the Contractor or a subcontractor arising out of the performance of the contract, pay any amount that is due and payable to the Contractor pursuant to the contract directly to the obligees of and the claimants against the Contractor or the subcontractor but such amount if any, as is paid by Her Majesty, shall not exceed that amount which the Contractor would have been obliged to pay to



such claimant had the provisions of the Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, been applicable to the work. Any such claimant need not comply with the provisions of such legislation setting out the steps by way of notice, registration or otherwise as might have been necessary to preserve or perfect any claim for lien or privilege which claimant might have had;

42.2 Her Majesty will not make any payment as described in GC42.1 unless and until that claimant shall have delivered to Her Majesty:

42.2.1 a binding and enforceable Judgment or Order of a court of competent jurisdiction setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.2 a final and enforceable award of an arbitrator setting forth such amount as would have been payable by the Contractor to the claimant pursuant to the provisions of the applicable Provincial or Territorial lien legislation, or, in the Province of Quebec, the law relating to privileges, had such legislation been applicable to the work; or

42.2.3 the consent of the Contractor authorizing a payment.

For the purposes of determining the entitlement of a claimant pursuant to GC42.2.1 and GC42.2.2, the notice required by GC42.8 shall be deemed to replace the registration or provision of notice after the performance of work as required by any applicable legislation and no claim shall be deemed to have expired, become void or unenforceable by reason of the claimant not commencing any action within the time prescribed by any applicable legislation.

42.3 The Contractor shall, by the execution of his contract, be deemed to have consented to submit to binding arbitration at the request of any claimant those questions that need be answered to establish the entitlement of the claimant to payment pursuant to the provisions of GC42.1 and such arbitration shall have as parties to it any subcontractor to whom the claimant supplied material, performed work or rented equipment should such subcontractor wish to be adjoined and the Crown shall not be a party to such arbitration and, subject to any agreement between the Contractor and the claimant to the contrary, the arbitration shall be conducted in accordance with the Provincial or Territorial legislation governing arbitration applicable in the Province or Territory in which the work is located.

42.4 A payment made pursuant to GC42.1 is, to the extent of the payment, a discharge of Her Majesty's liability to the Contractor under the contract and may be deducted from any amount payable to the Contractor under the contract.

42.5 To the extent that the circumstances of the work being performed for Her Majesty permit, the Contractor shall comply with all laws in force in the Province or Territory where the work is being performed relating to payment period, mandatory holdbacks, and creation and enforcement of mechanics' liens, builders' liens or similar legislation or in the Province of Quebec, the law relating to privileges.

42.6 The Contractor shall discharge all his lawful obligations and shall satisfy all lawful claims against him arising out of the performance of the work at least as often as the contract requires Her



Majesty to pay the Contractor.

- 42.7 The Contractor shall, whenever requested to do so by the Departmental Representative, make a statutory declaration deposing to the existence and condition of any obligations and claims referred to in GC42.6.
- 42.8 GC42.1 shall only apply to claims and obligations
- 42.8.1 the notification of which has been received by the Departmental Representative in writing before payment is made to the Contractor pursuant to TP4.10 and within 120 days of the date on which the claimant
- 42.8.1.1 should have been paid in full under the claimant's contract with the Contractor or subcontractor where the claim is for money that was lawfully required to be held back from the claimant; or
- 42.8.1.2 performed the last of the services, work or labour, or furnished the last of the material pursuant to the claimant's contract with the Contractor or subcontractor where the claim is not for money referred to in GC42.8.1.1, and
- 42.8.2 the proceedings to determine the right to payment of which, pursuant to GC42.2. shall have commenced within one year from the date that the notice referred to in GC42.8.1 was received by the Departmental Representative, and
- the notification required by GC42.8.1 shall set forth the amount claimed to be owing and the person who by contract is primarily liable.
- 42.9 Her Majesty may, upon receipt of a notice of claim under GC42.8.1, withhold from any amount that is due and payable to the Contractor pursuant to the contract the full amount of the claim or any portion thereof.
- 42.10 The Departmental Representative shall notify the Contractor in writing of receipt of any claim referred to in GC42.8.1 and of the intention of Her Majesty to withhold funds pursuant to GC42.9 and the Contractor may, at any time thereafter and until payment is made to the claimant, be entitled to post, with Her Majesty, security in a form acceptable to Her Majesty in an amount equal to the value of the claim, the notice of which is received by the Departmental Representative and upon receipt of such security Her Majesty shall release to the Contractor any funds which would be otherwise payable to the Contractor, that were withheld pursuant to the provisions of GC42.9 in respect of the claim of any claimant for whom the security stands.

GC43 Security Deposit – Forfeiture or Return

- 43.1 If
- 43.1.1 the work is taken out of the Contractor's hands pursuant to GC38,
- 43.1.2 the contract is terminated pursuant to GC41, or
- 43.1.3 the Contractor is in breach of or in default under the contract,



Her Majesty may convert the security deposit, if any, to Her own use.

- 43.2 If Her Majesty converts the contract security pursuant to GC43.1, the amount realized shall be deemed to be an amount due from Her Majesty to the Contractor under the contract.
- 43.3 Any balance of an amount referred to in GC43.2 that remains after payment of all losses, damage and claims of Her Majesty and others shall be paid by Her Majesty to the Contractor if, in the opinion of the Departmental Representative, it is not required for the purposes of the contract.

GC44 Departmental Representative's Certificates

44.1 On the date that

44.1.1 the work has been completed, and

44.1.2 the Contractor has complied with the contract and all orders and directions made pursuant thereto,

both to the satisfaction of the Departmental Representative, the Departmental Representative shall issue a Final Certificate of Completion to the Contractor.

44.2 If the Departmental Representative is satisfied that the work is substantially complete he shall, at any time before he issues a certificate referred to in GC44.1, issue an Interim Certificate of Completion to the Contractor, and

44.2.1 for the purposes of GC44.2 the work will be considered to be substantially complete,

44.2.1.1 when the work under the contract or a substantial part thereof is, in the opinion of the Departmental Representative, ready for use by Her Majesty or is being used for the purpose intended; and

44.2.1.2 when the work remaining to be done under the contract is, in the opinion of the Departmental Representative, capable of completion or correction at accost of not more than

44.2.1.2.1 -3% of the first \$500,000, and

44.2.1.2.2 -2% of the next \$500,000, and

44.2.1.2.3 -1% of the balance

of the value of the contract at the time this cost is calculated.

44.3 For the sole purpose of GC44.2.1.2, where the work or a substantial part thereof is ready for use or is being used for the purposes intended and the remainder of the work or a part thereof cannot be completed by the time specified in A2.1, or as amended pursuant to GC36, for reasons beyond the control of the Contractor or where the Departmental Representative and the Contractor agree not to complete a part of the work within the specified time, the cost of that part of the work



which was either beyond the control of the Contractor to complete or the Departmental Representative and the Contractor have agreed not to complete by the time specified shall be deducted from the value of the contract referred to GC44.2.1.2 and the said cost shall not form part of the cost of the work remaining to be done in determining substantial completion.

44.4 An Interim Certificate of Completion referred to in GC44.2 shall describe the parts of the work not completed to the satisfaction of the Departmental Representative and all things that must be done by the Contractor

44.4.1 before a Final Certificate of Completion referred to in GC44.1 will be issued, and

44.4.2 before the 12-month period referred to in GC32.1.2 shall commence for the said parts and all the said things.

44.5 The Departmental Representative may, in addition to the parts of the work described in an Interim Certificate of Completion referred to in GC44.2, require the Contractor to rectify any other parts of the work not completed to his satisfaction and to do any other things that are necessary for the satisfactory completion of the work.

44.6 If the contract or a part thereof is subject to a Unit Price Arrangement, the Departmental Representative shall measure and record the quantities of labour, plant and material, performed, used and supplied by the Contractor in performing the work and shall, at the request of the Contractor, inform him of those measurements.

44.7 The Contractor shall assist and co-operate with the Departmental Representative in the performance of his duties referred to in GC44.6 and shall be entitled to inspect any record made by the Departmental Representative pursuant to GC44.6.

44.8 After the Departmental Representative has issued a Final Certificate of Completion referred to in GC44.1, he shall, if GC44.6 applies, issue a Final Certificate of Measurement.

44.9 A Final Certificate of Measurement referred to in GC44.8 shall

44.9.1 contain the aggregate of all measurements of quantities referred to in GC44.6, and

44.9.2 be binding upon and conclusive between Her Majesty and the Contractor as to the quantities referred to therein.

GC45 Return of Security Deposit

45.1 After an Interim Certificate of Completion referred to in GC44.2 has been issued, Her Majesty shall, if the Contractor is not in breach of or in default under the contract, return to the Contractor all or any part of the security deposit that, in the opinion of the Departmental Representative, is not required for the purposes of the contract.

45.2 After a Final Certificate of Completion referred to in GC44.1 has been issued, Her Majesty shall return to the Contractor the remainder of any security deposit unless the contract stipulates otherwise.



- 45.3 If the security deposit was paid into the Consolidated Revenue Fund of Canada, Her Majesty shall pay interest thereon to the Contractor at a rate established from time to time pursuant to section 21(2) of the Financial Administration Act.

GC46 Clarification of Terms in GC47 to GC50

- 46.1 For the purposes of GC47 to GC50,
- 46.1.1 "Unit Price Table" means the table set out in the Articles of Agreement, and
- 46.1.2 "plant" does not include tools customarily provided by a tradesman in practicing his trade.

GC47 Additions or Amendments to Unit Price Table

- 47.1 Where a Unit Price Arrangement applies to the contract or a part thereof the Departmental Representative and the Contractor may, by an agreement in writing,
- 47.1.1 add classes of labour or material, and units of measurement, prices per unit and estimated quantities to the Unit Price Table if any labour, plant or material that is to be included in the Final Certificate of Measurement referred to in GC44.8 is not included in any class of labour, plant or material set out in the Unit Price Table; or
- 47.1.2 subject to GC47.2 and GC47.3, amend a price set out in the Unit Price Table for any class of labour, plant or material included therein if the Final Certificate of Measurement referred to in GC44.8 shows or is expected to show that the total quantity of that class of labour, plant or material actually performed, used or supplied by the Contractor in performing the work is
- 47.1.2.1 less than 85% of that estimated total quantity, or
- 47.1.2.2 in excess of 115% of that estimated total quantity.
- 47.2 In no event shall the total cost of an item set out in the Unit Price Table that has been amended pursuant to GC47.1.2.1 exceed the amount that would have been payable to the Contractor had the estimated total quantity actually been performed, used or supplied.
- 47.3 An amendment that is made necessary by GC47.1.2.2 shall apply only to the quantities that are in excess of 115%.
- 47.4 If the Departmental Representative and the Contractor do not agree as contemplated in GC47.1, the Departmental Representative shall determine the class and the unit of measurement of the labour, plant or material and, subject to GC47.2 and GC47.3, the price per unit therefore shall be determined in accordance with GC50.

GC48 Determination of Cost – Unit Price Table



- 48.1 Whenever, for the purposes of the contract, it is necessary to determine the cost of labour, plant or material, it shall be determined by multiplying the quantity of that labour, plant or material expressed in the unit set out in column 3 of the Unit Price Table by the price of that unit set out in column 5 of the Unit Price Table.

GC49 Determination of Cost – Negotiation

- 49.1 If the method described in GC48 cannot be used because the labour, plant or material is of a kind or class that is not set out in the Unit Price Table, the cost of that labour, plant or material for the purposes of the contract shall be the amount agreed upon from time to time by the Contractor and the Departmental Representative.
- 49.2 For the purposes of GC49.1, the Contractor shall submit to the Departmental Representative any necessary cost information requested by the Departmental Representative in respect of the labour, plant and material referred to in GC49.1

GC50 Determination of Cost – Failing Negotiation

- 50.1 If the methods described in GC47, GC48 or GC49 fail for any reason to achieve a determination of the cost of labour, plant and material for the purposes referred to therein, that cost shall be equal to the aggregate of
- 50.1.1 all reasonable and proper amounts actually expended or legally payable by the Contractor in respect of the labour, plant and material that falls within one of the classes of expenditure described in GC50.2 that are directly attributable to the performance of the contract,
 - 50.1.2 an allowance for profit and all other expenditures or costs, including overhead, general administration cost, financing and interest charges, and every other cost, charge and expenses, but not including those referred to in GC50.1.1 or GC50.1.3 or a class referred to in GC50.2, in an amount that is equal to 10% of the sum of the expenses referred to in GC50.1.1, and
 - 50.1.3 interest on the cost determined under GC50.1.1 and GC50.1.2, which interest shall be calculated in accordance with TP9,

provide that the total cost of an item set out in the Unit Price Table that is subject to the provisions of GC47.1.2.1 does not exceed the amount that would have been payable to the Contractor had the estimated total quantity of the said item actually be performed, used or supplied.

- 50.2 For purposes of GC50.1.1 the classes of expenditure that may be taken into account in determining the cost of labour, plant and material are,
- 50.2.1 payments to subcontractors;
 - 50.2.2 wages, salaries and travelling expenses of employees of the Contractor while they are actually and properly engaged on the work, other than wages, salaries, bonuses, living



and travelling expenses of personnel of the Contractor generally employed at the head office or at a general office of the Contractor unless they are engaged at the work site with the approval of the Departmental Representative,

- 50.2.3 assessments payable under any statutory authority relating to workmen's compensation, unemployment insurance, pension plan or holidays with pay;
- 50.2.4 rent that is paid for plant or an amount equivalent of the said rent if the plant is owned by the Contractor that is necessary for and used in the performance of the work, if the rent of the equivalent amount is reasonable and use of that plant has been approved by the Departmental Representative;
- 50.2.5 payments for maintaining and operating plant necessary for and used in the performance of the work, and payments for effecting such repairs thereto as, in the opinion of the Departmental Representative, are necessary to the proper performance of the contract other than payments for any repairs to the plant arising out of defects existing before its allocation to the work;
- 50.2.6 payments for material that is necessary for and incorporated in the work, or that is necessary for and consumed in the performance of the contract;
- 50.2.7 payments for preparation, delivery, handling, erection, installation, inspection protection and removal of the plant and material necessary for and used in the performance of the contract; and
- 50.2.8 any other payments made by the Contractor with the approval of the Departmental Representative that are necessary for the performance of the contract.

GC51 Records to be kept by Contractor

51.1 The Contractor shall

- 51.1.1 maintain full records of his estimated and actual cost of the work together with all tender calls, quotations, contracts, correspondence, invoices, receipts and vouchers relating thereto.
- 51.1.2 make all records and material referred to in GC5.1.1 available to audit and inspection by the Minister and the Deputy Receiver General for Canada or by persons acting on behalf of either of both of them, when requested;
- 51.1.3 allow any of the person referred to in GC51.1.2 to make copies of and to take extracts from any of the records and material referred to in GC51.1.1; and
- 51.1.4 furnish any person referred to in GC51.1.2 with any information he may require from time to time in connection with such records and material.

- 51.2 The records maintained by the Contractor pursuant to GC51.1.1 shall be kept intact by the Contractor until the expiration of two years after the date that a Final Certificate of Completion referred to in GC44.1 was issued or until the expiration of such other period of time as the



Minister may direct.

- 51.3 The Contractor shall cause all subcontractors and all other persons directly or indirectly controlled by or affiliated with the Contractor and all persons directly or indirectly having control of the Contractor to comply with GC51.1 and GC51.2 as if they were the Contractor.

GC52 Conflict of Interest

- 52.1 It is a term of this contract that no former public office holder who is not in compliance with the Conflict of Interest and Post-Employment Code for Public Office Holders shall derive a direct benefit from this contract.

GC53 Contractor Status

- 53.1 The Contractor shall be engaged under the contract as an independent contractor.
- 53.2 The Contractor and any employee of the said Contractor is not engaged by the contract as an employee, servant or agent of Her Majesty.
- 53.3 For the purposes of GC53.1 and GC53.2 the Contractor shall be solely responsible for any and all payments and deductions required to be made by law including those required for Canada or Quebec Pension Plans, Unemployment Insurance, Worker's Compensation or Income Tax.



GENERAL CONDITONS

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

GENERAL INSUANCE COVERAGES

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

COMMERCIAL GENERAL LIABILITY

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

BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS

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

INSURER'S CERTIFICATE OF INSURANCE



General Conditions

IC 1 Proof of Insurance (02/12/03)

Within thirty (30) days after acceptance of the Contractor's tender, the Contractor shall, unless otherwise directed in writing by the Contracting Officer, deposit with the Contracting Officer an Insurer's Certificate of Insurance in the form displayed in this document and, if requested by the Contracting Officer, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the Insurance Coverage Requirements shown hereunder.

IC 2 Risk Management (01/10/94)

The provisions of the Insurance Coverage Requirements contained hereunder are not intended to cover all of the Contractor's obligations under GC8 of the General Conditions "C" of the contract. Any additional risk management measures or additional insurance coverages the Contractor may deem necessary to fulfill its obligations under GC8 shall be at its own discretion and expense.

IC 3 Payment of Deductible (01/10/94)

The payment of monies up to the deductible amount made in satisfaction of a claim shall be borne by the Contractor.

IC 4 Insurance Coverage (02/12/03)

The Contractor has represented that it has in place and effect the appropriate and usual liability insurance coverage as required by these Insurance Conditions and the Contractor has warranted that it shall obtain, in a timely manner and prior to commencement of the Work, the appropriate and usual property insurance coverage as required by these Insurance Conditions and, further, that it shall maintain all required insurance policies in place and effect as required by these Insurance Conditions.



INSURANCE COVERAGE REQUIREMENTS

PART I GENERAL INSURANCE COVERAGES (GIC)

GCI 1 Insured (02/12/03)

Each insurance policy shall insure the Contractor, and shall include, as an Additional Named Insured, Her Majesty the Queen in right of Canada, represented by the National Research Council Canada.

GIC 2 Period of Insurance (02/12/03)

Unless otherwise directed in writing by the Contracting Officer or otherwise stipulated elsewhere in these Insurance Conditions, the policies required hereunder shall be in force and be maintained from the date of the contract award until the day of issue of the Departmental Representative's Final Certificate of Completion.

GIC 3 Proof of Insurance (01/10/94)

Within twenty five (25) days after acceptance of the Contractor's tender, the Insurer shall, unless otherwise directed by the Contractor, deposit with the Contractor an Insurer's Certificate of Insurance in the form displayed in the document and, if requested, the originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the requirements of these Insurance Coverages.

GIC 4 Notification (01/10/94)

Each Insurance policy shall contain a provision that (30) days prior written notice shall be given by the Insurer to Her Majesty in the event of any material change in or cancellation of coverage. Any such notice received by the Contractor shall be transmitted forthwith to Her Majesty.

PART II COMMERCIAL GENERAL LIABILITY

CGL 1 Scope of Policy (01/10/94)

The policy shall be written on a form similar to that known and referred to in the insurance industry as IBC 2100 – Commercial General Liability policy (Occurrence form) and shall provide for limit of liability of not less than \$2,000,000 inclusive for Bodily Injury and Property Damage for any one occurrence or series of occurrences arising out of one cause. Legal or defence cost incurred in respect of a claim or claims shall not operate to decrease the limit of liability.

CGL 2 Coverages/Provisions (01/10/94)



The policy shall include but not necessarily be limited to the following coverages/provisions.

- 2.1 Liability arising out of or resulting from the ownership, existence, maintenance or use of premises by the Contractor and operations necessary or incidental to the performance of this contract.
- 2.2 "Broad Form" Property Damage including the loss of use of property.
- 2.3 Removal or weakening of support of any building or land whether such support be natural or otherwise.
- 2.4 Elevator liability (including escalators, hoists and similar devices).
- 2.5 Contractor's Protective Liability
- 2.6 Contractual and Assumed Liabilities un this contact.
- 2.7 Completed Operations Liability – The insurance, including all aspects of this Part II of these Insurance Conditions shall continue for a period of at least one (1) year beyond the date of the Departmental Representative's Final Certificate of Completion for the Completed Operations.
- 2.8 Cross Liability – The Clause shall be written as follows:

Cross Liability – The insurance as is afforded by this policy shall apply in respect to any claim or action brought against any one Insured by any other Insured. The coverage shall apply in the same manner and to the same extent as though a separate policy had been issued to each Insured. The inclusion herein of more than one Insured shall not increase the limit of the Insurer's liability.

- 2.9 Severability of Interests – The Clause shall be written as follows:

Severability of Interests – This policy, subject to the limits of liability stated herein, shall apply separately to each Insured in the same manner and to the same extent as if a separate policy had been issued to each. The inclusion herein of more than one insured shall not increase the limit of the Insurer's liability.

CGL 3 Additional Exposures (02/12/03)

The policy shall either include or be endorsed to include the following exposures of hazards if the Work is subject thereto:

- 3.1 Blasting
- 3.2 Pile driving and calsson work
- 3.3 Underpinning
- 3.4 Risks associated with the activities of the Contractor on an active airport



- 3.5 Radioactive contamination resulting from the use of commercial isotopes
- 3.6 Damage to the portion of an existing building beyond that directly associated with an addition, renovation or installation contract.
- 3.7 Marine risks associated with the contraction of piers, wharves and docks.

**CGL 4 Insurance Proceeds
(01/10/94)**

Insurance Proceeds from this policy are usually payable directly to a Claimant/Third Party.

**CGL 5 Deductible
(02/12/03)**

This policy shall be issued with a deductible amount of not more than \$10,000 per occurrence applying to Property Damage claims only.

**PART III
BUILDER'S RISK – INSTALLATION FLOATER – ALL RISKS**

**BR 1 Scope of Policy
(01/10/94)**

The policy shall be written on an "All Risks" basis granting coverages similar to those provided by the forms known and referred to in the insurance industry as "Builder's Risk Comprehensive Form" or "Installation Floater – All Risks".

**BR 2 Property Insured
(01/10/94)**

The property insured shall include:

- 2.1 The Work and all property, equipment and materials intended to become part of the finished Work at the site of the project while awaiting, during and after installation, erection or construction including testing.
- 2.2 Expenses incurred in the removal from the construction site of debris of the property insured, including demolition of damaged property, de-icing and dewatering, occasioned by loss, destruction or damage to such property and in respect of which insurance is provided by this policy.

**BR 3 Insurance Proceeds
(01/10/94)**

- 3.1 Insurance proceeds from this policy are payable in accordance with GC28 of the General Conditions "C" of the contract.
- 3.2 This policy shall provide that the proceeds thereof are payable to Her Majesty or as the Minister may direct.



- 3.3 The Contractor shall do such things and execute such documents as are necessary to effect payment of the proceeds.

BR 4 Amount of Insurance
(01/10/94)

The amount of insurance shall not be less than the sum of the contract value plus the declared value (if any) set forth in the contract documents of all material and equipment supplied by Her Majesty at the site of the project to be incorporated into and form part of the finished Work.

BR 5 Deductible
(02/12/03)

The Policy shall be issued with a deductible amount of not more than \$10,000.

BR 6 Subrogation
(01/10/94)

The following Clause shall be included in the policy:

"All rights of subrogation or transfer of rights are hereby waived against any corporation, firm, individual or other interest, with respect to which, insurance is provided by this policy".

BR 7 Exclusion Qualifications
(01/10/94)

The policy may be subject to the standard exclusions but the following qualifications shall apply:

- 7.1 Faulty materials, workmanship or design may be excluded only to the extent of the cost of making good thereof and shall not apply to loss or damage resulting therefrom.
- 7.2 Loss or damage caused by contamination by radioactive material may be excluded except for loss or damage resulting from commercial isotopes used for industrial measurements, inspection, quality control radiographic or photographic use.
- 7.3 Use and occupancy of the project or any part of section thereof shall be permitted where such use and occupancy is for the purpose for which the project is intended upon completion.



INSURER'S CERTIFICATE OF INSURANCE

(TO BE COMPLETED BY INSURER (NOT BOKER) AND DELIVERD TO NATIONAL RESEARCH COUNCIL CANADA WITH 30 DAYS FOLLOWING ACCEPTANCE OF TENDER)

CONTRACT

| | | |
|---------------------|-----------------|------------|
| DESCRIPTION OF WORK | CONTRACT NUMBER | AWARD DATE |
| LOCATION | | |

INSURER

| |
|---------|
| NAME |
| ADDRESS |

BROKER

| |
|---------|
| NAME |
| ADDRESS |

INSURED

| |
|--------------------|
| NAME OF CONTRACTOR |
| ADDRESS |

ADDITIONAL INSURED

| |
|---|
| HER MAJESTY THE QUEEN IN RIGHT OF CANADA AS REPRESENTED BY THE NATIONAL RESEARCH COUNCIL CANADA |
|---|

THIS DOCUENT CERTIFIES THAT THE FOLLOWING POLICES OF INSURANCE ARE AT PRESENT IN FORCE COVERING ALL OPERATIONS OF THE INSURE IN CONNECTION WITH THE CONTRACT MADE BETWEEN THE NAMED INSURED AND THE NATIONAL RESEARCH COUNCIL CANADA AND IN ACCORDANCE WITH THE INSURANCE CONDITIONS "E"

| POLICY | | | | | |
|----------------------------------|--------|----------------|-------------|---------------------|------------|
| TYPE | NUMBER | INCEPTION DATE | EXPIRY DATE | LIMITS OF LIABILITY | DEDUCTIBLE |
| COMMERCIAL GENERAL LIABILITY | | | | | |
| BUILDERS RISK "AL RISKS" | | | | | |
| INSTALLATION FLOATER "ALL RISKS" | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

THE INSURER AGREES TO NOTIFY THE NATIONAL RESEARCH COUNCIL CANADA IN WRITING 30 DAYS PRIOR TO ANY MATERIAL CHANGE IN OR CANCELLATION OF ANY POLICY OR COVERAGE SPECIFICALLY RELATED TO THE CONTRACT

| | | |
|--|-----------|-------------------|
| NAME OF INSURER'S OFFICER OR AUTHORIZED EMPLOYEE | SIGNATURE | DATE: |
| | | TELEPHONE NUMBER: |

ISSUANCE OF THIS CERTIFIATE SHALL NOT LIMIT OR RESTRICT THE RIGHT OF THE NATIONAL RESEARCH COUNCIL CANADA TO REQUEST AT ANY TIME DUPLICATE COPIES OF SAID INSURANCE POLICIES



CS1 Obligation to provide Contract Security

- 1.1 The Contractor shall, at the Contractor's own expense, provide one or more of the forms of contract security prescribed in CS2.
- 1.2 The Contractor shall deliver to the Departmental Representative the contract security referred to in CS1.1 within 14 days after the date that the Contractor receives notice that the Contractor's tender or offer was accepted by Her Majesty.

CS2 Prescribed Types and Amounts of Contract Security

- 2.1 The Contractor shall deliver to the Departmental Representative pursuant to CS1
 - 2.1.1 a performance bond and a labour and material payment bond each in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, or
 - 2.1.2 a labour and material payment bond in an amount that is equal to not less than 50% of the contract amount referred to in the Articles of Agreement, and a security deposit in an amount that is equal to
 - 2.1.2.1 not less than 10% of the contract amount referred to in the Articles of Agreement where that amount does not exceed \$250,000, or
 - 2.1.2.2 \$25,000 plus 5% of the part of the contract amount referred to in the Articles of Agreement that exceeds \$250,000, or
 - 2.1.3 a security deposit in an amount prescribed by CS2.12 plus an additional amount that is equal to 10% of the contract amount referred to in the Articles of Agreement.
- 2.2 A performance bond and a labour and material payment bond referred to in CS2.1 shall be in a form and be issued by a bonding or surety company that is approved by Her Majesty.
- 2.3 The amount of a security deposit referred to in CS2.1.2 shall not exceed \$250,000 regardless of the contract amount referred to in the Articles of Agreement.
- 2.4 A security deposit referred to in CS2.1.2 and CS2.1.3 shall be in the form of
 - 2.4.1 a bill of exchange made payable to the Receiver General of Canada and certified by an approved financial institution or drawn by an approved financial institution on itself, or
 - 2.4.2 bonds of or unconditionally guaranteed as to principal and interest by the Government of Canada.
- 2.5 For the purposes of CS2.4
 - 2.5.1 a bill of exchange is an unconditional order in writing signed by the Contractor and addressed to an approved financial institution, requiring the said institution to pay, on demand, at a fixed or determinable future time a sum certain of money to, or to the order



of, the Receiver General for Canada, and

- 2.5.2 If a bill of exchange is certified by a financial institution other than a chartered bank then it must be accompanied by a letter or stamped certification confirming that the financial institution is in at least one of the categories referred to in CS2.5.3
- 2.5.3 an approved financial institution is
- 2.5.3.1 any corporation or institution that is a member of the Canadian Payments Association,
- 2.5.3.2 a corporation that accepts deposits that are insured by the Canada Deposit Insurance Corporation or the Régie de l'assurance-dépôts du Québec to the maximum permitted by law,
- 2.5.3.3 a credit union as defined in paragraph 137(6)(b) of the *Income Tax Act*,
- 2.5.3.4 a corporation that accepts deposits from the public, if repayment of the deposit is guaranteed by Her Majesty in right of a province, or
- 2.5.3.5 The Canada Post Corporation.
- 2.5.4 the bonds referred to in CS2.4.2 shall be
- 2.5.4.1 made payable to bearer, or
- 2.5.4.2 accompanied by a duly executed instrument of transfer of the bonds to the Receiver General for Canada in the form prescribed by the Domestic Bonds of Canada Regulations, or
- 2.5.4.3 registered, as to principal or as to principal and interest in the name of the Receiver General for Canada pursuant to the Domestic Bonds of Canada Regulations, and
- 2.5.4.4 provided on the basis of their market value current at the date of the contract.



| |
|--|
| Contract Number / Numéro du contrat |
| Security Classification / Classification de sécurité |

**SECURITY REQUIREMENTS CHECK LIST (SRCL)
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE

| | |
|--|---|
| 1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine | 2. Branch or Directorate / Direction générale ou Direction |
| 3. a) Subcontract Number / Numéro du contrat de sous-traitance | 3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant |

4. Brief Description of Work / Brève description du travail

5. a) Will the supplier require access to Controlled Goods? / Le fournisseur aura-t-il accès à des marchandises contrôlées? No / Non Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? / Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques? No / Non Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? / Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui
(Specify the level of access using the chart in Question 7. c) / (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. / Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé. No / Non Yes / Oui

6. c) Is this a commercial courier or delivery requirement with **no** overnight storage? / S'agit-il d'un contrat de messagerie ou de livraison commerciale **sans** entreposage de nuit? No / Non Yes / Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

| | | |
|---------------------------------|--------------------------------------|---|
| Canada <input type="checkbox"/> | NATO / OTAN <input type="checkbox"/> | Foreign / Étranger <input type="checkbox"/> |
|---------------------------------|--------------------------------------|---|

7. b) Release restrictions / Restrictions relatives à la diffusion

| | | |
|---|--|--|
| No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/> Not releasable / À ne pas diffuser <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays: | All NATO countries / Tous les pays de l'OTAN <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays: | No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/> Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays: |
|---|--|--|

7. c) Level of information / Niveau d'information

| | | |
|---|--|---|
| PROTECTED A / PROTÉGÉ A <input type="checkbox"/> | NATO UNCLASSIFIED / NATO NON CLASSIFIÉ <input type="checkbox"/> | PROTECTED A / PROTÉGÉ A <input type="checkbox"/> |
| PROTECTED B / PROTÉGÉ B <input type="checkbox"/> | NATO RESTRICTED / NATO DIFFUSION RESTREINTE <input type="checkbox"/> | PROTECTED B / PROTÉGÉ B <input type="checkbox"/> |
| PROTECTED C / PROTÉGÉ C <input type="checkbox"/> | NATO CONFIDENTIAL / NATO CONFIDENTIEL <input type="checkbox"/> | PROTECTED C / PROTÉGÉ C <input type="checkbox"/> |
| CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/> | NATO SECRET / NATO SECRET <input type="checkbox"/> | CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/> |
| SECRET / SECRET <input type="checkbox"/> | COSMIC TOP SECRET / COSMIC TRÈS SECRET <input type="checkbox"/> | SECRET / SECRET <input type="checkbox"/> |
| TOP SECRET / TRÈS SECRET <input type="checkbox"/> | | TOP SECRET / TRÈS SECRET <input type="checkbox"/> |
| TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/> | | TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/> |

| |
|--|
| Security Classification / Classification de sécurité |
|--|



| |
|--|
| Contract Number / Numéro du contrat |
| Security Classification / Classification de sécurité |

PART A (continued) / PARTIE A (suite)

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?
 Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui
 If Yes, indicate the level of sensitivity:
 Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?
 Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? No / Non Yes / Oui
 Short Title(s) of material / Titre(s) abrégé(s) du matériel :
 Document Number / Numéro du document :

PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

| | | | |
|--|---|---|--|
| <input type="checkbox"/> RELIABILITY STATUS COTE DE FIABILITÉ | <input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL | <input type="checkbox"/> SECRET SECRET | <input type="checkbox"/> TOP SECRET TRÈS SECRET |
| <input type="checkbox"/> TOP SECRET-SIGINT TRÈS SECRET - SIGINT | <input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL | <input type="checkbox"/> NATO SECRET NATO SECRET | <input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET |
| <input type="checkbox"/> SITE ACCESS ACCÈS AUX EMBLEMES | | | |

Special comments:
 Commentaires spéciaux : _____

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.
 REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?
 Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? No / Non Yes / Oui
 If Yes, will unscreened personnel be escorted?
 Dans l'affirmative, le personnel en question sera-t-il escorté? No / Non Yes / Oui

PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?
 Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

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

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?
 Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ? No / Non Yes / Oui

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?
 Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

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



PART C - (continued) / PARTIE C - (suite)

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.

Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.

Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

| Category / Catégorie | PROTECTED / PROTÉGÉ | | | CLASSIFIED / CLASSIFIÉ | | | NATO | | | | COMSEC | | | | | |
|--|---------------------|---|---|-----------------------------|--------|--------------------------|---|---------------------------------------|-------------|--|---------------------|---|---|-----------------------------|--------|--------------------------|
| | A | B | C | CONFIDENTIAL / CONFIDENTIEL | SECRET | TOP SECRET / TRÈS SECRET | NATO RESTRICTED / NATO DIFFUSION RESTREINTE | NATO CONFIDENTIAL / NATO CONFIDENTIEL | NATO SECRET | COSMIC TOP SECRET / COSMIC TRÈS SECRET | PROTECTED / PROTÉGÉ | | | CONFIDENTIAL / CONFIDENTIEL | SECRET | TOP SECRET / TRÈS SECRET |
| | | | | | | | | | | | A | B | C | | | |
| Information / Assets / Renseignements / Biens / Production | | | | | | | | | | | | | | | | |
| IT Media / Support TI | | | | | | | | | | | | | | | | |
| IT Link / Lien électronique | | | | | | | | | | | | | | | | |

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED? No Yes
 La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE? Non Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED? No Yes
 La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE? Non Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).



| |
|--|
| Contract Number / Numéro du contrat |
| Security Classification / Classification de sécurité |

PART D - AUTHORIZATION / PARTIE D - AUTORISATION

| | | | |
|---|-----------------------------------|-----------------------------------|---|
| 13. Organization Project Authority / Chargé de projet de l'organisme | | | |
| Name (print) - Nom (en lettres moulées) | | Title - Titre | Signature |
| Telephone No. - N° de téléphone | Facsimile No. - N° de télécopieur | E-mail address - Adresse courriel | Date |
| 14. Organization Security Authority / Responsable de la sécurité de l'organisme | | | |
| Name (print) - Nom (en lettres moulées) | | Title - Titre | Signature |
| Telephone No. - N° de téléphone | Facsimile No. - N° de télécopieur | E-mail address - Adresse courriel | Date |
| 15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached? Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes? | | | <input type="checkbox"/> No / Non <input type="checkbox"/> Yes / Oui |
| 16. Procurement Officer / Agent d'approvisionnement | | | |
| Name (print) - Nom (en lettres moulées) | | Title - Titre | Signature |
| Telephone No. - N° de téléphone | Facsimile No. - N° de télécopieur | E-mail address - Adresse courriel | Date |
| 17. Contracting Security Authority / Autorité contractante en matière de sécurité | | | |
| Name (print) - Nom (en lettres moulées) | | Title - Titre | Signature |
| Telephone No. - N° de téléphone | Facsimile No. - N° de télécopieur | E-mail address - Adresse courriel | Date |

| |
|--|
| Security Classification / Classification de sécurité |
|--|

Instructions for completion of a Security Requirements Check List (SRCL)

The instruction sheet should remain attached until Block #17 has been completed.

GENERAL - PROCESSING THIS FORM

The project authority shall arrange to complete this form.

The organization security officer shall review and approve the security requirements identified in the form, in cooperation with the project authority.

The contracting security authority is the organization responsible for ensuring that the suppliers are compliant with the security requirements identified in the SRCL.

All requisitions and subsequent tender / contractual documents including subcontracts that contain PROTECTED and/or CLASSIFIED requirements must be accompanied by a completed SRCL.

It is important to identify the level of PROTECTED information or assets as Level "A," "B" or "C," when applicable; however, certain types of information may only be identified as "PROTECTED". No information pertaining to a PROTECTED and/or CLASSIFIED government contract may be released by suppliers, without prior written approval of the individual identified in Block 17 of this form.

The classification assigned to a particular stage in the contractual process does not mean that everything applicable to that stage is to be given the same classification. Every item shall be PROTECTED and/or CLASSIFIED according to its own content. If a supplier is in doubt as to the actual level to be assigned, they should consult with the individual identified in Block 17 of this form.

PART A - CONTRACT INFORMATION

Contract Number (top of the form)

This number must be the same as that found on the requisition and should be the one used when issuing an RFP or contract. This is a unique number (i.e. no two requirements will have the same number). A new SRCL must be used for each new requirement or requisition (e.g. new contract number, new SRCL, new signatures).

1. Originating Government Department or Organization

Enter the department or client organization name or the prime contractor name for which the work is being performed.

2. Directorate / Branch

This block is used to further identify the area within the department or organization for which the work will be conducted.

3. a) Subcontract Number

If applicable, this number corresponds to the number generated by the Prime Contractor to manage the work with its subcontractor.

b) Name and Address of Subcontractor

Indicate the full name and address of the Subcontractor if applicable.

4. Brief Description of Work

Provide a brief explanation of the nature of the requirement or work to be performed.

5. a) Will the supplier require access to Controlled Goods?

*The Defence Production Act (DPA) defines "Controlled Goods" as certain goods listed in the Export Control List, a regulation made pursuant to the *Export and Import Permits Act* (EIPA). Suppliers who examine, possess, or transfer Controlled Goods within Canada must register in the Controlled Goods Directorate or be exempt from registration. More information may be found at www.cgd.gc.ca.*

b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations?

The prime contractor and any subcontractors must be certified under the U.S./Canada Joint Certification Program if the work involves access to unclassified military data subject to the provisions of the Technical Data Control Regulations. More information may be found at www.dlis.dla.mil/jcp.

6. Indicate the type of access required

Identify the nature of the work to be performed for this requirement. The user is to select one of the following types:

a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets?

The supplier would select this option if they require access to PROTECTED and/or CLASSIFIED information or assets to perform the duties of the requirement.

b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted.

The supplier would select this option if they require regular access to government premises or a secure work site only. The supplier will not have access to PROTECTED and/or CLASSIFIED information or assets under this option.

c) Is this a commercial courier or delivery requirement with no overnight storage?

The supplier would select this option if there is a commercial courier or delivery requirement. The supplier will not be allowed to keep a package overnight. The package must be returned if it cannot be delivered.

7. Type of information / Release restrictions / Level of information

Identify the type(s) of information that the supplier may require access to, list any possible release restrictions, and if applicable, provide the level(s) of the information. The user can make multiple selections based on the nature of the work to be performed.

Departments must process SRCLs through PWGSC where:

- contracts that afford access to PROTECTED and/or CLASSIFIED foreign government information and assets;
- contracts that afford foreign contractors access to PROTECTED and/or CLASSIFIED Canadian government information and assets; or
- contracts that afford foreign or Canadian contractors access to PROTECTED and/or CLASSIFIED information and assets as defined in the documents entitled Identifying INFOSEC and INFOSEC Release.

a) Indicate the type of information that the supplier will be required to access

Canadian government information and/or assets

If Canadian information and/or assets are identified, the supplier will have access to PROTECTED and/or CLASSIFIED information and/or assets that are owned by the Canadian government.

NATO information and/or assets

If NATO information and/or assets are identified, this indicates that as part of this requirement, the supplier will have access to PROTECTED and/or CLASSIFIED information and/or assets that are owned by NATO governments. NATO information and/or assets are developed and/or owned by NATO countries and are not to be divulged to any country that is not a NATO member nation. Persons dealing with NATO information and/or assets must hold a NATO security clearance and have the required need-to-know.

Requirements involving CLASSIFIED NATO information must be awarded by PWGSC. PWGSC / CIISD is the Designated Security Authority for industrial security matters in Canada.

Foreign government information and/or assets

If foreign information and/or assets are identified, this requirement will allow access to information and/or assets owned by a country other than Canada.

b) Release restrictions

If **Not Releasable** is selected, this indicates that the information and/or assets are for **Canadian Eyes Only (CEO)**. Only Canadian suppliers based in Canada can bid on this type of requirement. NOTE: If Canadian information and/or assets coexists with CEO information and/or assets, the CEO information and/or assets must be stamped **Canadian Eyes Only (CEO)**.

If **No Release Restrictions** is selected, this indicates that access to the information and/or assets are not subject to any restrictions.

If **ALL NATO countries** is selected, bidders for this requirement must be from NATO member countries only.

NOTE: There may be multiple release restrictions associated with a requirement depending on the nature of the work to be performed. In these instances, a security guide should be added to the SRCL clarifying these restrictions. The security guide is normally generated by the organization's project authority and/or security authority.

c) Level of information

Using the following chart, indicate the appropriate level of access to information/assets the supplier must have to perform the duties of the requirement.

| PROTECTED | CLASSIFIED | NATO |
|-------------|---------------------|-------------------|
| PROTECTED A | CONFIDENTIAL | NATO UNCLASSIFIED |
| PROTECTED B | SECRET | NATO RESTRICTED |
| PROTECTED C | TOP SECRET | NATO CONFIDENTIAL |
| | TOP SECRET (SIGINT) | NATO SECRET |
| | | COSMIC TOP SECRET |

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?

If Yes, the supplier personnel requiring access to COMSEC information or assets must receive a COMSEC briefing. The briefing will be given to the "holder" of the COMSEC information or assets. In the case of a "personnel assigned" type of contract, the customer department will give the briefing. When the supplier is required to receive and store COMSEC information or assets on the supplier's premises, the supplier's COMSEC Custodian will give the COMSEC briefings to the employees requiring access to COMSEC information or assets. If Yes, the Level of sensitivity must be indicated.

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?

If Yes, the supplier must provide the Short Title of the material and the Document Number. Access to extremely sensitive INFOSEC information or assets will require that the supplier undergo a Foreign Ownership Control or Influence (FOCI) evaluation by CIISD.

PART B - PERSONNEL (SUPPLIER)

10. a) Personnel security screening level required

Identify the screening level required for access to the information/assets or client facility. More than one level may be identified depending on the nature of the work. Please note that Site Access screenings are granted for access to specific sites under prior arrangement with the Treasury Board of Canada Secretariat. A Site Access screening only applies to individuals, and it is not linked to any other screening level that may be granted to individuals or organizations.

| RELIABILITY STATUS | CONFIDENTIAL | SECRET |
|--------------------|---------------------|-------------------|
| TOP SECRET | TOP SECRET (SIGINT) | NATO CONFIDENTIAL |
| NATO SECRET | COSMIC TOP SECRET | SITE ACCESS |

If multiple levels of screening are identified, a Security Classification Guide must be provided.

b) May unscreened personnel be used for portions of the work?

Indicating Yes means that portions of the work are not PROTECTED and/or CLASSIFIED and may be performed outside a secure environment by unscreened personnel. The following question must be answered if unscreened personnel will be used:

Will unscreened personnel be escorted?

If No, unscreened personnel may not be allowed access to sensitive work sites and must not have access to PROTECTED and/or CLASSIFIED information and/or assets.

If Yes, unscreened personnel must be escorted by an individual who is cleared to the required level of security in order to ensure there will be no access to PROTECTED and/or CLASSIFIED information and/or assets at the work site.

PART C - SAFEGUARDS (SUPPLIER)

11. INFORMATION / ASSETS

a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information and/or assets on its site or premises?

If Yes, specify the security level of the documents and/or equipment that the supplier will be required to safeguard at their own site or premises using the summary chart.

b) Will the supplier be required to safeguard COMSEC information or assets?

If Yes, specify the security level of COMSEC information or assets that the supplier will be required to safeguard at their own site or premises using the summary chart.

PRODUCTION

c) Will the production (manufacture, repair and/or modification) of PROTECTED and/or CLASSIFIED material and/or equipment occur at the supplier's site or premises?

Using the summary chart, specify the security level of material and/or equipment that the supplier manufactured, repaired and/or modified and will be required to safeguard at their own site or premises.

INFORMATION TECHNOLOGY (IT)

d) Will the supplier be required to use its IT systems to electronically process and/or produce or store PROTECTED and/or CLASSIFIED information and/or data?

If Yes, specify the security level in the summary chart. This block details the information and/or data that will be electronically processed or produced and stored on a computer system. The client department and/or organization will be required to specify the IT security requirements for this procurement in a separate technical document. The supplier must also direct their attention to the following document: Treasury Board of Canada Secretariat - Operational Security Standard: Management of Information Technology Security (MITS).

e) Will there be an electronic link between the supplier’s IT systems and the government department or agency?

If Yes, the supplier must have their IT system(s) approved. The Client Department must also provide the Connectivity Criteria detailing the conditions and the level of access for the electronic link (usually not higher than PROTECTED B level).

SUMMARY CHART

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier’s site(s) or premises.

For users completing the form **online** (via the Internet), the Summary Chart is automatically populated by your responses to previous questions.

| PROTECTED | CLASSIFIED | NATO | COMSEC |
|-------------|---------------------|-------------------|--------------|
| PROTECTED A | CONFIDENTIAL | NATO RESTRICTED | PROTECTED A |
| PROTECTED B | SECRET | NATO CONFIDENTIAL | PROTECTED B |
| PROTECTED C | TOP SECRET | NATO SECRET | PROTECTED C |
| | TOP SECRET (SIGINT) | COSMIC TOP SECRET | CONFIDENTIAL |
| | | | SECRET |
| | | | TOP SECRET |

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?

If Yes, classify this form by annotating the top and bottom in the area entitled “Security Classification”.

b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?

If Yes, classify this form by annotating the top and bottom in the area entitled “Security Classification” and indicate with attachments (e.g. SECRET with Attachments).

PART D - AUTHORIZATION

13. Organization Project Authority

This block is to be completed and signed by the appropriate project authority within the client department or organization (e.g. the person responsible for this project or the person who has knowledge of the requirement at the client department or organization). This person may on occasion be contacted to clarify information on the form.

14. Organization Security Authority

This block is to be signed by the Departmental Security Officer (DSO) (or delegate) of the department identified in Block 1, or the security official of the prime contractor.

15. Are there additional instructions (e.g. Security Guide, Security Classification Guide) attached?

A Security Guide or Security Classification Guide is used in conjunction with the SRCL to identify additional security requirements which do not appear in the SRCL, and/or to offer clarification to specific areas of the SRCL.

16. Procurement Officer

This block is to be signed by the procurement officer acting as the contract or subcontract manager.

17. Contracting Security Authority

This block is to be signed by the Contract Security Official. Where PWGSC is the Contract Security Authority, Canadian and International Industrial Security Directorate (CIISD) will complete this block.

Instructions pour établir la Liste de vérification des exigences relatives à la sécurité (LVERS)

La feuille d'instructions devrait rester jointe au formulaire jusqu'à ce que la case 17 ait été remplie.

GÉNÉRALITÉS - TRAITEMENT DU PRÉSENT FORMULAIRE

Le responsable du projet doit faire remplir ce formulaire.

L'agent de sécurité de l'organisation doit revoir et approuver les exigences de sécurité qui figurent dans le formulaire, en collaboration avec le responsable du projet.

Le responsable de la sécurité des marchés est le responsable chargé de voir à ce que les fournisseurs se conforment aux exigences de sécurité mentionnées dans la LVERS.

Toutes les demandes d'achat ainsi que tous les appels d'offres et les documents contractuels subséquents, y compris les contrats de sous-traitance, qui comprennent des exigences relatives à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS doivent être accompagnés d'une LVERS dûment remplie.

Il importe d'indiquer si les renseignements ou les biens PROTÉGÉS sont de niveau A, B ou C, le cas échéant; cependant, certains types de renseignements peuvent être indiqués par la mention « PROTÉGÉ » seulement. Aucun renseignement relatif à un contrat gouvernemental PROTÉGÉ ou CLASSIFIÉ ne peut être divulgué par les fournisseurs sans l'approbation écrite préalable de la personne dont le nom figure à la case 17 de ce formulaire.

La classification assignée à un stade particulier du processus contractuel ne signifie pas que tout ce qui se rapporte à ce stade doit recevoir la même classification. Chaque article doit être PROTÉGÉ et/ou CLASSIFIÉ selon sa propre nature. Si un fournisseur ne sait pas quel niveau de classification assigner, il doit consulter la personne dont le nom figure à la case 17 de ce formulaire.

PARTIE A - INFORMATION CONTRACTUELLE

Numéro du contrat (au haut du formulaire)

Ce numéro doit être le même que celui utilisé sur la demande d'achat et services et devrait être celui utilisé dans la DDP ou dans le contrat. Il s'agit d'un numéro unique (c.-à-d. que le même numéro ne sera pas attribué à deux besoins distincts). Une nouvelle LVERS doit être utilisée pour chaque nouveau besoin ou demande (p. ex. un nouveau numéro de contrat, une nouvelle LVERS, de nouvelles signatures).

1. Ministère ou organisme gouvernemental d'origine

Inscrire le nom du ministère ou de l'organisme client ou le nom de l'entrepreneur principal pour qui les travaux sont effectués.

2. Direction générale ou Direction

Cette case peut servir à fournir plus de détails quant à la section du ministère ou de l'organisme pour qui les travaux sont effectués.

3. a) Numéro du contrat de sous-traitance

S'il y a lieu, ce numéro correspond au numéro généré par l'entrepreneur principal pour gérer le travail avec son sous-traitant.

b) Nom et adresse du sous-traitant

Indiquer le nom et l'adresse au complet du sous-traitant, s'il y a lieu.

4. Brève description du travail

Donner un bref aperçu du besoin ou du travail à exécuter.

5. a) Le fournisseur aura-t-il accès à des marchandises contrôlées?

La *Loi sur la production de défense* (LPD) définit « marchandises contrôlées » comme désignant certains biens énumérés dans la Liste des marchandises d'exportation contrôlée, un règlement établi en vertu de la *Loi sur les licences d'exportation et d'importation* (LLEI). Les fournisseurs qui examinent, possèdent ou transfèrent des marchandises contrôlées à l'intérieur du Canada doivent s'inscrire à la Direction des marchandises contrôlées ou être exemptés de l'inscription. On trouvera plus d'information à l'adresse www.cgp.gc.ca.

b) Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?

L'entrepreneur et tout sous-traitant doivent être accrédités en vertu du Programme mixte d'agrément Etats-Unis / Canada si le travail comporte l'accès à des données militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques. On trouvera plus d'information à l'adresse www.dlis.dla.mil/jcp/.

6. Indiquer le type d'accès requis

Indiquer la nature du travail à exécuter pour répondre à ce besoin. L'utilisateur doit choisir un des types suivants :

a) Le fournisseur et ses employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS?

Le fournisseur choisit cette option s'il doit avoir accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS pour accomplir le travail requis.

b) Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.

Le fournisseur choisit cette option seulement s'il doit avoir accès régulièrement aux locaux du gouvernement ou à un lieu de travail protégé. Le fournisseur n'aura pas accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS en vertu de cette option.

c) S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?

Le fournisseur choisit cette option s'il y a nécessité de recourir à un service de messagerie ou de livraison commerciale. Le fournisseur ne sera pas autorisé à garder un colis pendant la nuit. Le colis doit être retourné s'il ne peut pas être livré.

7. Type d'information / Restrictions relatives à la diffusion / Niveau d'information

Indiquer le ou les types d'information auxquels le fournisseur peut devoir avoir accès, énumérer toutes les restrictions possibles relatives à la diffusion, et, s'il y a lieu, indiquer le ou les niveaux d'information. L'utilisateur peut faire plusieurs choix selon la nature du travail à exécuter.

Les ministères doivent soumettre la LVERS à TPSGC lorsque:

- les marchés prévoient l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS étrangers ;
- les marchés prévoient aux entrepreneurs étrangers l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS canadiens; ou
- les marchés prévoient aux entrepreneurs étrangers ou canadiens l'accès aux renseignements et aux biens de nature PROTÉGÉS et/ou CLASSIFIÉS tels que définis dans les documents intitulés Moyens INFOSEC détermination et Divulgateion de INFOSEC.

a) Indiquer le type d'information auquel le fournisseur devra avoir accès

Renseignements et/ou biens du gouvernement canadien

Si des renseignements et/ou des biens canadiens sont indiqués, le fournisseur aura accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS appartenant au gouvernement canadien.

Renseignements et/ou biens de l'OTAN

Si des renseignements et/ou des biens de l'OTAN sont indiqués, cela signifie que, dans le cadre de ce besoin, le fournisseur aura accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS appartenant à des gouvernements membres de l'OTAN. Les renseignements et/ou les biens de l'OTAN sont élaborés par des pays de l'OTAN ou leur appartiennent et ne doivent être divulgués à aucun pays qui n'est pas un pays membre de l'OTAN. Les personnes qui manient des renseignements et/ou des biens de l'OTAN doivent détenir une autorisation de sécurité de l'OTAN et avoir besoin de savoir.

Les contrats comportant des renseignements CLASSIFIÉS de l'OTAN doivent être attribués par TPSGC. La DSICI de TPSGC est le responsable de la sécurité désigné relativement aux questions de sécurité industrielle au Canada.

Renseignements et/ou biens de gouvernements étrangers

Si des renseignements et/ou des biens de gouvernements étrangers sont indiqués, ce besoin permettra l'accès à des renseignements et/ou à des biens appartenant à un pays autre que le Canada.

b) Restrictions relatives à la diffusion

Si **À ne pas diffuser** est choisi, cela indique que les renseignements et/ou les biens sont **réservés aux Canadiens**. Seuls des fournisseurs canadiens installés au Canada peuvent soumissionner ce genre de besoin. NOTA : Si des renseignements et/ou des biens du gouvernement canadien coexistent avec des renseignements et/ou des biens réservés aux Canadiens, ceux-ci doivent porter la mention **Réservé aux Canadiens**.

Si **Aucune restriction relative à la diffusion** est choisi, cela indique que l'accès aux renseignements et/ou aux biens n'est assujéti à aucune restriction.

Si **Tous les pays de l'OTAN** est choisi, les soumissionnaires doivent appartenir à un pays membre de l'OTAN.

NOTA : Il peut y avoir plus d'une restriction s'appliquant à une demande, selon la nature des travaux à exécuter. Pour ce genre de contrat, un guide de sécurité doit être joint à la LVERS afin de clarifier les restrictions. Ce guide est généralement préparé par le chargé de projet et/ou le responsable de la sécurité de l'organisme.

c) Niveau d'information

À l'aide du tableau ci-dessous, indiquer le niveau approprié d'accès aux renseignements et/ou aux biens que le fournisseur doit avoir pour accomplir les travaux requis.

| PROTÉGÉ | CLASSIFIÉ | NATO |
|-----------|----------------------|---------------------------|
| PROTÉGÉ A | CONFIDENTIEL | NATO NON CLASSIFIÉ |
| PROTÉGÉ B | SECRET | NATO DIFFUSION RESTREINTE |
| PROTÉGÉ C | TRÈS SECRET | NATO CONFIDENTIEL |
| | TRÈS SECRET (SIGINT) | NATO SECRET |
| | | COSMIC TRÈS SECRET |

8. Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?

Si la réponse est Oui, les membres du personnel du fournisseur qui doivent avoir accès à des renseignements ou à des biens COMSEC doivent participer à une séance d'information COMSEC. Cette séance sera donnée au « détenteur autorisé » des renseignements ou des biens COMSEC. Dans le cas des contrats du type « personnel affecté », cette séance sera donnée par le ministère client. Lorsque le fournisseur doit recevoir et conserver, dans ses locaux, des renseignements ou des biens COMSEC, le responsable de la garde des renseignements ou des biens COMSEC de l'entreprise donnera la séance d'information COMSEC aux membres du personnel qui doivent avoir accès à des renseignements ou à des biens COMSEC.

9. Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

Si la réponse est Oui, le fournisseur doit indiquer le titre abrégé du document, le numéro du document et le niveau de sensibilité. L'accès à des renseignements ou à des biens extrêmement délicats INFOSEC exigera que le fournisseur fasse l'objet d'une vérification Participation, contrôle et influence étrangers (PCIE) effectuée par la DSICI.

PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Niveau de contrôle de la sécurité du personnel requis

Indiquer le niveau d'autorisation de sécurité que le personnel doit détenir pour avoir accès aux renseignements, aux biens ou au site du client. Selon la nature du travail, il peut y avoir plus d'un niveau de sécurité. Veuillez noter que des cotes de sécurité sont accordées pour l'accès à des sites particuliers, selon des dispositions antérieures prises auprès du Secrétariat du Conseil du Trésor du Canada. La cote de sécurité donnant accès à un site s'applique uniquement aux personnes et n'est liée à aucune autre autorisation de sécurité accordée à des personnes ou à des organismes.

| COTE DE FIABILITÉ | CONFIDENTIEL | SECRET |
|-------------------|----------------------|--------------------|
| TRÈS SECRET | TRÈS SECRET (SIGINT) | NATO CONFIDENTIEL |
| NATO SECRET | COSMIC TRÈS SECRET | ACCÈS AUX EMBLEMES |

Si plusieurs niveaux d'autorisation de sécurité sont indiqués, un guide de classification de sécurité doit être fourni.

b) Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?

Si la réponse est Oui, cela veut dire que certaines tâches ne sont pas PROTÉGÉES et/ou CLASSIFIÉES et peuvent être exécutées à l'extérieur d'un environnement sécurisé par du personnel n'ayant pas d'autorisation de sécurité. Il faut répondre à la question suivante si l'on a recours à du personnel n'ayant pas d'autorisation de sécurité :

Le personnel n'ayant pas d'autorisation de sécurité sera-t-il escorté?

Si la réponse est Non, le personnel n'ayant pas d'autorisation de sécurité ne pourra pas avoir accès à des lieux de travail dont l'accès est réglementé ni à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS.

Si la réponse est Oui, le personnel n'ayant pas d'autorisation de sécurité devra être escorté par une personne détenant la cote de sécurité requise, pour faire en sorte que le personnel en question n'ait pas accès à des renseignements et/ou à des biens PROTÉGÉS et/ou CLASSIFIÉS sur les lieux de travail.

PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

11. RENSEIGNEMENTS / BIENS :

a) Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

Si la réponse est Oui, préciser, à l'aide du tableau récapitulatif, le niveau de sécurité des documents ou de l'équipement que le fournisseur devra protéger dans ses installations.

b) Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

Si la réponse est Oui, préciser, à l'aide du tableau récapitulatif, le niveau de sécurité des renseignements ou des biens COMSEC que le fournisseur devra protéger dans ses installations.

PRODUCTION

c) Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

Préciser, à l'aide du tableau récapitulatif, le niveau de sécurité du matériel que le fournisseur fabriquera, réparera et/ou modifiera et devra protéger dans ses installations.

TECHNOLOGIE DE L'INFORMATION (TI)

d) Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?

Si la réponse est Oui, préciser le niveau de sécurité à l'aide du tableau récapitulatif. Cette case porte sur les renseignements qui seront traités ou produits électroniquement et stockés dans un système informatique. Le ministère/organisme client devra préciser les exigences en matière de sécurité de la TI relativement à cet achat dans un document technique distinct. Le fournisseur devra également consulter le document suivant : Secrétariat du Conseil du Trésor du Canada – Norme opérationnelle de sécurité : Gestion de la sécurité des technologies de l'information (GSTI).

e) Y aura-t-il un lien électronique entre les systèmes informatiques du fournisseur et celui du ministère ou de l'agence gouvernementale?

Si la réponse est Oui, le fournisseur doit faire approuver ses systèmes informatiques. Le ministère client doit aussi fournir les critères de connectivité qui décrivent en détail les conditions et le niveau de sécurité relativement au lien électronique (habituellement pas plus haut que le niveau PROTÉGÉ B).

TABLEAU RÉCAPITULATIF

Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

| PROTÉGÉ | CLASSIFIÉ | NATO | COMSEC |
|-----------|----------------------|---------------------------|--------------|
| PROTÉGÉ A | CONFIDENTIEL | NATO DIFFUSION RESTREINTE | PROTÉGÉ A |
| PROTÉGÉ B | SECRET | NATO CONFIDENTIEL | PROTÉGÉ B |
| PROTÉGÉ C | TRÈS SECRET | NATO SECRET | PROTÉGÉ C |
| | TRÈS SECRET (SIGINT) | COSMIC TRÈS SECRET | CONFIDENTIEL |
| | | | SECRET |
| | | | TRÈS SECRET |

12. a) La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

Si la réponse est Oui, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de

sécurité » au haut et au bas du formulaire.

b) La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

Si la réponse est Oui, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

PARTIE D - AUTORISATION

13. Chargé de projet de l'organisme

Cette case doit être remplie et signée par le chargé de projet pertinent (c.-à-d. la personne qui est responsable de ce projet ou qui connaît le besoin au ministère ou à l'organisme client. On peut, à l'occasion, communiquer avec cette personne pour clarifier des renseignements figurant sur le formulaire.

14. Responsable de la sécurité de l'organisme

Cette case doit être signée par l'agent de la sécurité du ministère (ASM) du ministère indiqué à la case 1 ou par son remplaçant ou par le responsable de la sécurité du fournisseur.

15. Des instructions supplémentaires (p. ex. Guide de sécurité, Guide de classification de la sécurité) sont-elles jointes?

Un Guide de sécurité ou un Guide de classification de sécurité sont utilisés de concert avec la LVERS pour faire part d'exigences supplémentaires en matière de sécurité qui n'apparaissent pas dans la LVERS et/ou pour éclaircir certaines parties de la LVERS.

16. Agent d'approvisionnement

Cette case doit être signée par l'agent des achats qui fait fonction de gestionnaire du contrat ou du contrat de sous-traitance.

17. Autorité contractante en matière de sécurité

Cette case doit être signée par l'agent de la sécurité du marché. Lorsque TPSGC est le responsable de la sécurité du marché, la Direction de la sécurité industrielle canadienne et internationale (DSICI) doit remplir cette case.