

Town of Inuvik

MSC Electrical Upgrades Inuvik, NWT

Prepared by:

AECOM

101, 18817 Stony Plain Road 780 486 7000 tel
Edmonton, AB, Canada, T5S 0C2 780 486 7070 fax
www.aecom.com

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Divisions 1, 26



Division 5, 9, 33



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Notice to Bidders

TOWN OF INUVIK

Bid for: MSC Electrical Upgrades.

Sealed envelopes containing Bids clearly marked "MSC Electrical Upgrades" and addressed to Town of Inuvik, Town Office, 2 Firth Street, P.O. Box 1160, Inuvik, NWT, X0E 0T0 shall be received at the offices of the Town of Inuvik before 2:00:00 p.m., local time, on December 6, 2017.

The Work generally comprises:

- .1 The following is an approximate description of the Work to be completed under this Contract. Supply all labour, materials and equipment necessary for the MSC Electrical Upgrades. The work of the project includes, but is not limited to, the following (quantities and measurements being approximate and rounded):
 - .1 Supply and installation of generator building and electrical equipment within.
 - .2 Supply and installation of steel pipe piles.
 - .3 Supply and installation of arena lighting controls.
 - .4 Supply and installation of Fitness Area panelboard and associated work.
 - .5 All other work as detailed in the specifications and shown on the Contract Drawings.
- .2 **Mandatory Pre-Bid Site Walk-Thru on November 20, 2017**

Copies of the Bid Documents can be obtained from the offices of the Town of Inuvik and at the offices of AECOM Canada Ltd., 101, 18817 Stony Plain Road NW, Edmonton, AB on or after November 15, 2017, upon receipt of a \$100.00 non-refundable deposit by cheque, made payable to AECOM Canada Ltd.

Bids should be accompanied by Bid Security in the amount of ten percent (10%) of the Bid Price, payable to the Town of Inuvik. Failure to provide Bid Security will be a factor taken into account when awarding the contract.

Inquiries regarding this Project shall be directed to:

AECOM Canada Ltd.

101, 18817 Stony Plain Road NW
Edmonton, AB T5S 0C2
Attention: Jordan Hoffart, P.Eng.

Telephone: 780.486.7000
Facsimile: 780.486.7070

Town of Inuvik

2 Firth Street
P.O. Box 1160
Inuvik, NWT X0E 0T0

Attention: Senior Administrative Officer

Part I
Instructions to Bidders

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Part I

Instructions to Bidders

1. Submission of Bids. Bids shall be made on the Bid Form provided and shall be submitted in a sealed envelope clearly marked and addressed as follows:

Town of Inuvik _____

Town Office _____

2 Firth Street _____

Inuvik, NWT X0E 0T0 _____

(“Closing Place”)

Bid for:

MSC Electrical Upgrades _____

(the “Project”)

must be delivered to the **Closing Place** before the **Bid Closing Time** of 2:00:00 p.m. local time on December 6, 2017. The time will be conclusively determined by a clock designated by the Owner or the Consultant.

Any **Bids** received after the **Bid Closing Time** shall be returned to the **Bidder** unopened.

All requirements that use the word “shall” or “must” are mandatory and the **Bidder’s Bid** must substantially comply or fulfill such requirements or it shall be rejected as non-compliant. All requirements that use the term “should” are desired and the **Bidder’s** response to such requirements shall be considered in analysing the **Bids**.

The **Owner** and the **Consultant** shall only be responsible for lost or misplaced **Bids**, or amendments to **Bids**, if they have exercised bad faith or have been fraudulent with respect to the loss or misplacement.

2. Bids to be Under Seal. All Bids shall be signed and sealed in the case of a corporation and in the case of an individual, partnership or non-incorporated organization shall be signed and witnessed.

If a **Bid** is submitted by a consortium, each member of the consortium shall sign and seal or witness the **Bid** as described above.

3. Acceptability and Evaluation of Bids. Bids should be completed fully in ink or typewritten. Bids submitted via facsimile transmittal shall be rejected. Bids that have been submitted in accordance with these Instructions to Bidders may be modified via facsimile transmittal, however, pursuant to Clause 17 hereof.

The **Owner** is not under any obligation to award a contract, and reserves the right in its discretion to cancel these **Instructions to Bidders** at any time for any reason or without reason. Award of a contract may be contingent upon budget approval or other corporate, regulatory or other

pre-conditions. The **Owner** may, in its discretion, re-tender, or negotiate with any party (including a **Bidder**) the same or similar project at any time after cancellation of these **Instructions to Bidders**.

The **Owner** reserves the right to accept the Bid that it deems in its discretion most advantageous. The Bid having the lowest cost to the **Owner** or any Bid shall not necessarily be accepted. The **Owner** may take into account any criteria that it desires including, without limitation, the following (not necessarily in order of importance):

- (a) the qualifications of the **Bidder** (as described below);
- (b) **Bid Price**;
- (c) **Completion Date**;
- (d) the **Owner's** (positive or negative) relationship with any **Bidder**;
- (e) the use of equivalents/alternates;
- (f) the quality and responsiveness of the **Bid**, including, without limitation, all requested information; and
- (g) the following additional criteria: _____
Past Experience

Schedule

Local Content

The **Owner** is not obliged to inform the **Bidders** of the relative weight to be given to any particular evaluation criteria, to open the **Bids** publicly, or to provide reasons to any **Bidder** with respect to any use of the **Owner's** discretion.

The **Owner** and the **Consultant** may make such investigations as they deem necessary to determine the ability of any **Bidder** and its named subcontractors to perform the **Work** and the **Owner** may utilize the results of such investigation in awarding the **Contract**.

Qualifications of the **Bidder** may include consideration of the:

- (a) experience, and present workload and capacity of the **Bidders**, their proposed project personnel (including their proposed superintendent) and their nominated **Suppliers** and **Subcontractors**;
- (b) adequacy of proposed construction plant and equipment and labour;
- (c) financial capability and credit-worthiness of the **Bidders** and the **Owner's** overall assessment of each **Bidder's** ability to perform and complete the **Work** in accordance with the **Bid Documents** and in co-ordination with other contractors who may be located on the site; and
- (d) verification of (a) through (c) through third party references and inquiries.

The relative weight given to selection criteria shall be determined in the discretion of the **Owner**.

The **Owner** reserves the right, in its discretion, to seek further information from, or clarification of, any **Bid** submitted by any **Bidder** in respect of any of the terms and conditions of the **Contract Documents**. The **Owner** is entitled to utilize the information or clarifications received in awarding the **Contract**.

Accepted alternates and equivalents may, at the **Owner's** option, be considered in conjunction with the base bid in determining the price to be used in contract award.

The **Bidder** acknowledges and agrees that it shall have no claim against, or entitlement to damages from, the **Owner** or the **Consultant** by reason of the **Owner's** rejection of its **Bid** or all **Bids**.

Receipt of an invitation to bid by a **Bidder** or receipt and evaluation by the **Owner** of a **Bid** does not imply that any **Bidder** is qualified.

4. Bid Documents. The Bid Documents shall consist of the following:

- **Part I - Instructions to Bidders**
- **Part II - Bid Form**
- **Part IIA - Supplementary Bid Form**
- **Addenda (if any)**
- **Part III - Consent of Surety**
- **Bid Security**
- **Part IV - Agreement**
- **Part V - Definitions**
- **Part VI - General Conditions**
- **Supplementary Conditions**
- **General Requirements**
- **Drawings and Specifications, as listed in the index of the Bid Documents**
- **Schedules**

5. Omissions or Discrepancies. Should the Bidder find discrepancies in, or omissions from, the Bid Documents, or be in doubt as to their meaning, it should at once notify the Consultant, who may send an Addendum to all Bidders. No oral interpretation made by the Consultant to any Bidder as to the meaning of any part of the Bid Documents shall be binding upon the Owner, or be effective to modify any of the provisions of the Bid Documents. Words and abbreviations used in the Bid Documents which have well known technical or trade meanings, or are defined in the Bid Documents, shall be interpreted in accordance with such meanings or definitions. Every request for an interpretation shall be made in writing and promptly forwarded to the Consultant at the following address:

AECOM Canada Ltd.
101, 18817 Stony Plain Road, NW
Edmonton, AB T5S 0C2
Attention: Jordan Hoffart, P.Eng.
Phone: 780-486-7000 / Email: Jordan.Hoffart@aecom.com

6. **Bid Security.** The Bid should be accompanied by Bid Security in the form of a certified cheque or original bid bond, issued by a duly licensed surety company authorized to transact a business of suretyship in the jurisdiction of the Place of the Work, made payable to the Owner in the amount of ten percent (10%) of the Bid Price. The Bidder, with its Bid, should enclose a statement from the Surety substantially in the form of the Consent of Surety stating that the Surety is willing to supply the Contract Security referred to below. The Consent of Surety should be provided whether the Bidder uses a bid bond or a certified cheque under this Clause 6.
7. **Contract Security.** Pursuant to GC 44, the successful Bidder shall, within seven (7) Days of the date of the Notice of Acceptance of the Contract or such longer time as the parties may agree, provide the Contract Security required by GC 44. The cost of such security shall be borne by the successful Bidder.
8. **Alternate Prices.** Where called for, the Bidder must submit prices for all alternates shown in the places provided in the Bid Form.
9. **Substitutions.** Where the Bid Documents stipulate that a particular kind or make of material or equipment shall be used, and allow for an equal or alternate material or equipment to be substituted, no such substitution may be made unless the Consultant has, five (5) Days prior to the Bid Closing Time, given written approval for such substitution.

When a request to substitute an allegedly equal material or equipment is made to the **Consultant**, the **Consultant** may approve the substitution either as an equal or an alternate. If an item is approved as an equal, the **Bidder** may use that item in place of the specified item. If the item is approved as an alternate, the **Bidder** shall base its **Bid Price** upon the specified item and shall indicate in its **Bid** the reduction in price which shall apply if use of the alternate item is allowed.

In submission of equals or alternates to items of material or equipment mentioned in the **Bid Documents**, the **Bidder** shall in its **Bid** give consideration to all changes required in the **Work** to accommodate such equals or alternates. A claim by the **Bidder** for an addition to the **Bid Price** because of changes in **Work** necessitated by the use of equals or alternates shall not be considered.

10. **GST/HST.** It shall be assumed, unless otherwise stated, that the Bid Price does not include GST/HST. The appropriate GST/HST levy shall be paid to the successful Bidder in addition to the amount approved by the Consultant for Work performed under the Contract and, therefore, shall not affect the Bid Price.
11. **Commencement of the Work.** The commencement date of the Work shall be the date of the Notice of Acceptance, unless otherwise stated in the Contract Documents.
12. **Material and Equipment Suppliers.** The Bidder should state, if requested in the Bid Form, the names of the material and equipment Suppliers it intends to use for the Work together with the trade or brand names of the material and equipment to be supplied.
13. **Subcontractors.** The Bidder should state, if requested in the Bid Form, the names of the Subcontractors and Suppliers it intends to use on the Work and the portion of the Work on which each Subcontractor is intended to be used.
14. **Superintendent.** The Bidder should state in its Bid Form the name of the superintendent it intends to use on the Work.
15. **Subdivision of Work.** The successful Bidder shall be responsible for the administration of the Work and the subdivision of the Work to Subcontractors. All disputes as to the scope of the Work to be carried out by Subcontractors shall be resolved by the successful Bidder so that all Work is carried out in accordance with the Bid Documents. No claims for extras shall be allowed on the

basis that Subcontractors did not include same in their scope of Work due to any subdivisions of Work expressed or implied in the Bid Documents.

16. Site Conditions and Information Documents. The Bidder should examine the Place of the Work and review the Information Documents before submitting its Bid, and should satisfy itself as to the nature and location of the Work, site conditions and all matters which can in any way affect the Work.

The **Information Documents** are furnished merely for the general reference and convenience of each **Bidder** and do not form part of the **Bid Documents**. The **Information Documents** are not in any way represented, warranted or guaranteed to be accurate or complete by the **Owner** or the **Consultant**. Each **Bidder** acknowledges and agrees that the **Owner** and the **Consultant** do not owe any duty of care to it concerning the accuracy or completeness of the **Information Documents** nor do they owe any duty of care to disclose any other information, data, reports or material relating to the **Work** or the **Place of the Work**.

17. Bid Modification.

- (a) A Bid submitted in accordance with these Instructions to Bidders may be modified provided the modification:

- (i) is in the form of a letter or a fax transmittal and all pages of such letter or fax transmittal are received at the Closing Place prior to the Bid Closing Time;
 - (ii) states the name of the Bidder and the nature of the modification; and
 - (iii) is signed by the Bidder's authorized representative.

- (b) Where a modification is directing a change in the Bid Price, the modification shall not reveal the original Bid Price nor the revised Bid Price:

- (i) on lump sum bids, only the amount to be added to or deducted from the original Bid Price shall be stated;
 - (ii) when unit prices are used, only the amount to be added to or deducted from each original unit price shall be stated;
 - (iii) the Consultant shall not accept responsibility for the content of modifications or modifications that are, for any reason, delayed, illegible or otherwise improperly received. The Owner may, in its discretion, disregard modifications that are improperly received.

18. Bid Withdrawal. Any Bidder may withdraw its Bid either personally or by written request prior to the Bid Closing Time. The withdrawal of a Bid shall not prejudice the right of such Bidder to submit a new Bid. In addition to any damages that the Owner may be entitled to, if a Bid is withdrawn after the Bid Closing Time, the accompanying Bid Security is subject to forfeiture in like manner as in the failure to execute an Agreement after award as provided herein.

19. Currency. All dollar amounts stated in the Bid Documents are in Canadian dollars unless otherwise indicated.

20. Agreement between the Owner and the Bidder. The Bidder agrees that the Owner's sole obligation is to give consideration to the Bid in accordance with the Bid Documents. In return, the Bidder has prepared and submitted its Bid, and agrees:
- (a) to enter into a contract with the Owner in accordance with the Bid Documents if the Owner issues a notice of acceptance within forty-five (45) days of the Bid Closing Time (or such longer period as is agreed between the parties)(the "Bid Period"); and
 - (b) that the **Bid** is irrevocable, valid and shall remain open for acceptance for the **Bid Period**.

21. Waiver. The Bidder hereby waives any claim for damages or costs of any nature against the Owner and the Consultant (including, without limitation, the cost of preparing and submitting the Bid, and any anticipated profits and contributions to overhead) arising out of the Owner's use of its discretion under the Bid Documents, and the Consultant's advice to the Owner.

In preparing and submitting the **Bid, Bidders** are advised that the **Owner** may award other contracts for work in the area.

22. Information Requests. The Bidder shall comply with any reasonable requests for information made by the Owner or the Consultant, including information about the Bidder and its superintendent, Subcontractors and Suppliers.

The **Bid** should include a complete list of **Subcontractors** and **Suppliers**.

23. Product or Material Items

- A. **Bidders** shall include in their Lump Sum Contract Price the installed cost of Product or Material listed in the Product or Material Schedule on the Bid Form.
- B. The installed cost of each item includes:
 - 1. Cost of a complete operating installation. Include additional costs such as overhead and profit for changing or modifying the Work such as piping, mechanical, electrical, structural support, accessories, and controls necessary to accommodate Project requirements.
 - 2. Cost of preparation of drawings and details showing modifications, if any, to facilitate project submittal requirements.
 - 3. Cost for the total number of units called for by the Contract Documents.

Part II
Bid Form

1. **FROM:** _____
(Bidder) _____

TO: Town of Inuvik
(Owner) Town Office, 2 Firth Street
Inuvik, NT X0E 0T0

PROJECT: MSC Electrical Upgrades
Inuvik, NT

2. The **Bidder**, having examined and read the **Bid Documents** and examined all conditions affecting the **Work**, is satisfied that it understands the **Bid Documents** and declares itself competent to perform the **Work**, and does hereby irrevocably bid and agree to perform the **Work** in accordance with the **Bid Documents**, for the **Bid Price** consisting of the sums listed in Schedule A attached hereto which form an integral part of this **Bid**. The **Bidder** hereby makes all of the representations to be made by the **Contractor** in Article 5 of Part IV - Agreement as if such were repeated herein.
3. The **Bidder** also agrees as follows:
- 3.1. Where quantities are included in this **Bid Form** and unit prices are requested, it is understood that:
- 3.1.1. the estimates of quantities shown in the unit price tables contained in this **Bid Form** are approximate only and for the sole purpose of comparing **Bids**;
 - 3.1.2. the actual quantities involved in carrying out the **Work** may be greater or less than the said estimates of quantities set forth in this **Bid Form**;
 - 3.1.3. in arriving at the unit prices set forth in this **Bid Form**, the **Bidder** has made its own estimates of the respective quantities involved and has not relied solely upon the estimates set forth in this **Bid Form**;
 - 3.1.4. except as otherwise set forth in the **General Conditions**, payment for **Work** carried out on a unit price basis shall be made on the basis of actual quantities as determined by the **Consultant** at the unit prices set forth in this **Bid Form** for

each respective item of unit price **Work**, which shall be compensation in full for such **Work** notwithstanding variations between actual and estimated quantities.

- 3.1.5. if there is a discrepancy found between the total **Bid Price** as determined by taking the total of all extensions of the unit prices multiplied by the estimated quantities shown in the **Bid Form** (the "**Calculated Bid Price**") and the total **Bid Price** as indicated herein, the unit prices shall govern and the **Calculated Bid Price** shall be used for determination of the actual **Bid Price**. Any calculations by the **Bidder** of the estimated **Bid Price** or its components are for convenience only. The **Owner** shall be entitled to recalculate the sum of the unit prices and the estimated quantities with the total of all such sums being the actual **Bid Price**. The **Owner** shall also be entitled to utilize updated estimated quantities rather than those shown in the **Bid Form** for such calculation where the **Owner** reasonably believes that such updated estimated quantities more accurately reflect the quantities to be utilized in the **Work**.
- 3.1.6. except as otherwise set forth in the **General Conditions**, no claim shall be made by the **Bidder** against the **Owner** or the **Consultant** on account of any loss of anticipated profits, for delays in the completion of the **Work** or any portion of the **Work** or for any other matter or thing arising from or related, directly or indirectly, to any variation between the estimated quantities set forth in this **Bid Form** and the actual quantities as determined by the **Consultant**.
4. Where the **Bid Price** is a lump sum and there is a discrepancy between the numerical and alphabetical **Bid Price**, the alphabetical **Bid Price** shall be considered as representing the intention of the **Bidder**.
5. This **Bid** is irrevocable, and open for acceptance by the **Owner**, for the **Bid Period**. Upon acceptance of this **Bid**, the **Owner** shall issue the **Notice of Acceptance** to the **Bidder**. Communication to the **Bidder** of the **Notice of Acceptance** by delivery, facsimile or posting by prepaid mail shall constitute acceptance of this **Bid**.
6. Within seven (7) **Days** from the date of receipt of the **Contract Documents**, the **Bidder** shall execute and return the **Agreement**, together with the **Contract Security** required pursuant to Clause 7 of the **Instructions to Bidders**, to the **Owner**. Should the **Bidder** fail to execute and return the **Agreement** and **Contract Security** as aforesaid, whether any other bid has previously been accepted or not, the **Bid Security** shall be forfeited to the **Owner** and the **Owner** shall be entitled to withdraw the **Notice of Acceptance**. The forfeiture of the **Bid Security** shall not be construed as a waiver of any rights or remedies which the **Owner** may have against the **Bidder** for loss or damage incurred or suffered in excess of the amount of the **Bid Security**.
7. The **Agreement** shall be dated as of the date of the **Notice of Acceptance**.
8. The **Bidder** shall perform the **Work** in such manner so as to complete the **Work** by June 30, 2018.
9. No person, firm or corporation other than the **Bidder** has any interest in this **Bid** or in the proposed **Contract** for which this **Bid** is made and to which it relates.
10. This **Bid** is made by the **Bidder** without any connection, knowledge, comparison of figures or arrangement with any other person or persons making a bid for the same **Contract**, and is in all respects fair and without collusion or fraud.

11. The list of materials and material **Suppliers** the **Bidder** intends to use on the **Work** is as follows:

Product or Material	Manufacturer, Fabricator or Supplier
Structural steel fabricator _____	_____
Generator fabricator _____	_____
Building fabricator _____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Note: List all significant items to be manufactured, fabricated or supplied for the project.

13. The list of **Subcontractors** the **Bidder** intends to use on the **Work** and the portion of the **Work** on which each **Subcontractor** shall be used are as follows:

Section of Work	Name
Survey and layout _____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Note: List all items of work to be subcontracted, and subcontractors. For items pre-listed indicate "own forces" if not subcontracted.

14. The superintendent(s) the **Bidder** intends to use on the **Work** is as follows:

15. The **Bidder** hereby acknowledges receipt of the following **Addenda** to the **Bid Documents**:

Addendum No. _____ Date of Issue _____

Addendum No. _____ Date of Issue _____

Addendum No. _____ Date of Issue _____

Addendum No. _____ Date of Issue _____

16. Accompanying this **Bid** is the **Bid Security** in the amount of _____ (\$_____) DOLLARS payable to the **Owner** which is subject to forfeiture as provided in Clause 6 hereof.

SIGNED AND DELIVERED at _____ this _____ day of _____, 20_____.

If Bidder is an incorporated entity:

_____)	
_____)	
Name of Corporation)	
_____)	
Signature of Authorized Representative)	(Corporate Seal)
_____)	
Name)	
_____)	
Title)	
_____)	
Address)	
_____)	
_____)	
_____)	

If **Bidder** is an individual or an unincorporated entity:

_____)	_____
_____)	_____
_____)	Signature of Witness
Name of Business (if any))	_____
_____)	Name
Signature of Individual)	_____
or Authorized Representative)	Address
_____)	_____
Name of Individual)	_____
or Authorized Representative)	_____
_____)	_____
Title)	_____
_____)	
Address)	
_____)	
_____)	
_____)	
_____)	

Part IIA
Supplementary Bid Form

Revise Item 8. to include Substantial Performance date.

8. The **Bidder** shall perform the **Work** in such manner so as to achieve **Substantial Performance** by May 31, 2018, and to complete the **Work** by June 30, 2018.

Revise Item 14 from list of superintendent(s) to list of key personnel.

14. The key personnel the **Bidder** intends to use on the **Work** are listed as follows:

Position or Role	Name
Corporate Principal-in-Charge _____	_____
Project Manager _____	_____
Materials order/expedite _____	_____
Site Superintendent _____	_____
Site Safety Officer* _____	_____
Surveyor* _____	_____
Pipe Welder* _____	_____
_____	_____
_____	_____
_____	_____

* If known.

Note: A person may be named to fill more than one management role. It is acceptable to list an alternate for a role. Add any key individuals known but not pre-listed. Corporate Principal-in-Charge has corporate responsibility and authority but not necessarily day-to-day involvement. Project Manager exercises day-to-day control over all aspects of work including subcontractors and has corresponding authority. Site Superintendent is personally present at site during work whether by own forces or subcontractors, directs work, solves problems, and personally checks all work, including subcontractors' work, for workmanship and for compliance with plans and specifications and project intent. Site Superintendent has a broad understanding of all aspects of the project and all trades work involved.

Add Item 16 as follows:

16. Related Corporate Experience: Relevant projects in which the **Bidder** was the General Contractor are listed below. References are supplied for listed projects.

We authorize the Owner and the Engineer to make enquiries of persons listed as references and as well of any others possibly having personal knowledge of listed projects for the purpose of evaluating project experience relevant to this bid. We agree to the use of our Related Corporate Experience for Bid evaluation and selection.

Project 1.1: Location, Owner, Year _____

Installed length _____ Approx. Cost _____

Additional description _____

Project Manager: _____ Site Superintendent: _____

References, including phone no.: _____

Project 1.2: Location, Owner, Year _____

Installed length _____ Approx. Cost _____

Additional description _____

Project Manager: _____ Site Superintendent: _____

References, including phone no.: _____

Notes:

1. List only projects done in the most recent five years.
2. For "Reference" provide contact name, relationship to project, and contact phone number. Owner's representatives preferred.

Project 2.2: Location, Owner, Year _____

Installed length _____ Approx. Cost _____

Additional description _____

Project Manager: _____ Site Superintendent: _____

References, including phone no.: _____

3. Generator c/w Building or Similar Construction Projects (List up to Two)

Project 3.1: Location, Owner, Year _____

Installed length _____ Approx. Cost _____

Additional description _____

Project Manager: _____ Site Superintendent: _____

References, including phone no.: _____

Project 3.2: Location, Owner, Year _____

Installed length _____ Approx. Cost _____

Additional description _____

Project Manager: _____ Site Superintendent: _____

References, including phone no.: _____

Part III
Consent of Surety

The undersigned surety company does hereby consent and agree to become bound as surety to provide the **Contract Security**

(a) in an approved performance bond for the amount of _____
_____ (\$ _____) Dollars

- and -

(b) in an approved labour and materials payment bond for the amount of _____
_____ (\$ _____) Dollars

all for the fulfilment of the **Contract** for the **Work** covered by the annexed **Contract Documents**, which may be awarded to:

Name of **Bidder**

Address

at the **Bid Price**. The undersigned surety company is legally entitled to do business in the Province of _____ and is worth, over and above its present liabilities, in excess of the total amount of the bonds referred to herein.

DATED at _____ this ____ day of _____, 20____.

Name of Surety Company

Address

(Corporate Seal)

Per: _____
Signature of Authorized Representative

Per: _____
Signature of Authorized Representative

Part IV
Agreement

THIS **AGREEMENT** made this _____ of _____, 20_____.

BETWEEN:

Town of Inuvik

Town Office, 2 Firth Street

Inuvik, NT X0E 0T0

(herein called the “**Owner**”)
OF THE FIRST PART

AND:

(herein called the “**Contractor**”)
OF THE SECOND PART

WITNESSES that the **Owner** and the **Contractor** covenant and agree as follows:

1. **Contract Documents**

1.1. That the following documents, together with this **Agreement**, shall constitute the **Contract Documents**:

- Part I - Instructions to Bidders**
- Part II - Bid Form**
- Part IIA - Supplementary Bid Form**
- Addenda (if any)**
- Part III - Consent of Surety**
- Notice of Acceptance**
- Part V - Definitions**
- Part VI - General Conditions**
- Part XXVII - Safety Program**
- Supplementary Conditions**
- General Requirements**
- Drawings and Specifications, as listed in the index of the Bid Documents**
- Schedules**

2. Contractor's Covenants

The **Contractor** undertakes and agrees to:

2.1. perform the **Work** required by the **Contract Documents**:

for: MSC Electrical Upgrades
Title of the Work

located at: Inuvik, NT
Place of the Work

and for which AECOM Canada Ltd. is acting as and is herein called the **Consultant**;

2.2. commence the **Work** within a reasonable time after the date of the **Notice of Acceptance** and, subject to adjustment in the **Contract Time** as provided for in the **Contract Documents**, attain completion of the **Work**, by the 30 day of June, 2018 (the "**Completion Date**");

2.3. in accordance with GC12, pay to the **Owner** as liquidated damages and not as a penalty the sum(s) stipulated in the **Supplementary Conditions** if the **Work** has not been completed by the **Completion Date** or, if applicable, a specified portion(s) of the **Work** has not been completed by the milestone completion date(s) stipulated in the **Supplementary Conditions**;

2.4. indemnify and hold the **Owner** and the **Consultant** harmless from and against any suits, claims, demands, liability, costs, damages, or expenses, including reasonable legal fees, made or incurred by **Other Contractors** involved in the **Project**, arising from the **Contractor's** failure to complete the **Work** by the **Completion Date** or, if applicable, the **Contractor's** failure to complete one or more specified portions of the **Work** by the milestone completion date(s) stipulated in the **Supplementary Conditions**; and

2.5. do and fulfil everything indicated by the **Contract Documents**.

3. Contract Price

3.1. The **Contract Price**, which excludes the Goods and Services Tax, means the **Bid Price** subject to the adjustments, additions, deductions and deletions as provided in the **Contract Documents**.

3.2. The **Bid Price** is \$ _____ as set forth in the **Notice of Acceptance**.

4. Payment

4.1. Subject to the provisions of the **Contract Documents**, the **Owner** shall:

4.1.1. make progress payments to the **Contractor** on account of the **Contract Price**, in the amounts certified by the **Consultant**, within thirty (30) **Days** after receipt of each certificate for payment in accordance with GC 22;

- 4.1.2. retain from each payment to the **Contractor** a percentage holdback as required by applicable lien legislation or, where such legislation does not exist or apply, a holdback of fifteen percent (15%) of each payment to the **Contractor**. The **Owner** shall administer any amounts withheld from the **Contractor** in accordance with the provisions of any applicable lien legislation; and
- 4.1.3. the **Owner** shall pay to the **Contractor** the unpaid balance of holdback monies then due: i) within thirty (30) **Days** of expiration of the holdback period required by the applicable lien legislation; or such earlier date as required by provincial legislation; or ii) where such lien legislation does not exist or apply, fifty-five (55) **Days** after the date on which the **Interim Certificate of Completion** is issued; or iii) where no **Interim Certificate of Completion** is issued, and lien legislation does not exist or apply, fifty-five (55) **Days** after the date of the **Final Certificate of Completion**, provided that the **Contractor** has submitted to the **Consultant**, prior to such payment the following:
 - 4.1.3.1 a current Statutory Declaration verifying that all **Subcontractors**, **Suppliers**, labour and accounts for services, materials, machinery and equipment, and any other indebtedness which may have been incurred by the **Contractor**, directly or indirectly, in the performance of the **Work** have been fully paid by the **Contractor** except for unpaid holdbacks on such subcontracts and that no lien has been filed against the **Contractor**, the **Project**, the premises or any materials supplied to or incorporated in the **Work** or in respect of anything done under or by virtue of the **Contract**;
 - 4.1.3.2 a letter of clearance or certificate from the **Workers' Compensation Board** verifying that all assessments due by the **Contractor** have been fully paid;
 - 4.1.3.3 if requested by the **Owner**, a letter from the **Contractor's** surety (if any) approving the release of holdback;
 - 4.1.3.4 all record documents, showing changes as constructed, operating and maintenance manuals, guarantees, warranties, certificates, reports, spare parts and spare materials required by the **Contract Documents**; and
 - 4.1.3.5 a Final Release and Indemnity in the form attached to the General Conditions as Attachment "A".
- 4.2. If a lien is filed against the **Project** in respect of the **Work** by any **Subcontractor**, or **Supplier** or other person claiming through, by or under the **Contractor** or any of its **Subcontractors** or **Suppliers**:
 - 4.2.1 the **Owner** may, at its option, instruct the **Contractor** to cause the said lien to be removed from the title to the **Project** within ten (10) **Days** from the date of such notice by direct payment, furnishing of a bond, payment into court or otherwise;
 - 4.2.2 if the lien is not removed from the title to the **Project** within such time or such further time as may be subsequently agreed upon, the **Owner**, without prejudice to any other right or remedy it may have, may take such steps or proceedings, including payments, settlements or compromise of the lien or payment into court, as the **Owner** reasonably determines as necessary to procure the release of the

lien, and all payments and costs, including legal fees and disbursements incurred by the **Owner** shall be paid by the **Contractor** to the **Owner** or may be deducted from any amount then due or thereafter becoming due to the **Contractor**; and

- 4.2.3 the **Contractor** shall, if requested by the **Owner**, defend, indemnify and save the **Owner** harmless from the amount of all such liens and the costs of defending any and all actions commenced against the **Owner** pursuant to any applicable lien legislation, including the legal costs and disbursements incurred by the **Owner**.
- 4.3. Notwithstanding anything otherwise contained in the **Contract**, the **Consultant** may, in its discretion, withhold, or on account of subsequently discovered evidence, nullify the whole or any part of any previously issued certificate, to such an extent as may be necessary to protect the **Owner** from loss on account of any of the following:
 - 4.3.1. the **Contractor's** unsatisfactory prosecution of the **Work**;
 - 4.3.2. defective or damaged **Work** requiring correction or replacement;
 - 4.3.3. claims or liens filed or reasonable evidence indicating the probable filing of claims or liens;
 - 4.3.4. failure of the **Contractor** to make payments promptly to **Suppliers** or **Subcontractors** for materials or labour;
 - 4.3.5. a reasonable doubt by the **Consultant** that the **Contract** can be completed for the unpaid balance of the **Contract Price**;
 - 4.3.6. damage to an **Other Contractor's** work which has not been settled and which may result in the **Other Contractor** whose work has been damaged bringing action against the **Owner**. In case of such action, the **Contractor** shall bear the expense of same; or
 - 4.3.7. any amounts for maintenance holdbacks, commissioning allowances and liquidated damages.

When the basis for nullifying the previously issued certificate has been removed, the **Consultant** shall, subject to receipt by the **Consultant** of any documents mentioned in Clause 4.1.3 hereof requested by the **Consultant**, reissue the applicable certificate. Within thirty (30) **Days** of receiving the reissued certificate, the **Owner** shall make payment to the **Contractor** in the amounts set out in the applicable certificate.

- 4.4. Should either party fail to make payments as they become due under the terms of the **Contract** or in an award by arbitration or court, interest at one percent (1%) per annum above the Prime Rate on such unpaid amounts shall also become due and payable until payment. Such interest shall be compounded on a monthly basis. The Prime Rate shall be the rate established by the Royal Bank of Canada as its Prime Rate from time to time.

Interest shall apply at the rate and in the manner prescribed above on the amount of any claim settled pursuant to GC 45 from the date the amount would have been due and payable under the **Contract**, had it not been in dispute, until the date it is paid.

5. Contractor's Representations

The **Contractor** makes the following representations and acknowledges the **Owner's** reliance thereon:

- 5.1. the **Contractor** is skilled and experienced in all aspects of construction work and is well able to perform the **Work** within the **Contract Time** and for the **Contract Price**;
- 5.2. the **Contractor** is an expert in this field of work and is fully knowledgeable and experienced in all aspects of required procedures, methods, regulations, codes, and municipal or other local, provincial and/or national requirements and understands that the **Owner** is relying on this expertise, knowledge and experience;
- 5.3. the **Contractor** has examined the **Place of the Work** as provided in Clause 16 of the **Instructions to Bidders** and has familiarized itself with the nature and extent of the **Contract Documents**, the **Work** and with all local conditions and federal, provincial and local laws, ordinances, rules and regulations that in any manner affect the cost, progress or performance of the **Work**;
- 5.4. the **Contractor** acknowledges that the **Information Documents** and any **Additional Data** have been or shall be made available to the **Contractor** for the **Contractor's** information only and that the **Contractor** has made such inspection of the **Information Documents** and any **Additional Data** as the **Contractor** deems appropriate for the **Contractor's** purposes. The **Contractor** further acknowledges that:
 - 5.4.1. the **Information Documents** and the **Additional Data** are or shall be provided without warranty of any kind, express or implied;
 - 5.4.2. neither the **Owner** nor the **Consultant** has represented that the **Information Documents** or the **Additional Data** are accurate, complete or suitable for the **Contractor's** purposes;
 - 5.4.3. the **Information Documents** and any **Additional Data** do not form part of the **Contract Documents**; and
 - 5.4.4. any reliance made by the **Contractor** on the **Information Documents** or the **Additional Data** is entirely at the **Contractor's** own risk;
- 5.5. the **Contractor** has made or caused to be made examinations, investigations, and tests and has carefully studied reports and related data based thereon or obtained therefrom, in addition to those referred to in Clause 5.4. hereof, as it deems necessary for the performance of the **Work** at the **Contract Price**, within the **Contract Time** and in accordance with the other terms and conditions of the **Contract Documents**; and no additional examinations, investigations, tests, reports or similar data are or shall be required by the **Contractor** for such purpose;
- 5.6. the **Contractor** has correlated the results of all such observations, examinations, investigations, tests, reports and data with the terms and conditions of the **Contract Documents**;
- 5.7. the **Contractor** has given the **Consultant** written notice of all conflicts, errors or discrepancies that it has discovered in the **Contract Documents** and the written resolution thereof by the **Consultant** is acceptable to the **Contractor** or, if no written

notice has been given, the **Contractor** acknowledges that the **Contract Documents** are acceptable as written.

6. **Succession**

The **Contract Documents** are to be read into and form part of this **Agreement** and the whole shall constitute the **Contract** between the parties, and subject to the law and the provisions of the **Contract Documents** shall enure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors and assigns.

7. **Receipt of and Addresses for Notices**

Communications in writing between the parties or between them and the **Consultant** shall be deemed to have been received by the addressee on the date of delivery if delivered by hand or sent by facsimile or registered mail to the individual or to a member of the firm or to an officer of the corporation for whom they are intended and if sent by regular mail shall be deemed to have been delivered within five (5) **Days** of the date of mailing when addressed as follows:

The **Owner** at: Town of Inuvik
Town Office, 2 Firth Street
Inuvik, NT X0E 0T0

The **Contractor** at: _____

The **Consultant** at: AECOM Canada Ltd.
101,18817 Stony Plain Road NW
Edmonton, AB T5S 0C2

Provided that if there shall be, at the time of mailing or between the time of mailing and the actual receipt thereof, a mail strike, slowdown or other event which might affect delivery by the mail, then such notice, payment or other communication shall be effective only if actually delivered by hand or facsimile.

8. **Rights and Remedies**

8.1. The duties and obligations imposed by the **Contract Documents** and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

8.2. No action or failure to act by the **Owner**, **Consultant** or **Contractor** shall constitute a waiver of any right or duty afforded any of them under the **Contract**, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

8.3. The **Contract** shall be interpreted under and governed by the laws of the **Place of the Work**.

IN WITNESS WHEREOF the parties hereto have executed this **Agreement** by the hands of their duly authorized representatives.

*If **Owner** is an incorporated entity:*

_____)
 Town of Inuvik)
 Name of Corporation)
 _____)
 Signature of Authorized Representative)
 _____)
 Name)
 _____)
 Title)
 _____)
 Town Office, 2 Firth Street)
 Address)
 _____)
 Inuvik, NT X0E 0T0)
 _____)

(Corporate Seal)

*If **Owner** is an individual or an unincorporated entity:*

_____)
 Name of Business (if any))
 _____)
 Signature of Individual)
 or Authorized Representative)
 _____)
 Name of Individual)
 or Authorized Representative)
 _____)
 Title)
 _____)
 Address)
 _____)
 _____)
 _____)

 Signature of Witness

 Name

 Address

Part V

Definitions

The following **Definitions** shall apply to all **Contract Documents**:

1. **Addenda** means the documents designated as such in Clause 15 of the **Bid Form**.
2. **Additional Data** means any information, data, reports or other material relating to the **Work** or the **Place of the Work**, other than the **Information Documents**, provided to **Contractor** from time to time by **Owner** or **Consultant**.
3. **Bid** means a **Bidder's** priced offer to the **Owner** for the performance of the **Work** in accordance with the **Bid Documents**.
4. **Bidder** means a person or entity which submits a **Bid**. **Bidder** is treated throughout the **Contract Documents** as if it were of singular number and neuter gender. The **Bidder** which submits the successful **Bid** becomes the **Contractor** upon award of the **Contract**.
5. **Bid Closing Time** means the scheduled time for receipt of **Bids** designated in Clause 1 of the **Instructions to Bidders**.
6. **Bid Documents** means those documents listed in Clause 4 of the **Instructions to Bidders** and shall include amendments to such documents made pursuant to the provisions thereof.
7. **Bid Period** means the period of time designated in Clause 20 of the **Instructions to Bidders**.
8. **Bid Price** means the amount shown in Clause 3.2 of the **Agreement**.
9. **Bid Security** means the documents designated as such in Clause 6 of the **Instructions to Bidders**.
10. **Change Directive** means a written instruction prepared by the **Consultant** and signed by the **Owner** pursuant to GC 24, directing a change in the **Work** which is within the general scope of the **Contract Documents**.
11. **Change Order** means a written amendment to the **Contract** prepared by the **Consultant** and signed by the **Owner** and the **Contractor** pursuant to GC 23, stating their agreement upon:
 - a change in the **Work**;
 - the method of adjustment or the amount of the adjustment in the **Contract Price**, if any; and
 - the extent of the adjustment in the **Contract Time**, if any.
12. **Closing Place** means the location for delivery of **Bids** designated in Clause 1 of the **Instructions to Bidders**.
13. **Completion Date** means the date designated as such in Clause 2.2 of the **Agreement** as adjusted pursuant to the provisions of the **Contract Documents**.
14. **Consultant** means the person or entity designated as such in the **Contract Documents**. The **Consultant** is treated throughout the **Contract Documents** as if it were of singular number and neuter gender

15. **Contract** means the undertaking by the parties to perform their respective duties, responsibilities and obligations as prescribed in the **Contract Documents** and represents the entire agreement between the parties.
16. **Contract Documents** means those documents listed in Clause 1.1 of the **Agreement** and shall include amendments thereto made pursuant to the provisions thereof.
17. **Contract Price** means the amount designated as such in Clause 3.1 of the **Agreement** as adjusted pursuant to the provisions of the **Contract Documents**.
18. **Contract Security** means the security required to be provided by the **Contractor** pursuant to GC 44.
19. **Contract Time** means the period of time stipulated in the **Agreement** for completion of the **Work**, as amended from time to time pursuant to the provisions of the **Contract Documents**.
20. **Contract Work Schedule** means the document designated as such in GC 10.2.
21. **Contractor** means the person or entity designated as such in the **Contract Documents**. The **Contractor** is treated throughout the **Contract Documents** as if it were of singular number and neuter gender.
22. **Contractor Caused Event** means an event caused by the **Contractor** or any person or party employed or engaged by the **Contractor** either directly or indirectly.
23. **Day** means a calendar day.
24. **Drawings** means the graphic and pictorial portions of the **Contract Documents**, wherever located and whenever issued, showing the design, location, and dimensions of the **Work**, generally including plans, elevations, sections, details, schedules and diagrams.
25. **Excusable Event** means an event outside the **Contractor's** reasonable control.
26. **Final Certificate of Completion** means the certificate issued by the **Consultant** pursuant to GC 35.6.
27. **GC** means the General Conditions.
28. **GST/HST** means Goods and Services Tax/Harmonized Sales Tax.
29. **Information Documents** means any information, data, reports or other material relating to the **Work** or the **Place of the Work** provided to **Bidders** pursuant to Clause 16 of the **Instructions to Bidders**.
30. **Interim Certificate of Completion** means the form required by Provincial lien legislation to be issued by the **Consultant** or the payment certifier when **Substantial Performance of the Work** has been achieved or, where no such form exists, in the **Consultant's** standard form certificate issued by the **Consultant** pursuant to GC 35.2.
31. **Notice of Acceptance** means the written notice by the **Owner** to the successful **Bidder** stating that it has been awarded the **Contract**.
32. **Notice of Project** means a notice required to be posted by Provincial health and safety legislation at the commencement of **Work**.

33. **Other Contractor** means a person or entity employed by or having a **Contract** directly or indirectly with the **Owner** otherwise than through the **Contractor**.
34. **Owner** means the person or entity designated as such in the **Contract Documents**. The **Owner** is treated throughout the **Contract Documents** as if it were of singular number and neuter gender.
35. **Owner Caused Event** means an event of default or neglect caused solely by the **Owner**.
36. **Owner's Representative** means the person designated to act as the Owner's representative for the purpose of this contract as authorized in writing by the Owner.
37. **Place of the Work** means the site or location of the **Project** as designated in Clause 2.1 of the **Agreement**.
38. **Prime Contractor** means the person or entity solely responsible for construction safety for the **Project** and for compliance with the **Safety Regulations** and for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the **Work**, and without limitation, includes the "Prime Contractor" under the health and safety legislation applicable in British Columbia and Alberta and the "Constructor" under the health and safety legislation applicable in Ontario.
39. **Products** means material, machinery, equipment, fixtures, systems and other items forming the **Work**, but does not include machinery and equipment used to prepare, fabricate, convey or erect the **Work**, which are normally referred to as construction machinery and equipment.
40. **Project** means the total construction contemplated of which the **Work** may be the whole or a part.
41. **Project Schedule** means the document designated as such in GC 10.1.
42. **Provide** means to supply and install.
43. **Safety Regulations** means the rules, regulations, and practices required by the construction health and safety legislation applicable to the **Place of the Work**.
44. **Specifications** means that portion of the **Contract Documents**, wherever located and whenever issued, consisting of the written requirements and standards for **Products**, workmanship and the services necessary for the performance of the **Work**.
45. **Subcontractor** means a person or entity having a direct contract with the **Contractor** or another **Subcontractor** for the execution of a part or parts of the **Work**, or to supply **Products** worked to a project-specific design according to the **Contract Documents**.
46. **Submittals** means drawings, diagrams, illustrations, schedules, performance charts, **Product** data and samples, brochures and other data which the **Contractor** provides, or is required to provide, in order to illustrate details of a portion of the **Work**.
47. **Substantial Defects** means those defects in the **Work** which affect the **Work** to such an extent or in such a manner that a significant part or whole of the **Work** is unfit for the purpose intended by the **Contract Documents**.
48. **Substantial Performance of the Work** has the meaning attributed to "Substantial Performance of the Work" or "Completed" in the lien legislation applicable to the **Place of the Work**. If such

legislation is not in force or does not contain such definition, **Substantial Performance of the Work** shall mean that the **Work** is ready for use or is being used for the purpose intended.

49. **Supplier** means a person or entity having a direct contract with the **Contractor**, another **Supplier** or a **Subcontractor**, to supply **Products** not worked to a project-specific design for the **Work**.
50. **Warranty Period** means the period of twelve (12) months, or such longer period as specified in the **Contract Documents**, from the date of the **Interim Certificate of Completion** or, if an **Interim Certificate of Completion** is not issued, from the date of the **Final Certificate of Completion** during which the **Contractor** is required to correct any defects or faults in the **Work** pursuant to the provisions of GC 36.1.
51. **Work** means the total construction and services and the carrying out and doing of all things, whether of a temporary or permanent nature, required by or reasonably inferable from the **Contract Documents**.
52. **Workers Compensation Board** means the government entity having responsibility for worker compensation legislation in the jurisdiction of the **Place of the Work**.

Part VI**General Conditions**

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Part VI

General Conditions

1. Contract Documents

- 1.1. The **Contract Documents** are complementary and what is required by any one shall be as binding as if required by all.
- 1.2. If there is a conflict within the **Contract Documents**:
 - 1.2.1. the **Contractor** shall promptly notify the **Consultant** of the conflict;
 - 1.2.2. the order of priority of documents, from highest to lowest, shall be:
 - **Addenda (if any);**
 - **Supplementary Conditions;**
 - **Part I - Instructions to Bidders;**
 - **Part IV - Agreement;**
 - **Part V - Definitions;**
 - **Part II - Bid Form;**
 - **Part IIA - Supplementary Bid Form;**
 - **Part III - Consent of Surety;**
 - **Notice of Acceptance;**
 - **Part VI - General Conditions;**
 - **General Requirements;**
 - **Schedules;**
 - **Specifications; and**
 - **Drawings;**
 - 1.2.3. **Drawings** of larger scale shall govern over those of smaller scale of the same date;
 - 1.2.4. dimensions shall not be scaled from **Drawings** under any circumstances. In the event the **Contractor** requires dimensions not shown on **Drawings**, **Contractor** shall request the required dimensions from **Consultant**; and
 - 1.2.5. later dated documents shall govern over earlier dated documents of the same type.
- 1.3. Any work that may reasonably be inferred from the **Contract Documents** as being required to perform the **Work** shall form part of the **Work** and shall be performed by the **Contractor**, whether or not it is specifically called for, and shall include the supply of all materials, plant, labour, equipment necessary to complete the **Work**. The intent is that a complete project will be provided by the **Contractor**.
- 1.4. Reference to standard **Specifications**, manuals or codes of any technical society, organization or association, or to the code of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual or code in effect on the date of the **Agreement**, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the **Contract Documents**) shall change the duties and responsibilities of the **Owner**, the **Contractor**

or the **Consultant**, or any of their agents or employees from those set forth in the **Contract Documents**.

- 1.5. Words and abbreviations used in the **Contract Documents** which have well known technical or trade meanings, or are defined in the **Contract Documents**, shall be interpreted in accordance with such meanings or **Definitions**.
- 1.6. Industry standards, whether or not bound or referred to in the **Contract Documents**, shall apply to the **Work**.
- 1.7. The **Contractor** is responsible for the coordination of metric and imperial dimensions as shown on the **Drawings** and as specified.
- 1.8. The **Contractor** is responsible to coordinate all **Drawings** to totally complete the **Work**.
- 1.9. The **Drawings** are a diagrammatic view of the **Work** required but do not limit the extent of the work required to totally complete the details and work intended. It is the **Contractor's** responsibility to apply its expertise to execute the intended work shown on the **Specifications** and **Drawings**. The **Contractor** shall coordinate all **Drawings** with the sizes and dimensions of services, fixtures and equipment in the locations shown on the plans or as site conditions permit. Any changes required to facilitate and complete the installation of such services, fixtures or equipment shall be made at no additional cost to the **Owner**, unless a **Change Order** or a **Change Directive** has been issued.
- 1.10. Notwithstanding the apparent generality of the **Specifications** or the **Drawings** as to any detail, or the apparent omission from them of a detailed description concerning any point, the **Specifications** and the **Drawings** shall be interpreted as requiring that only the best general practice is to prevail and that only material and workmanship of the first quality are to be used in the performance of the **Work**.
- 1.11. Whenever in the **Contract Documents** the terms "as ordered", "as directed", "as required", "as allowed", "as approved" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of the **Consultant** as to the **Work**, it is intended that such requirement, direction, review or judgment shall be solely to evaluate the **Work** for general conformance with the design concept for the **Project** (unless there is a specific statement indicating otherwise). Notwithstanding any such requirement, direction, review or judgement by the **Consultant**, the **Consultant** does not have authority to supervise or direct performance of the **Work** or authority to undertake responsibility contrary to the provisions of GC 5.

2. **Supplemental Instructions**

- 2.1. During the progress of the **Work**, the **Consultant** shall furnish to the **Contractor** such supplemental instructions to supplement the **Contract Documents** as may be necessary, in the opinion of the **Consultant**, to carry out the design concept for the **Project**. In giving such supplemental instructions, the **Consultant** shall have authority to make minor changes in the **Work**, not inconsistent with the intent of the **Contract Documents**, and the **Work** shall be executed in conformity therewith.
- 2.2. Supplemental instructions may be in the form of **Specifications**, **Drawings**, samples, models or written instructions and shall not result in a change in the **Contract Price** or the **Contract Time**.
- 2.3. The **Contractor** shall work only from **Specifications** and **Drawings** approved for

construction. Where revised **Specifications** and **Drawings** have been issued, the **Contractor** shall be responsible, at its own expense, for the correction of any errors in the **Work** made as the result of not working from current **Specifications** and **Drawings**.

3. Copies Furnished

- 3.1. The **Contractor** shall be provided, without charge, with sufficient copies of **Specifications** and **Drawings** as are reasonably necessary for the performance of the **Work**.
- 3.2. All **Specifications**, **Drawings**, samples, models and other information furnished by the **Consultant** shall be used only with respect to the **Work**, shall not be used on other work, shall not be copied or revised in any manner, and shall be returned to the **Consultant**, on request, at the completion of the **Work**. Any samples or models furnished by the **Contractor** or the **Owner** are the property of the **Owner**.
- 3.3. The **Contractor** shall comply with the Electronic Data License attached as Attachment "D". The **Contractor** shall require all **Subcontractors** and **Suppliers** to execute and comply with the Electronic Data License.

4. Record Documents

- 4.1. The **Contractor** shall keep one record copy of all **Specifications**, **Drawings**, **Addenda**, **Submittals**, operation and maintenance manuals, samples and models at the **Place of the Work** in good order and shall record thereon all changes made during the construction of the **Work** as they occur. These record copies shall be made available to the **Consultant** during construction and shall be delivered to the **Consultant** upon completion of the **Work**.

5. Consultant's Functions During Construction

- 5.1. The **Consultant** shall provide administration of the **Contract** as described in the **Contract Documents**.
- 5.2. The **Consultant** shall be the **Owner's** representative during construction and until the expiry of the **Warranty Period**, unless otherwise advised by the **Owner**. The **Owner's** instructions to the **Contractor** shall be forwarded through the **Consultant**. The **Consultant** shall have authority to act on behalf of the **Owner** to the extent provided in the **Contract Documents**, unless otherwise modified by written agreement in accordance with GC 5.11.
- 5.3. The **Consultant** may visit the **Place of the Work** at intervals determined to be appropriate by the **Consultant** in its professional opinion. The **Consultant** may also provide one or more on-site **Project** representatives to familiarize itself with the progress and quality of the **Work** and to determine if the **Work** is proceeding in general conformance with the **Contract Documents**.
- 5.4. The **Consultant** may ascertain for the benefit of the **Owner** whether the **Contractor** has implemented and is maintaining adequate quality control procedures during the construction of the **Work**. Notwithstanding anything in the **Contract**, the **Consultant** shall not make exhaustive or continuous on-site inspections to check the quality or quantity of the **Work** and the **Consultant** shall neither be nor become a guarantor of the **Contractor's** work.

- 5.5. The **Consultant** is not responsible for and does not have control, charge, or supervision:
- 5.5.1 of construction means, methods, techniques, sequences, or procedures;
 - 5.5.2 of safety precautions and programs required in connection with the **Work**, in accordance with the **Safety Regulations**, other regulations, or general construction practice;
 - 5.5.3 of the **Contractor's** failure to carry out the **Work** in accordance with the **Contract Documents**; and
 - 5.5.4 for the acts or omissions of the **Contractor, Subcontractors, Suppliers**, or their agents, employees or any other persons performing portions of the **Work**,
- all of which are acknowledged to be the sole and exclusive responsibility of the **Contractor**.
- 5.6. The **Consultant** shall be the initial interpreter of the requirements of the **Contract Documents** and the judge of the acceptability of the **Work**. Claims, disputes and other matters in question relating to the acceptability of the **Work** or the interpretation of the requirements of the **Contract Documents** shall be referred initially to the **Consultant** in writing for decision which it shall give in writing within a reasonable time.
- 5.7. There shall be no duty on the **Consultant** to observe or discover defects or deficiencies in the **Work** but only to review such matters for the **Owner** concerning the acceptability of the **Work** as may be brought to the **Consultant's** notice or as it may actually observe. Should the **Contractor** hold decisions of the **Consultant** to be at variance with the **Contract Documents** or to have been made in error, the **Contractor** shall notify the **Consultant** before proceeding to carry out the **Consultant's** decision. If, after receiving notice of the perceived error or variance from the **Contractor**, the **Consultant** directs that the **Contractor** carry out the **Consultant's** decision, the **Contractor** shall promptly proceed with any work required to implement such decision.
- 5.8. The **Consultant** shall have authority to reject **Work** which in its professional opinion does not conform to the requirements of the **Contract Documents**.
- 5.9. Whenever the **Consultant** considers it necessary or advisable, it shall have authority to require special inspection or testing of a portion of the **Work** whether or not such **Work** is fabricated, installed or completed. However, neither the **Consultant's** authority to act nor any decision made by it either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the **Consultant** to the **Contractor, Subcontractors, Suppliers**, or their agents, employees or any other persons performing portions of the **Work**.
- 5.10. All certificates issued by the **Consultant** will be to the best of the **Consultant's** knowledge, information and belief. However, by issuing any certificates, granting an approval or performing a review or inspection, the **Consultant** does not guarantee that the **Work** is correct or complete.
- 5.11. The duties, responsibilities and limitations of authority of the **Consultant** as set forth in the **Contract Documents** shall not be modified or extended without the written consent of the **Owner**, the **Contractor** and the **Consultant**. At the request of the **Contractor** or the **Owner**, the duties, responsibilities and limitations of authority of the **Project** representatives, referred to in GC 5.3, shall be set forth in writing to the **Contractor** and the **Owner**.

- 5.12. The **Consultant** shall receive and review any written warranties and related documents which the **Contractor** is required to provide pursuant to the terms of the **Contract** in order to determine if they are in general conformance with the **Contract Documents**. Following such review, the **Consultant** shall forward such warranties and documents to the **Owner**.
- 5.13. Nothing contained in the **Contract Documents** shall create any contractual relationship between the **Consultant** and the **Contractor**, **Subcontractors**, **Suppliers**, or their agents, employees or any other persons performing portions of the **Work**.
- 5.14. In the performance of the services required of the **Consultant** under the **Contract Documents**, the **Consultant** and every director, officer, agent, employee and subconsultant of the **Consultant** shall have the benefit of all provisions in the **Contract Documents** excluding or limiting the **Consultant's** duty, responsibility or liability as if such provisions were expressed to also exclude or limit the duty, responsibility or liability of each such director, officer, agent, employee and subconsultant; and, in entering into this **Contract**, the **Owner** does so, to the extent of those provisions, as agent and trustee on behalf of and for the benefit of the **Consultant** and its directors, officers, agents, employees and subconsultants. It is further acknowledged and agreed by the **Owner** that the **Consultant** and any director, officer, agent, employee or subconsultant of the **Consultant** may ratify such agency at any time for the purpose of entitlement to the benefit of such exclusions or limitations of liability.

6. **Products and Employees**

- 6.1. All **Products** shall, unless otherwise specified in the **Contract Documents**, be new. All **Products** shall be suitable for their intended purpose, and shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, **Supplier** or distributor, except as otherwise provided in the **Contract Documents**. Workmanship and materials shall be of the quality specified or better. **Products** which are not specified shall be of a quality consistent with those specified and the **Contractor** shall obtain the prior written approval of the **Consultant** to their use.
- 6.2. All **Products**, whether supplied by the **Owner** or the **Contractor**, shall be stored under suitable conditions to prevent damage, deterioration, contamination and other adverse effects. No **Products** may be temporarily used or installed as a facility for construction purposes except with the written approval of the **Consultant**.
- 6.3. The **Contractor** shall be responsible for the protection and security of the **Products** stored at the **Place of the Work** and shall replace any material damaged or stolen from the **Place of the Work** at no cost to the **Owner**.
- 6.4. The **Contractor** shall provide competent, qualified personnel to perform the **Work** as required by the **Contract Documents**. The **Contractor** shall maintain good order and discipline among its employees and shall not employ on the **Work** any unfit person or anyone not skilled in the task assigned to him. The **Consultant** or the **Owner** may require that any person who is unfit for any reason leave the **Place of the Work**.

7. **Office Facilities for the Consultant**

- 7.1. Unless otherwise stipulated in the **Contract Documents**, the **Contractor** shall be responsible for providing a temporary weatherproof office for the **Consultant** during the performance of the **Work**. The office shall be separate from the **Contractor's** office and shall have minimum floor area of twenty (20) square metres; the **Contractor** shall provide

a telephone, high speed internet connection, facsimile machine, electric light and reasonable heat and shall pay the rental and monthly rates for the use of such utilities, except that the **Contractor** shall not be required to pay long distance telephone or facsimile charges. The **Contractor** shall also supply writing desks, layout tables and chairs, shelves, and a cylinder lock with two (2) keys for the entrance door.

8. Assistance to the Consultant

- 8.1. The **Contractor** shall provide the **Consultant** with assistance and personnel, as required, to make any surveys and measurements on behalf of the **Owner**. Wherever possible, the **Contractor** shall make the same personnel available to the **Consultant** throughout the course of the **Work**.
- 8.2. The **Contractor** shall supply to the **Consultant** all lath, stakes, hubs, nails and spikes when required by the **Consultant** for the **Project**.

9. Minimum Standards

- 9.1. In the absence of other standards required by the **Contract Documents**, all **Work**, materials and equipment shall be suitable for its intended purpose, and conform to, or exceed, the minimum standards of the Canadian Government Specification Board, the Canadian Standards Association, or the National Building Code of Canada (latest edition with all current addenda), whichever is applicable. Where the provisions of the applicable Building Bylaw are more stringent than the National Building Code of Canada, the provisions of such Building Bylaw shall govern.

10. Scheduling and Delays

- 10.1. The **Consultant** may establish a system for monitoring the planning and scheduling activities of the **Contractor** and all **Other Contractors** on the **Project** utilizing a **Project Schedule** which shall identify and allocate earliest expected starting and latest **Completion Dates** for each major design and construction activity. The **Project Schedule** may be revised from time to time by the **Consultant**.
- 10.2. Within fifteen (15) **Days** from the date of the **Notice of Acceptance**, the **Contractor** shall submit to the **Consultant** a detailed task by task work schedule for the construction of the **Work** within the framework of the **Project Schedule**. The **Consultant** shall review the **Contractor's** work schedule for general compliance with the **Project Schedule** and may request adjustments thereto to arrive at a work schedule that will not delay or impact the work of **Other Contractors** or other **Project** activities. This detailed schedule shall be called the **Contract Work Schedule** and shall become an integral part of the **Project Schedule**.
- 10.3. Time is of the essence. The **Contractor** acknowledges that it is aware that any delay in completing the **Work** will result in delays and impacts to **Other Contractors** and the **Owner** in carrying out other portions of the **Work** of the **Project**. Such delays and impacts will extend the time and increase the cost required to complete the **Project** and will thereby affect the value of the **Work** to the **Owner**.
- 10.4. Should the **Contractor**, at any time, be of the opinion that it cannot meet the requirements of the **Contract Work Schedule**, the **Contractor** shall consult with the **Consultant** to determine whether the **Contract Work Schedule** can be changed without affecting the **Project Schedule**. If, in the opinion of the **Consultant**, changes can be made to the **Contract Work Schedule** without affecting the **Project Schedule**, these changes shall be made to establish a new **Contract Work Schedule**. Notwithstanding

the foregoing, neither the **Contract Time** nor the **Completion Date** shall be adjusted except by way of a **Change Order** or **Change Directive**.

- 10.5. Subject to GC 10.4, if the **Contractor** does not maintain the progress necessary to comply with the **Contract** and the **Contract Work Schedule**, the **Owner**, in addition to those rights and remedies provided by law and under the **Contract Documents** (including those rights specifically set forth in GC 13) may, after consultation with the **Consultant** and the **Contractor**, order that the **Contractor** take such actions as the **Owner** or the **Consultant** deems necessary to maintain the progress required by the **Contract Documents** and the **Contract Work Schedule**, which actions may include, but shall not be limited to, the supply of additional labour, the provision of additional hours of work or the furnishing of additional plant, all at the **Contractor's** expense. Should the **Contractor** fail to comply with such orders, the **Owner** shall have the right to employ the required labour and equipment and (except when making up time lost due to delays of the kinds referred to in GC 10.4) deduct the cost of same from any payment then or thereafter due the **Contractor** or collect liquidated damages and deduct same from any payment then or thereafter due to the **Contractor**.
- 10.6. If the **Contractor** is delayed or impacted in the performance of the **Work** by an **Excusable Event**, and provided always that the said event is not one for which an extension of the **Contract Time** is specifically excluded by the **Contract** then the **Contract Time** shall be extended for such reasonable time as the **Consultant** may recommend in consultation with the **Contractor** and the **Owner**. The **Contractor** waives any claim for compensation for costs incurred as a result of an **Excusable Event**. In no case will an act or omission of the **Contractor** or any person employed or engaged by the **Contractor**, either directly or indirectly, constitute an **Excusable Event**.
- 10.7. The **Contractor** waives any claim for an extension of **Contract Time** or compensation for costs incurred where the **Contractor** is delayed or impacted in the performance of the **Work** by a **Contractor Caused Event**. All **Contractor Caused Events** shall be events of default under the **Contract**.
- 10.8. If the **Contractor** is delayed or impacted in the performance of the **Work** by an **Owner Caused Event**, and provided always that the said event is not one for which an extension of the **Contract Time** or compensation is specifically excluded by the **Contract**, then the **Contract Time** shall be extended for such reasonable time as the **Consultant** may recommend in consultation with the **Contractor** and the **Owner**. The **Contractor** shall only be reimbursed for the reasonable direct out-of-pocket expenses incurred by the **Contractor** that are established to have been caused by the **Owner Caused Event**. The **Contractor** must provide supporting documentation for such costs, as required by the **Consultant** or the **Owner**, before compensation for any delays or impacts will be considered. The documentation must be presented promptly, and in any event, no later than ten (10) **Days** after **Substantial Performance of the Work**.
- 10.9. The **Contractor** waives any claim for extension of **Contract Time** or compensation for costs incurred as the result of an **Excusable Event** or an **Owner Caused Event** unless: (i) the **Contractor** submitted and updated the **Contract Work Schedule** as required by GC 10.2; and (ii) the **Contractor** provides a notice in writing of the claim to the **Consultant** within fourteen (14) **Days** after the commencement of the delay or impact. A notice in writing shall describe the event, the date the delay or impact commenced, the anticipated duration of the delay or impact, the effect on the **Contract Time** and all steps taken or available to mitigate the delay or impact.
- 10.10. Any disruption or delay caused by one or more construction labour disputes, strikes and lock-outs, including, but not limited to, financial and jurisdictional disputes involving

unionised and non unionised workers, on or related to the **Place of the Work**, shall be deemed to be a **Contractor Caused Event**, except for disputes, strikes and lock-outs caused by the **Owner**.

- 10.11. In the event of an **Excusable Event** or an **Owner Caused Event**, the **Owner** may, at its option, request the **Contractor**, in writing, to take steps to accelerate the **Work** rather than allow the **Contractor** an extension of the **Contract Time**. In this case, the **Owner's** request shall be dealt with in accordance with GC 23. In any event, the **Contractor** shall only be entitled to receive compensation for its actual out-of-pocket costs required to accelerate the **Work**.
- 10.12. Where there are concurrent delays or impacts, some of which are caused by **Owner Caused Events** and some of which are not, the **Contractor** shall not be entitled to an extension of the **Contract Time** or compensation for costs. Concurrent delays or impacts are those that are caused by two or more independent events, irrespective of whether such delays or impacts are on the critical path or are contemporaneous.
- 10.13. The **Contractor** waives any claim for extension of **Contract Time** or compensation for costs incurred as the result of any **Excusable Event** or an **Owner Caused Event**, unless, at the time of the commencement of the delay or impact, the **Contractor** has submitted and updated the **Contract Work Schedule** as required by GC 10.2.
- 10.14. In the event that the **Contractor** is delayed or impacted in the execution of the **Work** for any reason other than one for which an extension is permitted under GC 10 or if the **Contractor** fails to file a notice in writing as required by GC 10.9, fails to submit and update a **Contract Work Schedule** as required by GC 10.2 or fails to perform the **Work** substantially in accordance with the **Contract Work Schedule**, the **Contractor** shall, at its own expense, take whatever measures are necessary to ensure the completion of the **Work** in accordance with the **Project Schedule**.
- 10.15. The entitlement of the **Contractor** to claim an extension of the **Contract Time** or reimbursement of costs under GC 10, shall be subject to the condition that the **Contractor** shall have exercised all reasonable efforts to avoid, or minimize, the duration, cost and impact of any delay or impact in respect of which a claim for extension of the **Contract Time** or compensation is made. The **Contractor** waives any claim for an extension of the **Contract Time** or compensation for delays or impacts, which do not adversely affect the critical path for achieving **Substantial Performance of the Work**, or which could have been avoided, minimized or mitigated by the **Contractor** using reasonable efforts.
- 10.16. Each claim under GC 10 based, in whole or in part, on a particular event or circumstance must be submitted, and shall be considered, separately. No claim shall be allowed under this GC 10, or otherwise under the **Contract**, for an extension of the **Contract Time** or compensation as a result thereof based upon the cumulative impact of two or more particular events causing delay or impact.
- 10.17. If the **Contractor** is entitled to an extension of the **Contract Time**, the **Contract Work Schedule**, the **Project Schedule** and any of the milestone completion date(s) stipulated in the **Supplementary Conditions** shall be extended for an equivalent time.

11. **Suspension of Work**

- 11.1. In emergencies affecting the safety or protection of persons or the **Work** or property at the **Place of the Work** or adjacent thereto, the **Contractor**, without special instruction or authorization from the **Consultant** or the **Owner**, is obligated to act to prevent threatened

damage, injury or loss. The **Contractor** shall give the **Consultant** prompt written notice of any significant changes in the **Work** or deviations from the requirements of the **Contract Documents** caused thereby.

- 11.2. In the event of an emergency affecting the safety or protection of persons or the **Work** or property at the **Place of the Work** or adjacent thereto, the **Owner** or the **Consultant** may suspend the **Work** in whole or in part at any time by written notice to the **Contractor** stating the extent and effective date of such suspension; whereupon the **Contractor** shall suspend the **Work** to the extent specified and shall place no further orders or subcontracts relating thereto. During the period of suspension, the **Contractor** shall protect and care for all **Work**, materials and equipment at the site or in the storage areas under its responsibility. The **Contractor** shall give the **Owner** copies of all outstanding orders and subcontracts for materials, equipment and services and shall take any action on such orders and subcontracts as may reasonably be required or as the **Owner** may direct. The **Work** shall be resumed by the **Contractor** within a mutually agreed upon period of time after the date of resumption fixed in a written notice from the **Owner** to the **Contractor**.
- 11.3. The **Contractor** shall be allowed an extension of the **Contract Time** for the delay or impact directly attributable to or resulting from any action taken by the **Contractor** under GC 11.1 or GC 11.2 or suspension by the **Owner** or the **Consultant**, provided that the emergency was due to causes beyond the **Contractor's** reasonable control and the **Contractor** makes a request therefor as provided in GC 10. Notwithstanding the foregoing, the **Contractor** waives any claims for damages on account of any such delay or impact, and agrees that its sole right and remedy in the case of any such delay or impact shall be an extension of the **Contract Time** as provided herein.
- 11.4. Unless otherwise determined by the **Consultant** in its discretion, the **Contractor** shall not be entitled to claim for damages, compensation, loss of profit, allowance or otherwise by reason of or directly or indirectly arising out of any action taken by the **Contractor** under GC 11.1 or any suspension of the **Work** pursuant to the provisions of GC 11.2.

12. Liquidated Damages

- 12.1. Should the **Contractor** fail to complete the **Work** on or before the **Completion Date**, or if applicable, any of the milestone completion date(s) stipulated in the **Supplementary Conditions**, the **Contractor** shall pay to the **Owner** by way of liquidated damages and not as a penalty the amount stipulated in the **Supplementary Conditions**, for each **Day** that the completion of the **Work** is delayed beyond the **Completion Date**, or if applicable, any of the milestone completion date(s) stipulated in the **Supplementary Conditions**. The **Owner** and the **Contractor** expressly agree that the amount stipulated in the **Supplementary Conditions** is a genuine pre-estimate of the damage or loss that will result to the **Owner** by reason of the failure of the **Contractor** to complete the **Work** on or before the **Completion Date**, and is not a penalty. The **Owner** may in its discretion either deduct the daily sum in respect of liquidated damages from any amounts payable to the **Contractor** under the **Contract Documents** or require payment thereof by the **Contractor** on demand. The payment of liquidated damages under GC 12 shall not amend or affect the parties' rights under other provisions of the **Contract Documents** including for certainty the **Owner's** rights relating to acceleration of the **Work** under GC 10 and termination of the **Contract** under GC 13.
- 12.2. If the **Contractor** fails to complete the **Work** on or before the **Completion Date**, or if applicable, any of the milestone completion date(s) stipulated in the **Supplementary Conditions**, for any reason other than those set out in GC 10, and if liquidated damages are found to be legally unenforceable for any reason, the **Contractor** shall, at the request

of the **Owner**, pay to the **Owner**, or the **Owner** shall be entitled to recover from the **Contractor** by set off against any payment then or thereafter due under the **Contract**:

- 12.2.1. an amount equal to all salaries, wages, consulting fees and travelling expenses paid by the **Owner** due to the delay;
- 12.2.2. an amount equal to the expenses and damages incurred by the **Consultant** and **Other Contractors**, for which the **Owner** is liable, due to the delay;
- 12.2.3. an amount equal to the expenses and damages incurred by the **Owner** as a result of its inability to use the **Work** or part(s) thereof for the period of the delay; and
- 12.2.4. an amount equal to all other expenses and damages incurred or sustained by the **Owner** as a result of the **Work** not being completed within the **Contract Time**.

13. **Owner's Right to Perform the Work, Suspend the Work or Terminate the Contract**

- 13.1. If the **Contractor** should be adjudged bankrupt or go into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reorganization) or make a general assignment for the benefit of creditors because of its insolvency or if a receiver is appointed, the **Owner** may, without prejudice to any other right or remedy it may have, immediately terminate the **Contract** by giving the **Contractor** or trustee in bankruptcy or receiver written notice to that effect.
- 13.2. If the **Contractor** neglects to prosecute the **Work** properly or otherwise fails to comply with the requirements of the **Contract** the **Owner** may, without prejudice to any other right or remedy it may have, notify the **Contractor** in writing, with a copy to the **Consultant**, that the **Contractor** is in default of its contractual obligations and instruct the **Contractor** to correct the default in the seven (7) **Days** immediately following the receipt of such notice.
- 13.3. If the correction of the default cannot be completed in the seven (7) **Days** specified, the **Contractor** shall be in compliance with the **Owner's** instructions if it:
 - 13.3.1. commences the correction of the default within the specified time, and
 - 13.3.2. provides the **Owner** with an acceptable schedule for such correction, and
 - 13.3.3. completes the correction in accordance with such schedule.
- 13.4. If the **Contractor** fails to correct the default in the time specified or subsequently agreed upon, the **Owner** may, without prejudice to any other right or remedy it may have:
 - 13.4.1. correct such default and deduct the cost thereof from any payment then or thereafter due the **Contractor** provided the **Consultant** has certified such cost to the **Owner** and the **Contractor**;
 - 13.4.2. suspend all or a portion of the **Work**; or
 - 13.4.3. terminate the **Contractor's** right to continue the **Work** in whole or in part or terminate the **Contract**.

- 13.5. If the **Owner** terminates the **Contractor's** right to continue with the **Work** or any part thereof as provided in this **General Condition**, the **Owner** shall be entitled to:
- 13.5.1. take possession of the **Work** and the **Products**; utilize the **Contractor's** construction machinery and equipment, subject to the rights of third parties; and finish the **Work** or such part thereof by whatever method the **Owner** may consider expedient but without undue delay or expense;
 - 13.5.2. withhold further payments to the **Contractor** until the **Work** or such part thereof is completed;
 - 13.5.3. upon the date of the **Final Certificate of Completion**, charge the **Contractor** the amount by which the full cost of finishing the **Work** as certified by the **Consultant**, including compensation to the **Consultant** for its additional services and a reasonable allowance as determined by the **Consultant** to cover the cost of corrections to portions of the **Work** performed by the **Contractor** that may be required under GC 35, exceeds the unpaid balance of the **Contract Price**; however, if such cost of finishing the **Work** is less than the unpaid balance of the **Contract Price**, the **Owner** shall pay the **Contractor** the difference; and
 - 13.5.4. upon expiry of the **Warranty Period**, charge the **Contractor** the amount by which the cost of corrections to the **Contractor's** work under GC 36 exceeds the allowance provided for such corrections, or if the cost of such corrections is less than the allowance, pay the **Contractor** the difference.
- 13.6. The **Contractor's** obligation under the **Contract** as to quality, correction and warranty of the **Work** performed by it up to the time of termination shall continue in force after such termination notwithstanding any reduction of payments by the **Owner** to the **Contractor**.

14. **Contractor's Right to Suspend the Work or Terminate the Contract**

- 14.1. If the **Owner** should fail to pay to the **Contractor** any sum certified by the **Consultant** or awarded by arbitrators or a court within thirty (30) **Days** of such certificate or award, then the **Contractor** may notify the **Owner** in writing that the **Owner** is in default of its contractual obligations and instruct the **Owner** to correct the default in the fifteen (15) **Days** immediately following the receipt of such notice.
- 14.2. If the **Owner** fails to correct the default in the time specified or subsequently agreed upon, the **Contractor** may suspend the **Work** or terminate the **Contract**.
- 14.3. If the **Contractor** terminates the **Contract** in accordance with GC 14.2, the **Owner** shall pay to the **Contractor** all amounts due to the **Contractor** on account of the **Contract Price** earned to that date together with reasonable and properly documented costs incurred by the **Contractor** in demobilizing and terminating its contracts with **Subcontractors**.

15. **Subcontractors and Suppliers**

- 15.1. Unless otherwise agreed to by the **Owner** in writing, the **Contractor** shall employ those **Subcontractors** and **Suppliers** listed in the **Bid Form**.
- 15.2. The **Owner** may, for reasonable cause, at any time before the **Owner** has signed the **Contract**, object to the use of a proposed **Subcontractor** or **Supplier** and require the **Contractor** to employ one of the other subcontract bidders.

- 15.3. In the event that the **Owner** requires a change from a proposed **Subcontractor** or **Supplier**, the **Contract Price** shall be adjusted by the difference in cost, without mark-up, occasioned by such change.
 - 15.4. The **Contractor** shall not be required to employ as a **Subcontractor** or **Supplier** a person or firm to whom it may reasonably object.
 - 15.5. The **Contractor** shall preserve and protect the rights of the parties under the **Contract** with respect to any of the **Work** to be performed under subcontract and shall:
 - 15.5.1. enter into contracts or written agreements with **Subcontractors** and **Suppliers** to require them to perform their work in accordance with and subject to the terms and conditions of the **Contract Documents**;
 - 15.5.2. incorporate the terms and conditions of the **Contract Documents** into all contracts or agreements it enters into with **Subcontractors** and **Suppliers**; and
 - 15.5.3. be as fully responsible to the **Owner** for acts and omissions of **Subcontractors** and **Suppliers** and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by the **Contractor**.
 - 15.6. The **Consultant** may, at its discretion, upon request from a **Subcontractor** and upon being apprised of the terms of the subcontract between a **Subcontractor** and the **Contractor**, provide to the **Subcontractor** information as to the percentage or quantity of the **Subcontractor's** work which has been certified for payment.
 - 15.7. Nothing contained in the **Contract Documents** shall create a contractual relationship between a **Subcontractor** or **Supplier** and the **Owner** or the **Consultant**.
 - 15.8. The **Contractor** shall comply and require that its **Subcontractors** and **Suppliers** comply with Attachment "B" – Code of Conduct.
16. **Other Contractors**
- 16.1. The **Owner** reserves the right to let separate contracts in connection with the **Project** to **Other Contractors** or perform certain work by its own forces.
 - 16.2. When separate contracts are awarded for different parts of the **Project**, or work is performed by the **Owner's** own forces the **Owner** shall require or provide insurance coverage to the same extent as is called for in GC 43; such insurance shall be coordinated with the insurance coverage of the **Contractor** as it affects the **Work**.
 - 16.3. The **Contractor** shall not commit or permit any act which will interfere with the performance of the work of **Other Contractors** or the **Owner's** own forces and shall coordinate and connect, as specified or shown in the **Contract Documents**, the **Work** with such work so as not to hinder the progress or completion of such work.
 - 16.4. The **Contractor** shall coordinate the work of all trades and **Other Contractors** and determine to what extent work specified in each section of the specifications is affected by work indicated elsewhere and make all necessary allowances for their integration. All additional work resulting from failure to make such determination shall be done at no cost to the **Owner**.

- 16.5. The **Contractor** shall report to the **Consultant** any apparent deficiencies in the work of **Other Contractors** or the **Owner's** own forces which would affect the **Work** immediately as they come to its attention and shall confirm such report in writing. The **Contractor** waives any claim against the **Owner** or the **Consultant** arising out of, or relating to an apparent deficiency in the work of **Other Contractors** or the **Owner's** own forces unless the **Contractor** provides immediate notice thereof to the **Consultant**.
- 16.6. The **Owner** and the **Contractor** shall take all reasonable precautions to avoid labour disputes or other disputes on the **Project** arising from the work of **Other Contractors** or the **Owner's** own forces.

17. **Contract Price**

- 17.1. The **Contract Price** shall be accepted by the **Contractor** as full compensation for everything furnished and done by the **Contractor** under the **Contract**, including:
- 17.1.1 all **Work**;
 - 17.1.2 all loss or damage arising out of the nature of the **Work**, the conditions of the **Place of the Work** and the action of the weather, elements, or any other unforeseen obstruction or difficulty encountered in the performance of the **Work**;
 - 17.1.3 all risks and obligations of every description connected with the **Work**;
 - 17.1.4 all expenses incurred by or in consequence of any delay or impact in the performance of the **Work**, or the suspension or discontinuance of the **Work** except as expressly excluded pursuant to GC 10; and
 - 17.1.5 completing the **Work** as provided in the **Contract**.
- 17.2. Except for items of **Work**, if any, for which the applicability of this GC 17.2 has been specifically excluded elsewhere in the **Contract**, the **Owner** and the **Contractor** shall adjust a rate or price contained in the **Contract**:
- 17.2.1. if the actual quantity of work executed under the item exceeds or falls short of the estimated quantity specified in the **Bid Form** by more than twenty percent (20%);
 - 17.2.2. if there is no off-setting adjustment with respect to the quantity of any other item of work;
 - 17.2.3. if, based on the actual quantity of work executed and the rate or price contained in the **Bid Form**, the extended amount of the item exceeds ten percent (10%) of the original **Contract Price**; and
 - 17.2.4. if **Owner**, in consultation with the **Consultant** and the **Contractor**, believes that the quantity variation requires an increase or decrease in the rate or price.
- 17.3. An adjusted rate or price made pursuant to GC 17.2, where the actual quantity of work executed under the item exceeds the estimated quantity specified in the **Bid Form** by more than twenty percent (20%), shall apply only to the quantity that is in excess of one hundred and twenty percent (120%).

- 17.4. An adjusted rate or price made pursuant to GC 17.2, where the actual quantity of work executed under the item falls short of the quantity specified in the **Bid Form** by more than twenty percent (20%), shall not exceed the rate or price that would cause the total amount paid for the item to exceed eighty percent (80%) of the product of the original rate or price contained in the **Bid Form** multiplied by the estimated quantity specified in the **Bid Form**.
- 17.5. The quantities of work performed shall be determined by the **Consultant** and such determinations shall be final and binding.
18. **Taxes and Duties**
- 18.1. Unless otherwise stated in the **Contract Documents**, the **Contractor** shall pay all government sales taxes, customs duties and excise taxes with respect to the **Contract**.
- 18.2. Except with respect to the **GST/HST**, any increase or decrease in costs to the **Contractor** due to changes in such taxes and duties, after the **Bid Closing Time**, shall increase or decrease the **Contract Price** accordingly.
19. **Permits, Royalties, Laws and Rules**
- 19.1. The **Contractor** shall obtain and pay for the building permit and all other permits, licences, inspections and certificates and pay all fees required for the performance of the **Work** but this shall not include the obtaining of permanent easements or rights of servitude. The **Contract Price** includes the cost of these permits, licenses, inspections, certificates, and fees. Except where otherwise specified, the **Contractor** shall pay all royalties, rent and other payments or compensation (if any) for obtaining all materials required for the **Work**.
- 19.2. The **Contractor** shall comply with all laws, ordinances, rules, regulations, codes and orders relating to the **Work**, to the preservation of the public health and to construction safety which are or become in force during the performance of the **Work**.
20. **Cash Allowances**
- 20.1. The **Contract Price** includes cash allowances (if any) stated in the **Contract Documents**.
- 20.2. Cash allowances, unless otherwise specified, cover the net cost to the **Contractor** of services, **Products**, construction machinery and equipment, freight, unloading, handling, storage, installation and other authorized expenses incurred in performing the **Work** stipulated under the cash allowance.
- 20.3. The **Contract Price**, and not the cash allowance, includes the **Contractor's** overhead and profit in connection with such cash allowance.
- 20.4. Expenditures under cash allowances shall be authorized by the **Owner** through the **Consultant**. Where the actual cost of the **Work** under any cash allowance exceeds the amount of the allowance the **Contractor** shall be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess, provided that the **Contractor** has obtained prior written approval from the **Consultant** for any excess costs. Where the actual cost of the **Work** under any cash allowance is less than the amount of the allowance, the **Owner** shall be credited for the unexpended portion of the cash allowance, but not the **Contractor's** overhead and profit on such amount.

- 20.5. The **Contract Price** shall be adjusted by written order to provide for any excess or deficit to each cash allowance.
- 20.6. Progress payments on account of authorized expenditures under cash allowances shall be certified on the **Consultant's** monthly certificates for payment.
- 20.7. A schedule shall be prepared jointly by the **Consultant** and the **Contractor** to show when items called for under cash allowances must be authorized by the **Consultant** for ordering purposes so that the progress of the **Work** shall not be delayed.

21. Applications for Payment

- 21.1. The **Contractor** shall submit to the **Consultant** with each application for payment, a statutory declaration on CCDC Form 9B, or other form required by the **Consultant**, stating that all wages, **Subcontractors** and **Suppliers** have been paid in respect of the performance of the **Work** and, if requested, with receipts or other vouchers showing its payments for labour and for material, including material on the site but not incorporated in the **Work** and satisfactory evidence of compliance with the **Safety Regulations**.
- 21.2. Applications for payment shall be dated the last day of the agreed payment period and the amount claimed shall be for the value, proportionate to the amount of the **Contract**, of **Work** performed and **Products** delivered to the **Place of the Work** at that date, less amounts already paid by the **Owner**.
- 21.3. If requested by the **Consultant**, the **Contractor** shall submit to the **Consultant**, at least fifteen (15) **Days** before the first application for payment, a schedule of values of the various parts of the **Work**, aggregating the total amount of the **Contract Price** and divided so as to facilitate evaluation of applications for payment.
- 21.4. The schedule of values shall be made out in such form and supported by such evidence as to its correctness as the **Consultant** may reasonably require and when approved by the **Consultant** shall be used as the basis for applications for payment.
- 21.5. When making applications for payment, the **Contractor** shall submit a statement based upon the schedule of values. Claims for **Products** delivered to the **Place of the Work** but not yet incorporated into the **Work** shall be supported by such evidence as the **Consultant** may reasonably require to establish the value and delivery of the **Products**.
- 21.6. The **Contractor** warrants and guarantees that title to all **Work** and **Products** covered by any application for payment, whether incorporated in the **Project** or not, shall pass to the **Owner** at the time of payment free and clear of all liens, claims, security interests and encumbrances.
- 21.7. All claims for changes in the **Work** must meet the requirements of GC 23 and GC 24 and must be included in an application for payment and submitted to the **Consultant** for certification.

22. Certificates for Payment

- 22.1. The **Consultant** shall issue a certificate for payment within ten (10) **Days** after receipt of an application for payment from the **Contractor** setting out the amount which the **Consultant** has determined, to the best of the **Consultant's** knowledge, information and belief, is properly due to the **Contractor** for the **Work** performed to date.

- 22.2. By issuing a certificate for payment, the **Consultant** shall not thereby be deemed to represent that it has made exhaustive or continuous on-site inspections to check the quality or quantity of the **Work** or that it has reviewed the construction means, methods, techniques, sequences or procedures or that it has made any examination to determine how or for what purposes the **Contractor** or the **Subcontractors** have used the money paid on account of the **Contract Price**.
- 22.3. The **Contractor's** obligation to perform and complete the **Work** in accordance with the **Contract Documents** shall be absolute. Neither the recommendation or certification of any progress or final payment by the **Consultant**, nor the issuance of any certificate for payment, nor any payment by the **Owner** to the **Contractor** under the **Contract Documents**, nor any use or occupancy of the **Work** or any part thereof by the **Owner**, nor any act of acceptance by the **Owner** nor any failure to do so, nor any correction of defective **Work** by the **Owner** shall constitute an acceptance of **Work** or **Products** which are not in accordance with the **Contract Documents** or a release of the **Contractor's** obligation to perform the **Work** in accordance with the **Contract Documents**.
- 22.4. The **Consultant** shall not certify any payment until the **Contract Work Schedule** required in GC 10.2, the evidence of insurance required by GC 43, and the **Contract Security** have been received by the **Consultant**.

23. Changes in the Work

- 23.1. The **Owner**, or the **Consultant** on the authority of the **Owner** and as the **Owner's** agent, may, without invalidating the **Contract**, make changes by altering, adding to or deducting from the **Work**.
- 23.2. When a change in the **Work** is proposed or required, the **Contractor** shall present to the **Consultant** the **Contractor's** claim for an adjustment to the **Contract Price** and/or the **Contract Time**, if any, with appropriate documentation in a form acceptable to the **Consultant**.
- 23.3. No changes in the **Work** shall be undertaken without written authorization of the **Consultant** and no claim for addition to or deduction from the **Contract Price** shall be valid unless so authorized and at the same time valued as provided in GC 24.
- 23.4. All changes in the **Work** shall be executed under the conditions of the original **Contract**, except that any adjustment to the **Contract Time** caused thereby shall be determined at the time of ordering such change or addition as provided in GC 10.

24. Valuation of Changes

- 24.1. The valuation of any changes in the **Work** shall be determined, at the **Owner's** discretion, by one or more of the following methods:
 - 24.1.1. by unit prices provided for in the **Bid Form**;
 - 24.1.2. by unit prices agreed upon;
 - 24.1.3. by estimate and acceptance in a lump sum; or
 - 24.1.4. by cost and a percentage fee or by cost and a fixed fee.
- 24.2. Where a change in the **Work** is to be paid for under GC 24.1.4, the cost to the **Owner** shall be the actual cost as defined in GC 24.3, plus a percentage covering overhead and

profit on additional work only, after all credits included in the change have been deducted, as follows:

- 24.2.1 for work to be completed by the **Contractor's** own forces, a mark-up on the actual cost of ten percent (10%) (five percent (5%) for overhead and five percent (5%) for profit);
 - 24.2.2 for work to be completed by the forces of a **Subcontractor** or **Supplier**, a mark-up on the actual cost of five percent (5%) for the **Contractor** and ten percent (10%) (five percent (5%) for overhead and five percent (5%) for profit) for the **Subcontractor** or **Supplier**; and
 - 24.2.3 for deleted work, no sums added or deleted for overhead and profit, and credit is to be for the actual cost of the deletion.
- 24.3. For the purposes of GC 24, "cost" is defined as including the following:
- 24.3.1. the **Contractor's** payments for labour and supervision directly participating in the **Work** at rates required by the applicable employment agreement or, in the absence of an agreement, at rates which are not higher than the standard paid in the locality of the **Work**;
 - 24.3.2. fringe benefits required by law or employment agreement incurred on account of payments made for such labour and supervision;
 - 24.3.3. invoiced costs of materials incorporated in the **Work** or consumed in the course of performance;
 - 24.3.4. reasonable rental value of construction plant, whether owned by the **Contractor** or rented from others, which is in addition to that required in order to perform other parts of the **Work**;
 - 24.3.5. transportation required for the proper execution of the **Work**;
 - 24.3.6. taxes on materials and plant;
 - 24.3.7. costs of required permits; and
 - 24.3.8. reasonable, substantiated payments for work required to be subcontracted.
- 24.4. Any discounts, refunds or rebates not reflected in the invoiced costs and any salvage value of reusable materials shall be subtracted when determining cost. All expenditures must be certified by the **Consultant**. The **Contractor** shall keep, in such form as the **Consultant** may reasonably require, an accurate account of costs, together with all supporting documents, and the **Owner** shall have the right to audit same.
- 24.5. All items of cost which are not set forth in GC 24.3 shall be absorbed by the **Contractor** as part of the **Contract Price**. Without limiting the generality of the foregoing, reimbursement of costs to the **Contractor** shall not include any of the following:
- 24.5.1. salary of any person employed, during the execution of the **Work**, in the main office or in any regularly established branch office of the **Contractor**;
 - 24.5.2. overhead or general expenses of any kind, except as these may be expressly included in the above definition of cost;

- 24.5.3. cost of small tools;
- 24.5.4. interest on capital employed in plant or for expenditures on the **Work**;
- 24.5.5. depreciation;
- 24.5.6. insurance; or
- 24.5.7. **Contract Security**.

- 24.6. No payment on account of changes in the **Work** shall be made until the value thereof shall have been determined as herein provided and an application requesting payment of same processed in accordance with the provisions of GC 21.
- 24.7. If the valuation, measurement and adjustment to the **Contract Price** and/or the **Contract Time** cannot be promptly agreed upon, and the change is required to be proceeded with, then the **Consultant** shall determine the valuation, measurement and adjustment to the **Contract Price** and/or the **Contract Time** subject to the provisions of GC 45. In this case the **Consultant** shall, with the consent of the **Owner**, issue a **Change Directive** setting out the valuation, measurement and adjustment to the **Contract Price** and/or the **Contract Time**.
- 24.8. The balance of the **Work** of the **Contractor** shall not be delayed pending agreement on resolution of the valuation of any change in the **Work**.

25. **Contractor's Responsibilities**

- 25.1. The **Contractor** shall have complete control of the **Work** and shall effectively direct and supervise the **Work** using its best skill and attention. The **Contractor** shall be solely responsible for construction means, methods, techniques, sequences and procedures, for safety precautions and programs (unless otherwise specifically agreed to in writing by the **Owner** or required by the applicable construction safety legislation) and for coordinating all portions of the **Work**. At all times the onus shall be and remain on the **Contractor** to carry out and complete the **Work** in accordance with the **Contract Documents**.
- 25.2. The **Contractor** shall provide all necessary supervision and appoint a competent representative and necessary assistants who shall be in attendance at the **Place of the Work** at all times during the progress of the **Work**. The representative shall not be changed except for valid reason. The representative shall represent the **Contractor** and information and instructions given to him by the **Consultant** shall be deemed to have been given to the **Contractor**. All instructions shall be confirmed to the **Contractor** in writing by the **Consultant**.
- 25.3. The **Contractor** shall designate a responsible member of its organization at the **Place of the Work**, whose duty shall be the prevention of accidents. This person shall be the **Contractor's** representative unless otherwise designated in writing by the **Contractor** to the **Owner** and the **Consultant**.

26. **Safety and Protection of the Work and Property**

- 26.1. The **Contractor** shall ensure compliance on its part and on the part of all the **Subcontractors** with the applicable Workers' Compensation and Occupational Health and Safety statutes and any regulations thereunder, in particular, the provisions of said statutes or regulations having to do with the prevention of accidents, the prevention of

diseases and the provision of safe working conditions, including proper sanitation and ventilation. The **Contractor** shall provide to the **Owner**, on the **Consultant's** request, evidence of such compliance with the requirements of the applicable Workers' Compensation and Occupational Health and Safety statutes and any regulations or orders thereunder, including payments due for Workers' Compensation Insurance.

- 26.2. In any case where, pursuant to the provisions of the Workers' Compensation or Occupational Health and Safety legislation, the appropriate board or authority orders the **Contractor** or one or more of the **Subcontractors**, in respect of their operations under the **Contract**, to cease operations because of failure to install or adopt safety devices or appliances directed by order of the said board or authority or required under said legislation, or because said board or authority is of the opinion that conditions of immediate danger exist that would be likely to result in injury to any person, the **Contractor** shall cease operations forthwith and shall ensure immediate compliance on its part and on the part of all the **Subcontractors** with such orders.
- 26.3. The **Contractor** is responsible for all site safety and shall be deemed to be the "Prime Contractor" for the purposes of all occupational health and safety regulations during the time period specified in Attachment "C", provided that the **Owner** or the **Consultant** can unilaterally amend Attachment "C" at any time and the **Contractor** shall not be entitled to an extension of time or compensation for costs incurred as a result of such amendment. Notwithstanding the foregoing, in the event that the **Owner** fails to designate a contractor as the "Prime Contractor" in Attachment "C", then the **Owner** or the **Consultant** may designate the **Contractor** as the "Prime Contractor" from the time that the **Owner** or the **Consultant** delivers to the **Contractor** written notice of such designation until such time as the **Owner** or the **Consultant** delivers to the **Contractor** written notice that another contractor has been appointed "Prime Contractor" and for any additional period(s) of time as the **Consultant** may advise by written notice re-appointing the **Contractor** as the "Prime Contractor".
- 26.4. If the **Owner** or the **Consultant** is of the reasonable opinion that the **Contractor** has not taken such precautions as are necessary to ensure compliance with the requirements of GC 26.1, the **Owner** may take or order any remedial measures which it deems necessary, including suspending the performance of all or any portion of the **Work**, and the **Owner** may use the employees of itself, the **Contractor**, any **Subcontractor** or any **Other Contractor** to perform such remedial measures. The cost of any work suspension and of the performance of any remedial measures shall be borne by the **Contractor**.
- 26.5. The **Contractor** shall file any notices or any similar document (including, without limitation, a Notice of Project where applicable) required pursuant to the **Contract** or the **Safety Regulations**. This duty of the **Contractor** shall be considered to be included in the **Work** and no separate payment therefor shall be made to the **Contractor**.
- 26.6. Where the **Contractor** will not be the **Prime Contractor**, or during any period of time when the **Contractor** is not the **Prime Contractor**, the **Contractor**:
 - 26.6.1 shall follow all reasonable directions issued by the Prime Contractor regarding compliance with the **Safety Regulations**; and
 - 26.6.2 the **Contractor** waives any claim for an extension of **Contract Time** or compensation for costs incurred as a result of the **Contractor's** compliance with any directions referred to in GC 26.6.1.

- 26.7. Notwithstanding any agreement by the **Owner** or the **Consultant** to undertake some of the duties that would normally be undertaken by the **Prime Contractor** pursuant to the **Safety Regulations**, neither the **Owner** nor the **Consultant** shall be the **Prime Contractor** unless otherwise specifically agreed to in writing by the **Owner** and the **Consultant**.
- 26.8. Without in any way limiting the generality of the foregoing and except as otherwise provided, the **Contractor** shall comply fully with the following provisions:
- 26.8.1. the **Contractor** shall provide at least seventy-two (72) hours' written notice to all utility companies and property owners in the immediate vicinity of its operations prior to the commencement of construction and shall, if requested, co-operate, without additional cost to the **Owner**, with such parties in the protection, removal or relocation of their installations and property;
- 26.8.2. unless otherwise provided in the **Contract Documents**, the **Contractor** shall develop, maintain and supervise for the duration of the **Work** a comprehensive safety program that shall effectively incorporate and implement all required safety precautions. The program shall, as a minimum, respond fully to the **Safety Regulations** and general construction practices for the safety of persons or property, including without limitation any general safety rules and regulations of the **Owner** and any Workers' Compensation or Occupational Health and Safety statutes or regulations that may be applicable (e.g. WHMIS);
- 26.8.3. the **Contractor** shall provide a copy of its Certificate of Recognition in jurisdictions where this is applicable or otherwise provide a copy of the safety program described in GC 26.8.2 to the **Consultant** for delivery to the **Owner** prior to the commencement of the **Work** and shall, at all times during which the **Contractor** is the **Prime Contractor**, ensure, as far as it is reasonably practical to do so, that every employer and worker performing work in respect of the **Project** complies with such program;
- 26.8.4. the **Contractor** shall designate a safety officer who shall be qualified and authorized to supervise and enforce compliance with the safety program;
- 26.8.5. while the **Contractor** is the **Prime Contractor**, the **Contractor** shall arrange regular safety meetings at its expense. Such meetings shall occur no less frequently than once per week. The **Contractor** shall record the minutes of such meetings and maintain a complete file for review by the appropriate authorities;
- 26.8.6. at all times during which the **Contractor** is the **Prime Contractor**, the **Contractor** shall supply and maintain, at its own expense, at its office or other well-known place at the job site, safety equipment necessary to protect the workers and general public against accident or injury as prescribed by the governing authorities;
- 26.8.7. when the use of explosives is necessary for the performance of the **Work**, the **Contractor** shall observe the utmost care not to endanger life or property. The method of storing and handling explosives and highly flammable materials shall conform to all applicable statutes, bylaws and regulations and the **Contractor** shall be responsible for obtaining all required permits thereunder;

- 26.8.8. the **Contractor** shall perform all **Work** in a fire-safe manner. It shall comply with all applicable governmental requirements and, without limiting the generality of the foregoing, shall supply and maintain adequate and proper fire-fighting equipment at the job site;
- 26.8.9. night work shall only be performed by the **Contractor** if permission is given beforehand by the appropriate authorities. When **Work** is carried out at night, the **Contractor** shall supply a sufficient number of electric or other approved lights to enable the **Work** to be done in a safe and satisfactory manner;
- 26.8.10. except as otherwise agreed to in the **Contract**, at all times during which the **Contractor** is the **Prime Contractor**, the **Contractor** shall supply and maintain all articles necessary for giving first-aid to any person who may be injured on the job site and shall establish an emergency procedure for the immediate removal of any injured person to a hospital or a doctor's care in accordance with the **Safety Regulations**;
- 26.8.11. the **Contractor** shall promptly report in writing to the **Prime Contractor** (with copies to the **Owner** and the **Consultant**) all accidents of any sort arising out of or in connection with the performance of the **Work** whether on or adjacent to the job site, giving full details and statements of witnesses and copies of all reports submitted to governmental authorities. If death or serious injuries or damages are caused, the accident shall be promptly reported by the **Contractor** to **Prime Contractor** by telephone or messenger (with written notice to the **Owner** and the **Consultant**) in addition to any reporting required under the **Safety Regulations** or any other applicable law; and
- 26.8.12. if a claim is made by anyone or an order is issued by a governmental authority against the **Contractor** or any **Subcontractor** on account of any incident or circumstance, the **Contractor** shall promptly report the facts in writing to the **Owner** and the **Consultant**, giving full details of the claim or order and a copy of any relevant document received by the **Contractor** in relation to same.
- 26.9. Should any of the **Work** cause interference with any existing public or private road, the **Contractor** shall provide and maintain necessary detour roads, shall post such signs, warnings and protection as may be required for public convenience and safety, and shall make good any damage caused by such interference.
- 26.10. The **Contractor** shall protect the **Work**, the **Owner's** property and the property adjacent to the **Place of the Work** from damage and shall make good at its own expense any damage which may arise as the result of its operations under the **Contract**, except damage which occurs solely as the result of:
 - 26.10.1. errors in the **Contract Documents**, and/or
 - 26.10.2. acts or omissions by the **Owner**, its agents, employees or **Other Contractors**.

27. Damages and Responsibility

- 27.1. If either the **Owner** or the **Consultant** should suffer loss or damage in any manner because of any wrongful act or neglect of the **Contractor** or of anyone employed by it, then the **Contractor** shall reimburse them for such loss or damage. Claims pursuant to this GC shall be made in writing to the **Contractor** within a reasonable time after the first

observance of such loss or damage and not later than thirty (30) **Days** after the date of final payment, except as expressly stipulated otherwise in the case of faulty **Work** or materials, and may be adjusted by agreement and the **Contractor** shall thereupon be subrogated to the rights of the **Owner** or the **Consultant** in respect of such wrongful act or neglect if it be that of a third party.

- 27.2. Should the **Contractor** cause loss or damage to any **Other Contractor**, the **Contractor** agrees upon due notice to settle with such **Other Contractor** by negotiation or arbitration. If such **Other Contractor** sues the **Owner** and/or the **Consultant** on account of any loss or damage alleged to have been so sustained, the **Owner** and/or the **Consultant** shall notify the **Contractor** who shall defend such proceedings at the **Contractor's** expense and, if any final order or judgment against the **Owner** and/or the **Consultant** arises therefrom, the **Contractor** shall pay or satisfy it and pay all costs incurred by the **Owner** and/or the **Consultant**. If the **Contractor** becomes liable to pay or satisfy any final order or judgment against the **Owner** and/or the **Consultant**, the **Contractor** shall have the right, upon undertaking to indemnify the **Owner** and/or the **Consultant** against any and all liability for costs, to appeal in the name of the **Owner** and/or the **Consultant** such final order or judgment to any and all courts of competent jurisdiction.
- 27.3. The **Contractor** shall indemnify and hold harmless the **Owner** and the **Consultant** and their agents, employees and subconsultants from all claims, demands, losses, damages, costs, actions or proceedings of whatever nature arising out of the **Work** furnished by the **Contractor**, **Subcontractors** or **Suppliers** under the **Contract Documents**. If the **Contractor** becomes delinquent on any indebtedness which has become or may become a lien upon any property of the **Owner** or which may become a claim against the **Owner** or its property, then, upon the **Owner's** or the **Consultant's** request, the **Contractor** shall immediately pay such indebtedness and cause such lien or claim to be discharged and removed at the **Contractor's** cost; failing which, the **Owner** may do so and deduct the cost thereof from any payments then or thereafter due to the **Contractor**. The **Owner** shall have the right to hold all sums due or to become due to the **Contractor**, without interest, until satisfactory evidence is furnished to the **Owner** that all liens and claims have been settled and released.

28. **Indemnification**

- 28.1. The **Contractor** shall defend, indemnify and hold harmless the **Owner** and the **Consultant** and their directors, officers, employees, agents and subconsultants from and against all claims, demands, damages, losses, expenses, costs including legal fees, actions, suits or proceedings by whomsoever made, brought or prosecuted in any manner based upon, related to, occasioned by or arising out of, resulting from or attributable to the acts or omissions of the **Contractor**, any **Subcontractor**, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable in the performance of the **Work**, breach of any term contained in this **Contract** (including, without limitation, the warranties), or negligence. This indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the **Contractor** or any **Subcontractor** under Workers' Compensation legislation, disability benefit acts or other employee benefit acts and shall survive the termination of the **Contract**.
- 28.2. GC 28.1 may be relied upon by the **Consultant** and its directors, officers, employees, agents and subconsultants and may be enforced directly by any of them against the **Contractor** in the same manner and for the same purpose as if pursuant to a contractual indemnity directly between them and the **Contractor**.

29. Infringement

29.1. The **Contractor** shall indemnify and save harmless the **Owner** and the **Consultant** from and against all claims and proceedings for or on account of infringement of any patent, trademark, copyright, trade secret or other protected rights in respect of any equipment or material used for or in connection with the **Work** and from and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

30. Toxic and Hazardous Substances and Materials

30.1. The **Contractor** shall not cause, bring, permit or suffer to be brought any toxic or hazardous substances or materials onto the **Place of the Work** or any part thereof, except to the extent that such toxic or hazardous substances or materials are required by the **Contract Documents**.

30.2. Upon becoming aware of any toxic or hazardous substances or materials at the **Place of the Work**, the presence of which constitutes an offence or breach of the **Contract Documents** or any law, bylaw or regulation or is reportable under any law, bylaw or regulation relating to toxic or hazardous substances or materials and the protection of the environment, the **Contractor** shall promptly give written notice to the **Owner**, with a copy to the **Consultant**, of the presence of such toxic or hazardous substances or materials, and:

- (i) comply with all lawful orders or reasonable requests from the **Owner**, the **Consultant** or any government authority relating to such toxic or hazardous substances or materials;
- (ii) where the toxic or hazardous substances or materials were introduced to the **Place of the Work** by the **Contractor**, any **Subcontractor**, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the **Contractor** shall, at its own cost, undertake and complete all removal and remedial actions necessary to contain, remove and clean-up such toxic or hazardous substances or materials to the reasonable satisfaction of the **Owner**, the **Consultant** and all appropriate regulatory authorities.

30.3. The **Contractor** shall indemnify and hold harmless the **Owner** and the **Consultant** and their directors, officers, employees, agents and subconsultants from and against all claims, demands, damages, losses, expenses, costs including legal fees, actions, suits or proceedings arising out of or resulting from exposure to, or the presence of, any toxic or hazardous substances or materials which were introduced to the **Place of the Work** by the **Contractor** any **Subcontractor**, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

30.4. GC 30.3 may be relied upon by the **Consultant** and its directors, officers, employees, agents and subconsultants and may be enforced directly by any of them against the **Contractor** in the same manner and for the same purpose as if pursuant to a contractual indemnity directly between them and the **Contractor**.

31. Submittals

31.1. The **Contractor** shall review, stamp with its approval and submit, with reasonable promptness and in orderly sequence so as to cause no delay in the **Work** or in the work of any **Other Contractor**, all **Submittals** required by the **Contract Documents** or requested by the **Consultant**. **Submittals** shall be properly identified and shall be in the

form specified or as the **Consultant** may require. At the time of submission, the **Contractor** shall inform the **Consultant** in writing of any deviation in the **Submittals** from the requirements of the **Contract Documents**. **Submittals** which require approval of any legally constituted authority having jurisdiction shall be submitted to such authority by the **Contractor** for approval.

- 31.2. By approving and submitting **Submittals**, the **Contractor** thereby represents that it has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data, or will do so, and that it has checked and coordinated all **Submittals** with the requirements of the **Work** and of the **Contract Documents**.
- 31.3. The **Consultant** shall review the **Submittals** with reasonable promptness, but only for general conformance with the **Contract Documents**. The **Consultant's** review of a separate item shall not indicate approval of such item or of any assembly in which the item functions. The **Consultant's** review of **Submittals** shall not relieve the **Contractor** of responsibility for any deviation from the requirements of the **Contract Documents** unless the **Contractor** has informed the **Consultant** in writing of such deviation at the time of submission and the **Consultant** has given written approval to the specific deviation; provided that any such review and approval by the **Consultant** shall not relieve the **Contractor** from responsibility for errors or omissions in the **Submittals** themselves.
- 31.4. The **Contractor** shall make any corrections required by the **Consultant** and shall resubmit the required number of corrected copies of **Submittals**. The **Contractor** shall direct specific attention in writing or on resubmitted **Submittals** to revisions other than the corrections requested by the **Consultant** on previous submissions.
- 31.5. The **Consultant** does not warrant or represent that the information in the **Submittal** is accurate or complete. The **Consultant's** review does not relieve the **Contractor** of responsibility for errors or omissions in designs, including a **Submittal**, that are the **Contractor's** responsibility, and for conforming and correlating with all quantities and dimensions, performing the **Work**, selecting performance means and methods, coordinating with other parts of the **Work** and between **Subcontractors**, and performing the **Work** safely. Notwithstanding any review by the **Consultant** and subject only to GC 31.3, the **Contractor** remains solely responsible for compliance with the **Contract Documents**.

32. Laying Out Work

- 32.1. Unless otherwise stipulated in the **Contract Documents**, all **Work** is to be laid out by the **Contractor**. This shall include but not be limited to batter boards, sight rails, stakes and marks, and bench marks as required.
- 32.2. The **Contractor** shall be responsible for the accuracy of the layout and preservation of bench marks, reference points and stakes; failing which, all costs to rectify same shall be for the **Contractor's** account.

33. Inspection of Work

- 33.1. The **Owner**, or the **Consultant** on the **Owner's** behalf, and their representatives shall, at all times, have access to the **Work** whenever it is in preparation or progress and the **Contractor** shall provide proper facilities for such access.
- 33.2. If the **Contract Documents**, the **Consultant's** instructions, or the laws or ordinances of the **Place of the Work** require any work to be specially tested, inspected or approved,

the **Contractor** shall give the **Consultant** timely notice of readiness of the **Work** for all required tests, inspections or approvals. The **Contractor** shall arrange for tests, inspections or approvals by other authorities and shall give the **Consultant** timely notice of the date and time. If the **Contractor** covers, or permits to be covered, **Work** that has been designated for special tests, inspections or approvals before such tests, inspections or approvals are made, given or completed, the **Contractor** shall, if so requested, uncover the **Work**, have the inspections or tests satisfactorily completed and correct such work at its own expense. The **Contractor** shall furnish promptly to the **Consultant** two (2) copies of certificates and inspection reports relating to the **Work**.

- 33.3. Re-examination of questioned work may be ordered by the **Consultant**. If such work is determined by the **Consultant** to be in accordance with the requirements of the **Contract Documents**, the **Owner** shall pay the cost of re-examination and replacement. If such work is determined by the **Consultant** to not be in accordance with the requirements of the **Contract Documents**, the **Contractor** shall correct such work and shall pay the cost of re-examination and correction.
- 33.4. The **Contractor** shall pay the cost of making any test or inspection, including the cost of samples required for such test or inspection, if such test or inspection is designated in the **Contract Documents** to be performed by the **Contractor**, or is designated by laws or ordinances applicable to the **Place of the Work**.
- 33.5. The **Contractor** shall pay the cost of samples required for any test or inspection to be performed by the **Consultant** or the **Owner** if such test or inspection is designated in the **Contract Documents**.
- 33.6. No obligation shall be imposed on the **Owner** or the **Consultant** by reason of any testing, inspection or approval made pursuant to GC 33, nor shall any failure to test, inspect or approve relieve the **Contractor** of responsibility for the **Work**.

34. **Defective Work**

- 34.1. The **Contractor** shall promptly correct any defective **Work** which has been rejected by the **Consultant** as failing to conform to the **Contract Documents**, whether incorporated in the **Work** or not. Thereafter, the **Contractor** shall promptly correct any defective **Work** in accordance with the **Contract Documents** and without expense to the **Owner** and shall bear the expense of making good all work of **Other Contractors** destroyed or damaged by such correction.
- 34.2. If the **Contractor** does not correct such defective **Work** within the time fixed by written notice from the **Consultant**, the **Owner** may have such defective **Work** corrected at the expense of the **Contractor**. If the **Contractor** does not pay the expense of such correction within five (5) **Days** after receipt of an invoice therefor, the **Owner** may, upon ten (10) **Days'** written notice, deduct from the **Contract Price** all expenses that should have been borne by the **Contractor**.
- 34.3. If, in the opinion of the **Consultant**, it is not expedient to correct defective **Work**, the **Owner** may deduct from the **Contract Price** the difference in value between the **Work** as done and that called for by the **Contract Documents**, the amount of which shall be determined by the **Consultant**. Any reduction of payment to the **Contractor** under GC 34 shall in no way relieve the **Contractor** from its obligations pursuant to the **Contract**.

35. Completion

- 35.1. When the **Contractor** believes that it has achieved **Substantial Performance of the Work**, in accordance with the **Contract Documents**, the **Contractor** shall prepare and submit to the **Consultant** a comprehensive list of items to be corrected or completed and apply for a review by the **Consultant** to establish interim completion of the **Work**. Failure to include an item on the list does not alter the responsibility of the **Contractor** to complete the **Contract**. The **Consultant** shall, in evaluating whether **Substantial Performance of the Work** has been achieved, determine the amount of **Work** that has been performed by determining the total value of the **Work** by adding all approved **Change Orders** and **Change Directives** to the **Contract Price** (the "Amended Contract Price") and then subtracting the value of the **Work** that is defective or deficient with the net amount being the "Work Performed". The percent performed shall be the ratio of the Work Performed to the Amended Contract Price multiplied by one hundred (100).
- 35.2. No later than ten (10) **Days** after the receipt of the **Contractor's** list and application, the **Consultant** shall review the **Work** to verify the validity of the application, and no later than seven (7) **Days** after completing the review, shall notify the **Contractor** whether the **Contractor** has achieved **Substantial Performance of the Work**. When the **Consultant** finds that **Substantial Performance of the Work** has been reached, the **Consultant** shall issue an **Interim Certificate of Completion**. If the **Consultant** determines that **Substantial Performance of the Work** has not been achieved, the **Contractor** shall perform the work required to achieve **Substantial Performance of the Work** and thereafter provide the **Consultant** with another application for an **Interim Certificate of Completion**. This process shall be repeated until an **Interim Certificate of Completion** is issued in accordance with GC 35.2. Additional costs, if any, incurred by the **Owner** for processing any second or subsequent application shall be borne by the **Contractor**, shall be due on demand, and may be deducted and retained by the **Owner** from any payment then or thereafter due to the **Contractor** under this **Contract**.
- 35.3. The **Consultant** shall state the date of **Substantial Performance of the Work** in the **Interim Certificate of Completion**.
- 35.4. Immediately following the issuance of the **Interim Certificate of Completion**, the **Contractor**, in consultation with the **Consultant** shall establish a reasonable date for finishing the **Work**.
- 35.5. Concurrently with the issuance of the **Interim Certificate of Completion**, the **Consultant** shall prepare a written list of items of the **Work** to be corrected and/or completed that were apparent to it in its inspection and assessment of the **Work**. The issuance of this list does not relieve the **Contractor** from its obligation to correct and/or complete all defects and deficiencies in the performance of the **Contract** as provided for in GC 35. In addition to the monies to be held back in accordance with Clause 4 of the **Agreement**, the **Owner** may hold back monies equal to two (2) times the cost, as estimated by the **Consultant**, to correct and/or complete the items appearing in the said list from the net payment to be made following the issuance of the **Interim Certificate of Completion**. As defects and deficiencies on the **Consultant's** list are remedied, the holdback monies corresponding to such defects and deficiencies shall be released to the **Contractor**. If the **Contractor** should fail to correct and/or complete such items within a reasonable time, the **Owner** may use the monies held back for defects and deficiencies to correct and/or complete such items.
- 35.6. When the **Contractor** has corrected and/or completed all defects and deficiencies required to fully complete the **Work** in accordance with the **Contract Documents**, the **Contractor** shall prepare and submit to the **Consultant** a request for a **Final Certificate**

of Completion. The **Consultant** shall have ten (10) **Days** from receipt of the **Contractor's** application to review the **Work** and accept or reject the **Contractor's** application for a **Final Certificate of Completion**. If the **Consultant** accepts that a **Final Certificate of Completion** should be issued, the **Consultant** shall issue the **Final Certificate of Completion**.

- 35.7. Correction and/or completion of defective and/or deficient **Work** noted at the time of issuing the **Interim Certificate of Completion** shall be done promptly and within a reasonable time. When such items have not been corrected or completed within a reasonable time, especially within the **Warranty Period**, the **Warranty Period** shall be extended, at no additional cost to the **Owner**, so as to commence at such time when such defective and/or deficient **Work** is completed.
- 35.8. If the **Consultant** determines that a **Final Certificate of Completion** should not be issued, the **Contractor** shall perform the work required to fully complete the **Work** in accordance with the **Contract Documents** and thereafter provide the **Consultant** with another application for a **Final Certificate of Completion**. This process shall be repeated until a **Final Certificate of Completion** is issued in accordance with GC 35.6. Additional costs, if any, incurred by the **Owner** for processing any second or subsequent application shall be borne by the **Contractor**, shall be due on demand, and may be deducted and retained by the **Owner** from any payment then or thereafter due to the **Contractor** under this **Contract**.
- 35.9. The acceptance by the **Contractor** of the **Final Certificate of Completion** or of any payment due thereunder shall constitute a warranty by the **Contractor** to the **Owner** that the **Work** has been performed in accordance with the **Contract Documents** and a waiver of all claims against the **Owner** and the **Consultant**, whether in contract, tort or otherwise (including without limitation claims for or relating to breach of contract, breach of warranty, fundamental breach, negligence, misrepresentation and strict liability), except those made in writing prior to the date of the **Final Certificate of Completion** and still unsettled, if any, and those relating to any **Substantial Defects** in the **Work** which the **Contractor** is required to correct following the expiration of the **Warranty Period** as described in GC 36.5.2.

36. **Warranty**

- 36.1. Without restricting any warranty or guarantee either made by the **Contractor** or implied by law, the **Contractor** shall, at its own expense, promptly correct any defective **Work** that is observed or discovered prior to the expiration of the **Warranty Period**, whether or not such defects could have been observed or discovered during construction, and the **Contractor** shall promptly pay for any damage resulting from such defects. Any certificate issued pursuant to the **Contract** shall not relieve the **Contractor** from this responsibility.
- 36.2. The **Owner** shall give notice of any defect within a reasonable time of observing such defect. The **Contractor** shall correct all defective **Work** within fifteen (15) **Days** of receipt of written notice from the **Owner** or such time as the **Consultant** determines is reasonable for the remediation.
- 36.3. Should the **Contractor** fail to proceed with the correction of such defective **Work** within fifteen (15) **Days** from the date of notice from the **Consultant** to do so, the **Owner** may, after giving an additional fifteen (15) **Days'** notice to the **Contractor**, take all necessary steps to have the work done by another contractor and the costs of, and incidental to, the doing of the said work shall be paid by the **Contractor**. At the **Owner's** option, such costs, together with the damages resulting from such defects, may be deducted from any

monies then or thereafter due and payable to the **Contractor** under the **Contract**, or the **Owner** may recover the same from the **Contractor** and its sureties as monies paid for and on behalf of the **Contractor** at its request. The **Consultant** shall decide the necessity and extent of the correction and the nature thereof.

- 36.4. The correction of all defects shall be executed at such time as is convenient to the **Owner**. This may entail overtime work on the part of the **Contractor**. Additional charges for overtime work in this regard shall be borne by the **Contractor**. Prior to the expiry of the **Warranty Period**, the **Owner** reserves the right to carry out an inspection of the **Work**. The **Contractor** shall be required to correct the defective **Work** identified by the **Owner**.
- 36.5. Notwithstanding the expiration of the **Warranty Period** or the issuance of any certificate, the **Contractor** shall:
 - 36.5.1 not be relieved of its responsibility for correcting any defects in the **Work** of which notice has been given to the **Contractor** prior to the expiration of the **Warranty Period** and which remain uncorrected; and
 - 36.5.2 be responsible for correcting, at its own expense, any **Substantial Defects** which were neither observed nor discovered prior to the expiration of the **Warranty Period**.
- 36.6. Notwithstanding the provisions of GC 36, if any statute or bylaw of the Province, Municipality, County or other applicable jurisdiction where the **Work** is being performed creates a more extended liability for defective materials or workmanship, then the provisions of such statute or bylaw shall apply.
- 36.7. The **Contractor** shall assign to the **Owner** the benefit of all guarantees and warranties for all **Products** and other parts of the **Work** used or incorporated in the **Work** and shall ensure such assignment is also effected by all **Subcontractors**, **Suppliers** or consultants from whom the same have been obtained. Thereafter, as reasonably required by the **Owner**, the **Contractor** shall make, do, execute, and deliver such instruments in writing as may be necessary or desirable to assure the enforceability of such guarantees and warranties.
- 36.8. The **Owner** shall have the right to assign all guaranties and warranties to a new owner or owners and the **Contractor** shall make, do, execute, and deliver such instruments in writing as may be necessary or desirable to assure the enforceability of such assignment. The **Contractor** shall make all reasonable efforts to promptly correct any defects in the **Work** and fulfil its warranty obligations in order to ensure that the **Owner's** reputation is not adversely affected.
- 36.9. Correction of defective **Work** shall be done promptly and within a reasonable time. When such items have not been corrected within a reasonable time, especially within the **Warranty Period**, the **Warranty Period** shall be extended, at no additional cost to the **Owner**, so as to commence at such time when such defective **Work** is corrected.
- 36.10. Nothing in this **Contract** shall be deemed to limit any rights of the **Owner** to sue the **Contractor** either at law or in equity on any cause of action arising out of its performance of or failure to perform the terms of this **Contract**, or to claim damages, contribution or indemnity from the **Contractor** or any other person under the terms of this **Contract**.

37. **Use of Premises**

37.1. The **Contractor** shall confine its operations and the storage of materials to limits indicated by laws, ordinances or permits and as permitted by the **Owner** and shall not unreasonably encumber the **Place of the Work** with its materials. The **Contractor** shall not load, or permit to be loaded, any part of the **Work** with a weight that will endanger its safety. The **Contractor** shall enforce all regulations and requirements regarding signs, advertisements, fires and smoking.

38. **Responsibility Regarding Existing Utilities and Structures**

38.1. Excavation in the vicinity of existing structures and utilities shall be carefully performed by the **Contractor**, and any utilities which cross an excavation must be properly supported or shored to prevent settlement. Where trenching is to be done under existing utilities, such utilities shall be shored before excavation commences and shoring shall be left in place.

38.2. The existence, location and elevation of underground utilities and/or concealed structures are not guaranteed by the **Owner** or the **Consultant** and, notwithstanding any other provision in the **Contract Documents** but subject to GC 38.5, the **Contractor** shall be responsible for determining the existence, location and elevation of all sewer, water and gas mains, services or lines, electric light, power or telephone conduits, or other such structures or utilities, and shall pay for any service supplied by the gas, waterworks, sewer, electric light, power or telephone company or department. The **Contractor** shall be responsible for notifying the appropriate company, department, or person(s) of its intention to carry out its operations.

38.3. Prior to commencing any excavation, the **Contractor** shall deposit with the **Consultant** a letter or letters from the appropriate authority of the utility or utilities involved stating that the **Contractor** has made satisfactory arrangements with the appropriate utility company(ies) for the location, protection and inspection of the utility involved.

38.4. Subject to the provisions of GC 38.5, the **Contractor** shall indemnify and save harmless the **Owner** and the **Consultant** against damages for consequential loss and against any claim made against the **Owner** or the **Consultant** by the owner of any main, line, conduit or other such structure or utility referred to in GC 38.2 for any loss or damage in respect of third party claims, or which may be suffered by any such owner because of damage to any such main, line, conduit or other structure or utility, in any way caused by the operations of the **Contractor**, a **Subcontractor** or **Supplier** or anyone for whom they may be responsible.

38.5. If the **Contractor** discovers conditions at the **Place of the Work** which are:

38.5.1 subsurface or otherwise concealed physical conditions which existed before the commencement of the **Work** and which differ materially from those indicated in the **Contract Documents**; or

38.5.2 physical conditions of a nature which differ materially from those ordinarily found to exist and generally recognised as inherent in construction activities of the character provided for in the **Contract Documents**;

then the **Contractor** shall notify the **Owner** and the **Consultant** in writing before the conditions are disturbed and in no event later than five (5) **Days** after first observance of the conditions. The **Consultant** shall promptly investigate such conditions and make a finding. If the finding is that the conditions differ materially and this would cause an

increase or decrease in the **Contractor's** cost or time to perform the **Work**, the **Consultant**, with the **Owner's** approval, shall issue appropriate instructions for a change in the **Work** as provided in GC 23. If the **Consultant** finds that the conditions at the **Place of the Work** are not materially different or that no change in the **Contract Price** or the **Contract Time** is justified, the **Consultant** shall report the reasons for such finding to the **Owner** and the **Contractor** in writing.

- 38.6. The **Contractor** acknowledges that it has inspected the **Place of the Work** for the physical conditions described in GC 38.5 and has disclosed its findings to the **Consultant**. The **Contractor** shall not be entitled to, and shall not claim, any additional compensation, or extension of **Contract Time** as a result of any conditions that were or ought to have been discovered upon reasonable inspection by the **Contractor** prior to the date of the **Contract** or in respect of any claims for which the **Contractor** failed to give notice as required by GC 38.5.
- 38.7. Nothing in GC 38 hereof shall relieve the **Contractor** from the responsibility to conduct its own examination of the **Place of the Work** and the **Work**, as provided in GC 38.6.
- 38.8. No claims for additional compensation, or for an extension of **Contract Time**, shall be allowed if the **Contractor** fails to give notice to the **Consultant**, as required by GC 38.5.

39. **Use of Completed Portions**

- 39.1. The **Owner** reserves the right to take possession of and use any completed or partially completed portion of the **Work**, regardless of the time of completion of the entire **Work** providing it does not interfere with the **Contractor's** work. Such taking possession or use of the partially completed portions shall not be construed as **Substantial Performance of the Work** or an acknowledgement of fulfilment of the **Contract**.

40. **Temporary Facilities and Temporary Loadings**

- 40.1. The **Contractor** shall have the sole responsibility for the design, erection, operation, maintenance and removal of temporary facilities and for the design and execution of the construction methods to be used for the adequacy and safety of such facilities. The **Contractor** shall engage and pay for registered professional engineering personnel, skilled in the appropriate discipline to perform these functions where required by law or the **Contract Documents**, and in all cases where such temporary facilities and their method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results and any opinion expressed by the **Consultant** shall not relieve the **Contractor** of this responsibility in any way. The drawings depicting the design of the temporary facilities shall show the design loads which the structure is expected to withstand, the type and grade of material to be used, and sufficient dimensions and instructional detail as to permit strict adherence to the design during construction. Calculations shall be made and recorded which will show that the temporary facilities are capable of carrying all loads which are expected to be imposed upon them. The design drawings of the temporary facilities shall be signed and sealed by the **Contractor's** engineer who made the design or who supervised and directed its preparation and each revision thereto shall also be signed by such engineer, or by another engineer qualified to undertake the responsibility for the alteration in design. Before any load is placed on the temporary facilities, the **Contractor's** design engineer shall perform an inspection to ensure that the temporary structure complies with the design requirements and is satisfactory for use.

41. **Cleaning Up**

- 41.1. The **Contractor** shall, at all times, keep the **Place of the Work** in a safe and tidy condition, and free from accumulation of waste material or rubbish caused by its performance of the **Work**, and at the completion of the **Work** it shall remove all rubbish and all tools, equipment and surplus materials from and about the **Work** and shall leave the **Work** clean and suitable for occupancy by the **Owner**. In case of dispute, the **Owner** may remove the rubbish and charge the cost to the **Contractor** as the **Consultant** shall determine to be proper in the circumstances.

42. **Cutting and Fitting**

- 42.1. The **Contractor** shall perform all cutting, fitting and remedial work required to make the affected parts of the **Work** come together properly and to integrate the **Work** with the work of **Other Contractors**, the **Owner's** own forces or work performed by utility service companies. The **Contractor** shall coordinate the **Work** to ensure that such cutting, fitting and remedial work are kept to a minimum.
- 42.2. Any cost caused by a failure to properly coordinate the **Work** shall be borne by the **Contractor**.
- 42.3. The **Contractor** shall not endanger the **Work** or the work of others by cutting, digging or otherwise and shall not cut or alter existing work except with the written consent of the **Consultant**.
- 42.4. Cutting and remedial work shall be performed by specialists familiar with the materials affected and shall be performed in a manner to neither damage nor endanger the **Work** or the work of others.

43. **Insurance**

- 43.1. Without in any way limiting the liability of the **Contractor** under the **Contract**, the **Contractor** shall provide, maintain and pay the premiums for any insurance it is required by law to provide, marine cargo insurance (if applicable) and the minimum insurance coverages listed in GC 43 unless otherwise stipulated in the **Contract Documents**:
- 43.1.1. **General Liability Insurance:** General Liability Insurance shall be in the name of the **Contractor**, with the **Owner** and the **Consultant** as additional insureds, but only with respect to liability arising out of the operations of the **Contractor** with regard to the **Work** (excluding any legal liability arising out of the sole negligence of the **Owner** or the **Consultant**), with limits of not less than five million dollars (\$5,000,000) per occurrence, an aggregate limit of not less than five million dollars (\$5,000,000) within any policy year with respect to completed operations, and a deductible not exceeding five thousand, (\$5,000). Subject to satisfactory proof of financial capability by the Contractor, the Owner may agree to increase the deductible amounts. The insurance coverage and the form of this insurance shall be at least equal to the latest edition of IBC Form 2100, including an extension for a standard provincial and territorial form of non-owned automobile liability policy and the latest edition of the relevant CCDC endorsement form, and shall be maintained continuously from commencement of the **Work** until the date of the expiry of the **Warranty Period**, and with respect to Completed Operations Coverage for a period of not less than six (6) years from the date on which the **Warranty Period** expires. The policy shall be endorsed to provide the **Owner** with not less than thirty (30) **Days'** written notice in advance of any cancellation, change or amendment restricting coverage.

- 43.1.2. **Automobile Liability Insurance:** Automobile Liability Insurance in respect of vehicles that are required by law to be insured under a contract by a Motor Vehicle Liability Policy, shall have limits of not less than five million dollars (\$5,000,000) inclusive per occurrence for bodily injury, death, and damage to property, covering all vehicles owned or leased by the **Contractor**, in the following forms endorsed to provide the **Owner** with not less than thirty (30) **Days'** written notice in advance of any cancellation, change or amendment restricting coverage:
- 43.1.2.1. Standard Non-Owned Automobile Policy including Standard Contractual Liability Endorsement. (This may be attached to the General Liability Insurance policy.)
 - 43.1.2.2. Standard Owner's Form Automobile Policy providing Third Party Liability and Accident Benefits Insurance and covering licensed vehicles owned or leased by the **Contractor**.

The Automobile Liability Insurance shall be maintained continuously from commencement of the **Work** until the date of the expiry of the **Warranty Period**.

- 43.1.3. **Aircraft and Watercraft Liability Insurance:** Aircraft and Watercraft Liability Insurance covering owned or non-owned aircraft and watercraft if used directly or indirectly in the performance of the **Work**, including use of additional premises, shall be subject to limits of not less than five million dollars (\$5,000,000) inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof and limits of not less than five million dollars (\$5,000,000) for Aircraft Passenger Hazard. Such insurance shall be in a form acceptable to the **Owner**. The policies shall be endorsed to provide the **Owner** with not less than thirty (30) **Days'** written notice in advance of any cancellation, change or amendment restricting coverage.
- 43.1.4. Property and Boiler and Machinery Insurance:
- 43.1.4.1. "Broad form" Property Insurance shall be in the joint names of the **Contractor**, the **Owner**, and the **Consultant**, with **all Subcontractors** as additional insureds, insuring not less than the sum of the amount of 1.1 times the **Contract Price** and the full value, as stated in the **General Requirements** or elsewhere in the **Contract Documents**, of **Products** and design services that are specified to be provided by the **Owner** for incorporation into the **Work** with a deductible not exceeding five thousand dollars (\$5,000). Subject to satisfactory proof of financial capability by the Contractor, the Owner may agree to increase the deductible amounts. The insurance coverage and the form of insurance shall be at least equal to the latest edition of IBC Form 4042, including the latest edition of the relevant CCDC endorsement form (excluding flood and earthquake), and shall be maintained continuously until ten (10) **Days** after the date of the **Final Certificate of Completion**.
 - 43.1.4.2. Boiler and Machinery Insurance shall be in the joint names of the **Contractor**, the **Owner**, and the **Consultant**, with **all Subcontractors** as additional insureds, insuring not less than the replacement value of permanent or temporary boilers, pressure

vessels and other insurable objects forming part of the **Work**. The insurance coverage and the form of insurance shall be at least equal to the latest edition of the “Comprehensive Boiler and Machinery Form” and shall be maintained continuously from commencement of use or operation of the property insured until ten (10) **Days** after the date of the **Final Certificate of Completion**.

- 43.1.4.3. The policies shall allow for partial or total use or occupancy of the **Work**. If because of such use or occupancy the **Contractor** is unable to provide coverage, the **Owner**, upon written notice from the **Contractor** and prior to such use or occupancy, shall assume the responsibility to provide, maintain and pay for Property and Boiler and Machinery Insurance insuring the full value of the **Work**, as in GC 43.1.4.1 and GC 43.1.4.2, in the forms mentioned therein, including coverage for such use or occupancy, and the **Contractor** shall refund to the **Owner** the unearned premiums applicable to the **Contractor's** policies upon termination of coverage.
- 43.1.4.4. The policies shall provide that, in the event of a loss or damage, payment shall be made to the **Owner** and the **Contractor** as their respective interests may appear. The **Contractor** shall act on behalf of the **Owner** and itself for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the **Contractor** shall, at the option of the **Owner**, proceed to restore the **Work**. Loss or damage shall not affect the rights and obligations of either party under the **Contract** except that the **Contractor** shall be entitled to such reasonable extension of the **Contract Time** as the **Consultant** may decide in accordance with GC 10.
- 43.1.4.5. The **Contractor** shall be entitled to receive from the payments made by the insurers the amount of the **Contractor's** interest in the restoration of the **Work**. In addition, the **Contractor** shall be entitled to receive from the **Owner** (in addition to the amount due under the **Contract**) the amount at which the **Owner's** interest in the restoration of the **Work** has been appraised, such amount to be paid as the restoration of the **Work** proceeds and in accordance with the requirements of GC 21 and GC 22.
- 43.1.4.6. In the case of loss or damage to the **Work** arising from the work of an **Other Contractor**, or the **Owner's** own forces, the **Owner**, in accordance with the **Owner's** obligations under GC 16.2, shall pay the **Contractor** the cost of restoring the **Work** as the restoration of the **Work** proceeds and in accordance with the requirements of GC 21 and GC 22.
- 43.1.5. **Contractor's Equipment Insurance:** “Broad form” Contractor's Equipment Insurance covering construction machinery and equipment owned or rented and used by the **Contractor** and/or **Subcontractors** for the performance of the **Work**, shall be in a form acceptable to the **Owner** and shall not allow subrogation claims by the insurer against the **Owner** or the **Consultant**. The policies shall be endorsed to provide the **Owner** with not less than thirty (30) **Days'** written notice in advance of any cancellation, change or amendment restricting coverage. Subject to satisfactory proof of financial capability by the Contractor for self-insurance, the Owner may agree to waive the equipment insurance requirement.

43.1.6. **General Insurance Provisions:**

43.1.6.1. The **Contractor** shall be responsible for deductible amounts under each of the insurance policies mentioned in GC 43.1.

43.1.6.2. Unless specified otherwise, the duration of each policy shall be from the date of commencement of the **Work** until the date of the **Final Certificate of Completion**.

43.1.6.3. The **Contractor** shall provide the **Owner** with proof of insurance prior to commencement of the **Work** and, if requested by the **Owner** or the **Consultant**, shall promptly provide the **Owner** with a certified true copy of each policy exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. The **Contractor** shall obtain and comply with all of the **Owner's** and the insurers' requirements, including, but not limited to, allowable classes of vessels, maximum value concentrations, reports and claims handling procedures.

43.1.6.4. If the **Contractor** fails to provide or maintain insurance as required hereunder or elsewhere in the **Contract Documents**, then the **Owner** shall have the right to provide and maintain such insurance and give evidence thereof to the **Contractor** and the **Consultant**. The cost thereof shall be payable by the **Contractor** to the **Owner** on demand or the **Owner** may deduct such amount from monies which are due or may become due to the **Contractor**.

43.1.6.5. All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the **Place of the Work**.

43.2. In addition to the broad form property exclusions identified in IBC forms 4042(1995), and 4047(2000), the **Contractor** is not required to provide the following insurance coverage:

43.2.1. Asbestos;

43.2.2. Cyber Risk;

43.2.3. Mould; or

43.2.4. Terrorism.

44. **Contract Security**

44.1. The **Contractor** shall furnish **Contract Security** in the form of a Performance Bond in an amount equal to at least fifty percent (50%) of the **Contract Price** as security for the faithful performance of the **Contract**, including the corrections after completion provided for in GC 35 and GC 36, and the payment of all obligations arising under the **Contract**.

44.2. The **Contractor** shall also furnish **Contract Security** in the form of a Labour and Materials Payment Bond in an amount equal to at least fifty percent (50%) of the **Contract Price** as security for the payment of all labour and material used or reasonably required in the performance of the **Contract**.

44.3. The bonds mentioned in GC 44.1 and GC 44.2 shall be originals issued by a duly licensed surety authorized to transact a business of suretyship in the jurisdiction of the

Place of the Work and shall be maintained in good standing until the date of the expiry of the **Warranty Period**. Unless otherwise specified in the **Contract Documents**, the form of such bonds shall be in accordance with the latest edition of the CCDC approved bond forms.

45. **Disputes**

- 45.1. Differences between the parties to the **Contract** as to the interpretation, application or administration of the **Contract** or any failure to agree where agreement between the parties is called for, herein collectively called disputes, which are not resolved in the first instance by decision of the **Consultant** pursuant to the provisions of GC 5.6, shall be settled in accordance with the requirements of GC 45.
- 45.2. A party shall give written notice of such dispute to the **Consultant** and the other party no later than thirty (30) **Days** after it has received the **Consultant's** decision under GC 5.6, failing which the **Consultant's** decision under GC 5.6 shall be treated as final and binding. Such notice shall set forth particulars of the matters in dispute, the probable extent and value of the damage and the relevant provisions of the **Contract Documents**. The **Consultant** shall reply to such notice no later than fifteen (15) **Days** after it receives such notice, setting out in such reply any relevant provisions of the **Contract Documents**.
- 45.3. The **Contractor** shall continue diligently to prosecute the **Work** pending determination of every dispute. In the event the **Contractor** refuses to proceed diligently with the **Work** or any portion thereof, the **Contractor** shall be directly responsible for all damages to the **Owner** as a result of such suspension and, in addition to any other right that the **Owner** may have at law or in equity, the **Owner** shall have the right to notify the **Contractor** that it is in default of its contractual obligations pursuant to GC 13.2.
- 45.4. If the matter in dispute is not resolved promptly, the **Consultant** may give such instructions as, in its opinion, are necessary for the proper performance of the **Work** to prevent delays pending settlement of the dispute. The **Contractor** shall act immediately according to such instructions, it being understood that by so doing the **Contractor** shall not prejudice any claim it may have arising out of the matter in dispute.
- 45.5. The **Owner** and the **Contractor** shall make all reasonable efforts to resolve their disputes by discussion and negotiation and agree to provide, without prejudice, frank, candid and timely disclosure of relevant facts, information and documents to facilitate these negotiations. If the **Owner** and the **Contractor** are unable to resolve the dispute and the dispute cannot be resolved, or the parties dispute the **Consultant's** decision under GC 5.6, the parties may agree to have the dispute resolved by mediation or arbitration or such other means as the parties may mutually agree. If no agreement as to the method of dispute resolution is reached between the **Owner** and **Contractor** then either party may submit the dispute to such judicial tribunal as the circumstances may require.

46. **Assignment**

- 46.1. The **Contractor** shall not assign the **Contract** or a portion thereof (otherwise than by a charge by the **Contractor** in favour of the **Contractor's** bankers of any monies due or to become due under the **Contract**, which assignment shall be notified to the **Owner**) without the **Owner's** written consent, which consent may be unreasonably withheld. The **Contractor**, when requesting the **Owner's** consent to an assignment, shall provide evidence satisfactory to the **Owner** of the ability of the proposed assignee to complete the **Contract** in respect of its technical and financial competence, its workforce and its equipment along with any other information requested by the **Owner**.

- 46.2. The **Owner** acting reasonably, may assign the **Contract** without the consent of the **Contractor** upon thirty (30) **Days** written notice to the **Contractor** and, upon such assignment, the **Owner** shall have no further liability or obligation whatsoever to the **Contractor** under the **Contract** or at law and more particularly shall have no further obligations to perform or make payment of any amounts accruing due after the effective date of the assignment.

47. **Miscellaneous**

- 47.1. Title to the **Work** and all portions thereof during and after construction, together with all **Products** on the **Place of the Work**, are vested in the **Owner**.
- 47.2. The **Contractor** shall check all **Contract Documents** before commencing the **Work** to ensure all issues related to dimensions, and to applicable municipal or other local, provincial and/or national codes, regulations and detailing are correct and understandable.
- 47.3. The **Contractor** shall ensure that all rights and privileges presently accorded adjacent properties are maintained.
- 47.4. To provide for occupancy by one or more occupants or the **Owner** prior to completion and final acceptance of the entire **Work** as provided above, the **Contractor** shall make available the use of such services reasonably required for occupant or **Owner's** occupancy including, but not limited to, elevators, heating, ventilation, cooling, water, lighting, security, power, and telephone for the space or spaces to be occupied, and the **Owner** shall be required to pay for its reasonable share of such services. The occupancy or use of such space or spaces shall not constitute the **Owner's** acceptance of any work, materials, or equipment which are not in accordance with the requirements of the **Contract Documents**, nor relieve the **Contractor** from its obligations to complete the **Work**, or from any other unfulfilled obligations or responsibilities under the **Contract Documents**.
- 47.5. The **Contractor** shall, after partial occupancy, permit no disruption to any necessary utilities or other services to such occupied areas and shall schedule and organize its work to minimize any disruptions or unpleasant conditions that might affect access to, or the comfort of persons occupying such space.
- 47.6. If any article, section or subsection of this **Contract** or any portion thereof is determined to be indefinite, invalid, illegal or otherwise void, voidable or unenforceable, then it shall automatically be severed from this **Contract** and the balance of this **Contract** shall continue in full force and effect.
- 47.7. This **Contract** can be amended or added to only by a written agreement executed by both the **Owner** and the **Contractor** in accordance with the **Contract Documents**.
- 47.8. This **Contract** sets forth the entire agreement between the **Owner** and **Contractor** and contain all of the representations, warranties, terms, conditions, provisos, covenants, undertakings and conditions agreed upon by them with reference to the subject matter hereof. All other representations, warranties, terms, conditions, provisos, covenants, understandings and agreements, whether oral or written (including without limitation any letter of intent between the parties), are waived and are superseded by this **Contract**.

**Attachment "A" – Final Release and Indemnity
(referenced in s.4.1.3.5 of Part IV – Agreement)**

DATE: _____

TO: Town of Inuvik (the "Owner")

FROM: (the "Contractor")

RE: MSC Electrical Upgrades (the "Project")

In consideration of the sum of _____ the receipt of which is hereby acknowledged, and other good and valuable consideration, the **Contractor** hereby acknowledges that the **Owner** has paid and satisfied in full all monies due for all work performed and material whatsoever installed and supplied by the **Contractor** to the above **Project** (collectively the "**Work**") pursuant to the contract for various work between the **Owner** and the **Contractor** (the "**Contract**") and the **Contractor** has no further claims against the **Owner** arising out of the **Work**, the **Contract** and/or the **Project**, except for any unpaid holdback and the following specific claims (the "Claims") which are identified and quantified herein:

_____ (\$ _____)
_____ (\$ _____)

Save as hereinafter provided, the **Contractor** hereby releases and discharges the **Owner** and the **Consultant** of and from any and all actions, causes of action, suits, debts, duties, accounts, claims, damages, costs and demands which the **Contractor** now has, ever had or hereinafter can, shall or may have for or by reason of any cause, matter or thing arising out of the **Work**, **Contract** and/or the **Project** (including, without limitation, the assignment provided in favour of the **Contractor**), excepting the Claims.

Except for the Claims, the **Contractor** further represents that no supplier or sub-contractor of it has any right to file any claim of lien with respect to the **Project** nor have any claims of lien been filed or registered by such supplier or sub-contractor and, if such claims of lien are filed or registered or trust fund claim or workers compensation claim is made, the **Contractor** shall indemnify the **Owner** and save the **Owner** harmless from any and all claims and any loss or damage which the **Owner** may suffer as a result, and the **Owner** is authorized hereby to take any and all steps and make such payments as may be necessary to discharge the claims of lien or trust fund claim and/or pay to satisfy the workers compensation claim, and the **Contractor** hereby covenants to reimburse the **Owner** for such costs.

The **Contractor** acknowledges and warrants that the person executing this Final Release and Indemnity on its behalf is authorized to do so.

Every reference to the "**Owner**" or the "**Contractor**" includes their respective heirs, executors, administrators, receivers, trustees, predecessors, successors, officers, directors, shareholders, agents, employees and assigns, as the case may be.

The terms of the Final Release and Indemnity are contractual and not mere recitals. No agreements, covenants, warranties or representation of any kind whatsoever have been made or relied upon by the **Contractor**, except as expressly set forth in this Final Release and Indemnity.

The **Contractor** acknowledges that the facts in respect of which this Final Release and Indemnity is made may prove to be other than or different from the facts which the **Contractor** at the present time

understand to be true, and the **Contractor** agrees that this Final Release and Indemnity shall be in all respects enforceable and not subject to termination, rescission or variation if its present understanding of said facts is incorrect.

If any term of this Final Release and Indemnity is held to be void, voidable or unenforceable, the **Contractor** agrees that said term shall be severed from this Final Release and Indemnity and the remaining terms thereof shall remain in full force and effect.

This Final Release and Indemnity is governed by the laws of the jurisdiction in which the **Project** is located.

IN WITNESS WHEREOF the **Contractor** has duly executed this Final Release and Indemnity on the day and year first above written.

Authorized Signatory

c/s

**Attachment “B” – Code of Conduct
(referenced in GC 15.8)**

Construction Hours: Construction access hours shall be consistent with any regulations in effect in the municipality where the **Place of the Work** is located.

Roadways: All speed limits and other traffic rules must be obeyed and access to the roadways should not be impeded. Parking shall be in designated areas only.

Communication devices: Radio and cell phone volume shall be at the minimum volume which is consistent with the ability to operate the device.

Animals: No dogs or other animals, are permitted at the **Place of the Work** without the written consent of the **Owner**.

Alcohol/Drugs: No alcoholic beverages or illegal drugs shall be brought on to or consumed at the **Place of the Work**.

Cleanliness: The **Place of the Work** must be maintained for an orderly appearance on a daily basis. Trash and construction debris shall be contained at all times and removed from the **Place of the Work** weekly and from areas used by the **Owner** daily.

Inappropriate Materials: No potentially inappropriate, offensive or discriminatory photographs, articles, magazines or other materials shall be permitted at the **Place of the Work**.

Smoking: Smoking shall be in designated areas only and shall only occur outside.

Storage: Storage shall be in designated areas only.

Noise: Noise levels should be kept to a minimum at all times. Equipment that generates noise should be adequately damped, silenced and soundproofed.

Identity Badges or Clothing: Where required by the **Owner**, all workers shall have an identity badge that clearly indicates the company’s name, the individual’s name and has an identity photograph on it, and is to be worn whenever at the **Place of the Work**.

Fitness for Work: All workers must be fit for work at all times. The **Owner** retains the right to request that individuals leave the **Place of the Work** if they are unfit for any reason including, without limitation, inebriation, taking illegal drugs, injury, fatigue, rudeness or any for other reason that may affect the quality of the work or which represents a breach of these rules.

Standards of Dress: All workers must be in suitable clean clothing, wear shirts and long pants, and display an appropriate standard of personal hygiene.

Theft: Workers who steal from the **Place of the Work** or the **Owner** shall be immediately ejected from the **Place of the Work**. The **Contractor** is responsible for all such thefts irrespective of whether the worker is an employee of the **Contractor**, a **Subcontractor** sub-**Subcontractor** or **Supplier**.

Security: The **Contractor** shall be responsible for ensuring the security of the **Place of the Work** during access and for ensuring that locks are effectively and securely locked. Security doors shall at all times remain closed and shall not be propped open, even for a short time.

**Attachment "C" – Prime Contractor Designation
(referenced in GC 26.3)**

Identity of Prime Contractor	Date From	Date To
THE CONTRACTOR	COMMENCEMENT	FINAL COMPLETION

**Attachment "D" – Electronic Data License
(referenced in GC 3.3)**

ATTENTION: THE ELECTRONICALLY OR DIGITALLY STORED INFORMATION (THE "DATA") ACCOMPANYING THIS LICENCE IS PROVIDED TO YOU ("LICENCEE") SUBJECT TO THE TERMS AND CONDITIONS SET OUT BELOW. IF YOU DO NOT AGREE WITH SUCH TERMS AND CONDITIONS, RETURN ANY AND ALL DATA AND DISKS RECEIVED BY YOU CONTAINING THE DATA AND DELETE ALL DATA FROM YOUR COMPUTER SYSTEM.

THIS LICENCE SHOULD BE REVIEWED AND RENEWED ANNUALLY IF INTENDED FOR MULTIPLE PROJECTS.

Project Name (or description of projects if multiple projects):

(the "Project")

Project Number:

N/A if intended for multiple projects

Client:

("Client")

- Use and Disclosure of Data:** Licencee acknowledges that the Data has been prepared by AECOM Canada Ltd. ("Consultant") for Client in connection with the Project, details of which are known to Licencee. Licencee is hereby granted a non-exclusive right and licence to use, disclose and reproduce the Data, provided that such use, disclosure and reproduction is solely for the purpose of the Project. Licencee shall not use, permit the use of, disclose or reproduce any of the Data for the construction of another project or work, or in any way amend, alter or revise the Data, without first obtaining the written consent of Consultant, and without limitation to the foregoing, all reproductions shall include notice of this restriction. Licencee shall be responsible for ensuring compliance with this Licence by other persons or legal entities to whom the Data has been disclosed by or through Licencee directly or indirectly. Licencee shall be liable to Consultant for damages arising directly or indirectly from a breach of this Licence.
- Disclaimer:** Unless Licencee and Consultant agree otherwise in writing, Licencee acknowledges and agrees that the Data is provided to Licencee for Licencee's convenience and reference, and that Consultant and Client make no guarantees, representations or warranties, whether express or implied, as to the Data or as to any results to be or intended to be achieved from use of the Data, including the possibility of any errors in the Data arising in the course of transmission of the Data. Licencee agrees that it will notify Consultant of any discrepancies or inconsistencies in the Data before proceeding to use the Data. Without limitation to the foregoing, Consultant shall have no responsibility for any loss or damage suffered by Licencee or others resulting from any unauthorised use or modification of the Data.
- Termination of Licence:** Licencee's right and licence to use, disclose and reproduce the Data may be immediately terminated at any time upon written notice from Consultant, whereupon Licencee shall return to Consultant all Data and all media containing the Data and Licencee shall ensure that the Data is erased from all memories of Licencee's computers or information storage devices and from all memories of computers or information storage devices belonging to other persons or legal entities to whom the Data has been disclosed by or through Licencee directly or indirectly and that no residual copies of any part of the Data is retained by any of them. At the request of Consultant, Licencee will provide a certificate of a senior officer certifying Licencee's compliance with this clause.

Signed this ____ day of _____, 20 ____

INSERT NAME OF LICENCEE

by: _____
AUTHORIZED REPRESENTATIVE

PART VI (A)

SUPPLEMENTARY CONDITIONS TO

Town of Inuvik
MSC Electrical Upgrades

1. PRECEDENCE

These Supplementary Conditions form an integral part of the Contract Documents and are to be read in conjunction therewith. The order of precedence of these Supplementary Conditions is as per Clause 1.2.2 of Part VI – General Conditions.

2. AMENDMENTS

(1) Delete Clause 7 of Part VI General Conditions: Office Facilities for the Consultant.

(2) Add the following clauses to Clause 44 of Part VI General Conditions headed Contract Security:

- 44.4 In lieu of the Bonds referred to in Clauses 44.1 and 44.2, the Contractor may provide a security deposit in an amount that is equal to 10% of the total tender price, in the form of a certified cheque or bank draft from a bank acceptable to the Town of Inuvik and made payable to the Town of Inuvik.
- 44.5 If the Contractor's right to perform the work is terminated pursuant to Clause 13, or if the contract is terminated pursuant to Clause 13, or if the Contractor is in breach of or in default under the contract, the Owner may convert the security deposit, if any to its own use.
- 44.6 If the Owner covers the contract security pursuant to SGC 44.5, the amount realized shall be deemed to be an amount due from the Owner to the Contractor under the contract.
- 44.7 Any balance of an amount referred to in SGC 44.6 that remains after payment of all losses, damage and claims of the Owner and other shall be paid by the Owner to the Contractor, if in the opinion of the Engineer, it is not required for the purposes of the contract.
- 44.8 After an Interim Certificate of Completion has been issued, the Owner 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 Engineer, is not required for the purposes of the contract.
- 44.9 After a Final Certificate of Completion has been issued, the Owner shall return to the Contractor the remainder of any security deposit unless the contract stipulates otherwise.
- 44.10 Interest shall not be paid on security deposits.

1. GENERAL

- .1 The Contractor shall read and be governed by the General Conditions, Supplemental General Conditions, General Requirements, Instructions to Bidders, Addenda, Bid Form and Agreement of the complete Specifications for this Project.
- .2 The complete work under this section shall be governed by the dictates of good practice in all details and materials and methods even if not minutely specified. The work shall be properly coordinated with the requirements of other units of work specified in other sections.
- .3 The Contractor shall be responsible for the safety of all persons and property on or about the Project and for ensuring that the Work is performed in accordance with all applicable safety requirements.

2. NOTICE

- .1 The Contractor shall provide at least seventy-two (72) hours' written notice to all utility companies and property owners in the immediate vicinity of his operations prior to the commencement of construction and shall, if requested, co-operate with such parties in the protection, removal or relocation of their installations and property.

3. SAFETY PROGRAM

- .1 The Contractor shall develop, maintain and supervise for the duration of the Work a comprehensive safety program that will effectively incorporate and implement all required safety precautions. The program shall, as a minimum, respond fully to the requirements of all applicable laws, ordinances, rules, regulations and orders and general construction practices for the safety of persons or property, including any general safety rules and regulations of the Owner and any Workers' Compensation or Occupational Health and Safety legislation or regulations that may be applicable. Without limiting the generality of the foregoing, the Contractor shall comply with the Occupational Health and Safety Act, R.S.A., Chapter O-2, as amended and regulations hereunder (the "Act") and ensure, as far as it is reasonably practicable for it to do so, that every contractor and employer performing work in respect of the Project complies with the Act.

4. SAFETY OFFICER

- .1 The Contractor shall designate a safety officer who shall be qualified and authorized to supervise and enforce compliance with the safety program.

5. SAFETY MEETINGS

- .1 The Contractor shall arrange regular safety meetings at his expense. Such meetings shall occur no less frequently than once per week. The Contractor shall record the minutes of such meetings and maintain a complete file for review by the appropriate authorities.

6. SAFETY EQUIPMENT

- .1 The Contractor shall supply and maintain, at his own expense, at his office or other well-known place at the job site, safety equipment necessary to protect the workers and general public against accident or injury as prescribed by the governing authorities.

7. FIRE PREVENTION AND PROTECTION

- .1 The Contractor shall perform all Work in a fire-safe manner. He shall comply with all applicable governmental requirements and, without limiting the generality of the foregoing, shall supply and maintain at the job site adequate and proper fire-fighting equipment.

8. NIGHT WORK

- .1 Night work will only be performed by the Contractor if permission is given beforehand by the appropriate authorities. When work is carried out at night, the Contractor shall supply a sufficient number of electric or other approved lights to enable the work to be done in a safe and satisfactory manner.

9. ACCIDENTS AND ACCIDENT REPORTS

- .1 Except as otherwise agreed to in the Contract, the Contractor shall supply and maintain all articles necessary for giving first-aid to any person who may be injured on the job site and shall establish an emergency procedure for the immediate removal of any injured person to a hospital or a doctor's care in accordance with applicable legislative and regulatory requirements.
- .2 The Contractor shall promptly report in writing to the Owner and the Consultant all accidents of any sort arising out of or in connection with the performance of the Work whether on or adjacent to the job site, giving full details and statements of witnesses. If death or serious injuries or damages are caused, the accident shall be promptly reported by the Contractor to the Owner and the Consultant by telephone or messenger in addition to any reporting required under provincial laws and regulations.
- .3 If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner and the Consultant, giving full details of the claim.

END OF SECTION

1. GENERAL

1.1 General Requirements

- .1 The work covered by this Contract shall include, but shall not be limited to, the furnishing of all materials, plant, equipment, tools, implements, machinery, supplies, temporary lighting, water, heating, scaffolding, shoring, temporary works, dewatering, transportation, labour and superintendence necessary for the construction of the work as herein specified and shown on the drawings.
- .2 The complete work under this Contract shall be governed by the dictates of good practice and shall be complete in all details of materials and methods even if not minutely specified.
- .3 The work shall be properly coordinated with the requirements of all work specified in other sections.
- .4 The work includes testing as specified and assistance with start-up and placing of the work in operation, ready for use by the Owner.

1.2 Description of Work

- .1 Work under this Contract covers supply and installation of all materials and construction of the following:
 - .1 Site Work
 - .1 Site Work is to include supply and installation of 450 kW diesel generator set. Generator set must be supplied within a walk-in enclosure. Unit will be supplied complete with transfer switch. Enclosure unit shall be set on steel pipe piles.
 - .2 Site work includes installation of new ducts and cabling, and as indicated in drawings E01, E02, S01 and S02.
 - .2 Electrical
 - .1 Electrical works shall include the supply and installation of new secondary conduits from the transformer pole to the generator building and from the generator building back to the MSC building.
 - .2 New main breaker, metering, and other electrical equipment shown on the single line diagram located in generator building.
 - .3 New 600 – 120/208 V dry-core transformer located in generator building,
 - .4 New 120/208V panel board located in generator building.
 - .5 Arena lighting control devices and wiring.
 - .6 New fitness area panelboard, relocation of breakers, and rewiring fitness area equipment.

1.3 Material Supply

- .1 The Contractor shall supply all materials necessary for the construction of the work as herein specified or shown on the drawings.

1.4 Cash Allowances

- .1 Items identified as "Cash Allowances" in Schedule "A" of the Bid Form will be paid as cash allowances in accordance with General Condition 20 - Cash Allowances.
- .2 The following items have been identified in the Bid Form as Cash Allowances:
 - .1 New Electrical Service
 - .2 ARC Flash
 - .1 These items to be coordinated by the Contractor and paid for by the Contractor and reimbursed through the Cash Allowances noted on the Bid Form.
- .3 New Electrical Service (NPC Direct Costs) will be paid directly by the Contractor. Costs to be reimbursed to the Contractor through the New Electrical Service Cash Allowance.
- .4 ARC Flash study will be paid directly by contractor. Costs to be reimbursed to the Contractor through the ARC Flash Cash Allowance.
- .5 Contractor to provide copies of invoices for all the above items to the Consultant and these costs will be processed on Progress Certificate through the Cash Allowances.
- .6 The maximum amount payable under the cash allowance will be actual invoice cost for the items noted above. As per General Condition 23, the Lump Sum Price noted in the Total Bid Price, and not the Cash Allowances, includes the Contractor's overhead and profit in connection with such Cash Allowances.
- .7 Invoice cost refers to the cost invoiced by the firm directly supplying the service or materials.
- .8 Any portion of the Cash Allowances, which is not expended, will revert to the Owner.

1.5 Definition of Trades

- .1 For convenience of reference only, the specifications are separated into sections identified by title and a six digit numbering system.
- .2 The separation into sections is not intended to identify responsibility of work.
- .3 Responsibility as to which trade provides required materials or articles of work rests solely with the Contractor.
- .4 In the case of a dispute, it is the Contractor's responsibility to determine which subtrade supplies and installs required materials or equipment.

- .5 Extras will not be considered for differences in interpretation of the specifications as to which trades do the work.

1.6 Mobilization and Demobilization

- .1 Mobilization shall include transportation to the site of the Contractor's labour, equipment, and materials in readiness to start work.
- .2 Demobilization shall include the dismantling and removal from the site of all of the Contractor's equipment and materials, cleanup of the site, and transportation of labour from the site.

1.7 Permits, Licenses, Certificates and Fees

- .1 Contractor shall pay for all permits, licenses and all fees required for performance of the work in accordance with General Condition 19 and Special Provisions.

1.8 Construction Timeline Constraints and Milestones

- .1 The MSC Electrical upgrades are to be complete and ready for commissioning by May 21, 2018.
- .2 Overall project Substantial Completion by May 31, 2018.
- .3 Correction of deficiencies and outstanding work by June 30, 2018.
- .4 The work is to progress without disrupting the operation of the MSC Building.

1.9 Suggested Construction Sequence (Electrical Works)

- .1 Install new power conduits and wiring from the transformer pole to the generator building and from the generator building to the MSC Building.
- .2 Install new arena lighting control.
- .3 Install new fitness area panelboard.
- .4 Install steel pipe piles.
- .5 Install new generator building on site.
- .6 Coordinate power outage with Owner.
- .7 Coordinate with Utility to:
 - .1 De-energize overhead service to building.
 - .2 Connect new generator building service to existing transformer.
- .8 Connect new fitness area panel to new 200A breaker.

- .9 Relocate breakers from hall panelboard to new fitness area panelboard and rewire effected electrical devices.

1.10 Work Schedule

- .1 Provide within fifteen (15) days after Contract award, construction bar chart schedule in weekly increments showing anticipated progress stages, significant milestones, inspections by outside parties and final completion of work within time period required by Contract and Bid documents.
- .2 Interim reviews of work progress based on work schedule will be conducted as decided by Consultant and schedule updated by Contractor in conjunction with and to approval of Consultant.
- .3 Scheduling shall be in accordance with the General Conditions, Special Provisions and General Requirements.
- .4 All system shutdowns and service interruptions must be approved by and coordinated with the Owner. Provide a minimum of fourteen (14) days written notice for each interruption.
- .5 Costs resulting from work or temporary systems required to limit shutdowns to within the time periods given in the Contract Documents shall be borne by the Contractor.

1.11 Documents Required

- .1 Maintain at job site, one copy each of following:
 - .1 Latest "Construction Issue" of Contract drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed shop drawings.
 - .5 Change Orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 Copy of latest approved work schedule.
 - .9 Manufacturers' installation and application instructions.
 - .10 Permits, licenses and land use regulations.
 - .11 Up-to-date Record Drawings.

1.12 Subsurface Conditions

- .1 The Contractor shall be responsible for his own assessment of soil conditions which may include additional on-site investigations.

1.13 Examination of Site

- .1 Prior to commencing actual construction, check field conditions to obtain actual dimensions required to ensure correct execution of the work, and notify the Consultant, in writing, of all matters which could prejudice proper execution of the work.
- .2 Commencement of construction shall constitute acceptance of existing conditions and verification of dimensions.
- .3 No extra charges will be allowed for work resulting from conditions which would have been evident upon a thorough examination of the site.

1.14 Contractor's Use of Site

- .1 Use of site: exclusive and complete for execution of work in accordance with General Conditions and Special Provisions, except as follows:
 - .1 The Contractor and stored materials shall not interfere with the Owner's access to the site for operation, maintenance and repair of existing facilities. Provide temporary access to the existing facilities as may be required and move materials as requested by the Owner.
 - .2 The Contractor shall not operate any of the existing facilities without a representative of the Owner present.
 - .3 At all times cooperate with the Owner.
- .2 The Contractor shall be responsible for site security for the duration of the Contract. Where security is reduced by work of Contract, provide temporary means to maintain security.
- .3 Supply, install and maintain any temporary chain link fencing that may be required to define the limits of the construction area and to maintain site security.
- .4 Provide temporary dust screens and barriers to prevent contamination of existing facilities.
- .5 Obtain and pay for use of additional storage or work areas as required.

1.15 Project Meetings

- .1 The Consultant will arrange and set times for project meetings and will record and distribute minutes.
- .2 The Contractor's site superintendent and representatives of the subcontractors shall attend the meetings at the request of the Consultant.

1.16 Cutting and Patching

- .1 Obtain Consultant's approval before cutting, boring or sleeving load-bearing members.
- .2 Make cuts with clean, true, smooth edges.
- .3 Perform the cutting and patching required to make the affected parts of the work come together properly.
- .4 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .5 Co-ordinate the work to ensure that the cutting and patching is kept to a minimum.
- .6 Cutting and patching shall be performed by specialists familiar with the products affected and shall be performed in a manner to neither damage nor endanger the work.
- .7 Clean up all spray and debris immediately upon completion of any cutting or coring operation.

1.17 Additional Drawings

- .1 In concurrence with General Condition 3 and the Special Provisions, the Consultant may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

1.18 Relics and Antiquities

- .1 Give immediate notice to the Consultant if evidence of archaeological finds are encountered during construction, and await the Consultant's written instructions before proceeding with the work in this area.

1.19 Remove and Dispose of Materials

- .1 Materials to be removed and disposed shall be removed, hauled and disposed of at the Contractor's expense.
- .2 Obtain all necessary approvals and/or permits, from the Owner of the disposal site, and any governing authority prior to dumping any materials.

1.20 Dewatering and Drainage

- .1 Keep all portions of the work properly drained during the construction and until completion.
- .2 The Contractor shall be responsible for all damage, directly resultant from his operations, which may be caused by or which may result from water backing up or overflowing through, from or along any part of the work.
- .3 Bear all costs related to the effective dewatering of excavations and all other pumping and drainage necessary for the proper construction of the works, including keeping the pipes,

structures and trenches free of undesirable accumulations of seepage, subsoil water, surface water or rainwater.

- .4 Dispose of all water drained or pumped as above by discharging it to drainage ditches or natural water course approved by the Consultant, but in compliance with all Municipal, Territorial and Federal regulations, ordinances, bylaws, etc., and provide documentation indicating that authority has been granted to discharge effluent water into any drainage ditch, brook, creek or river.
- .5 Keep all drainage channels and culverts free of silt, sand, debris and gravel and remove such deposits as required by the Consultant or any other Authority having jurisdiction.
- .6 Accept responsibility for any actionable damage, inconvenience or interference caused by the dewatering operations to the surrounding properties, houses, other building, roads, curbs, sidewalks, driveways, utilities, services or other improvements which may be affected by a lowering of the water table and bear all costs of repair, replacement, reinstatement or alteration of same.

1.21 Contractor Submission Requirements

- .1 A list of the documents and information to be submitted by the Contractor is presented in the table at the end of this Section. Please note that this list does not necessarily include all required submissions.
- .2 Submit all information and documents by the dates indicated, unless otherwise directed by the Consultant.

1.22 Site Security

- .1 The Contractor shall establish temporary chain link fencing and gates as may be required and arrange the appropriate security. Despite what facilities and security as the Owner may or may not have on the existing site, the Contractor will be totally responsible for the security of its own equipment, tools, materials, temporary facilities and the completed and stored works under its care and custody and will take appropriate steps to ensure that security to the extent it does not effect the work of others on the site.
- .2 Maintain site security by:
 - .1 Restrict access to the site to those requiring access and limiting visitors and tours.
 - .2 Provide temporary security fencing and reinstating as soon as practical any breaches in the fencing.
 - .3 Report any breaches in security and/or suspicious situations to the Consultant and Owner (and police if appropriate).
 - .4 Lock temporary facilities and gates on off-hours.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

.1 Not applicable.

4. CONTRACTOR SUBMITTAL SCHEDULE

SPECIFICATION SECTION	DESCRIPTION	DATE REQUIRED
01 10 00	COPIES OF PERMITS/LICENSES	UPON CONSULTANT'S REQUEST.
01 33 00	MATERIAL AND SHOP DRAWING SCHEDULE	15 DAYS FROM NOTICE OF ACCEPTANCE.
01 79 00	FORM 100 - START-UP AND COMMISSIONING	PRIOR TO ISSUANCE OF INTERIM CERTIFICATE OF COMPLETION.
01 79 00	FORM 100A – EQUIPMENT INSTALLATION CERTIFICATION FORM	PRIOR TO ISSUANCE OF INTERIM CERTIFICATE OF COMPLETION.
01 77 00	RECORD DRAWINGS (2 SETS)	AT PROJECT COMPLETION/PRIOR TO FINAL INSPECTION.
01 77 01	OPERATION AND MAINTENANCE MANUAL(S)	DRAFT COPY 6 WEEKS PRIOR TO INTERIM INSPECTION. ALL MANUALS 15 DAYS PRIOR TO TRAINING SEMINAR.

END OF SECTION

1. PERMITS/INSPECTIONS

- .1 Obtain and pay for all permits, licenses, certificates and governmental inspections required for the performance of the Work in force at the date of Tender closing.
- .2 Give all required notices and comply with all local, territorial and federal laws, ordinances, rules, regulations, codes and orders relating to the Work, which are or become in force during the performance of the Work.

2. APPLICABLE CODES/STANDARDS

- .1 The National Building Code was used as a basis for designing the Work.
- .2 Where specified standards are not dated, conform to latest issue of specified standards, as amended and revised to the Tender closing date.
- .3 Confine apparatus, the storage of products and the operations of workers to limits indicated by laws, ordinances, permits, and by directions of the Town of Inuvik. Do not unreasonably encumber the premises with Products.

3. SAFETY

- .1 Observe and enforce all construction safety measures required by code, Workers' Compensation Board and applicable statutes. Appoint a suitably qualified employee who has sole responsibility on site on behalf of the Contractor, for compliance with the requirements and so advise the Owner in writing with copy to the Owner's Representative.
- .2 If there is discrepancy between such provisions, the most stringent provision shall apply.
- .3 Do not load or permit to be loaded any part of the Work with a weight, load or force that will exceed the design load and endanger its safety.

4. UTILITIES

- .1 Indemnify and save harmless the Owner from any loss or damage which may be suffered by reason of the operations of the Contractor in the performance of this Contract.

END OF SECTION

1. GENERAL

1.1 Related Sections

.1 Not Applicable.

1.2 General Requirements.

.1 Present shop drawings and product data in SI Metric units.

.2 Review submittals prior to submission to the Consultant.

.1 Verify that submittal has been properly completed, applicable information shown and the submittal checked and coordinated with the requirements of the Work and the Contract Documents.

.2 Affix Contractor's stamp, signed and dated by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.3 Submittals not stamped, signed, dated and identified as to the specific project will be returned without being examined and shall be considered rejected.

.3 Accompany submissions with transmittal letter containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name, address and telephone and facsimile numbers.

.4 Specification section number.

.4 Allow five (5) calendar days for Consultant's review of each submission.

.5 Adjustments made on submittals by the Consultant are not intended to change the Contract Price. If adjustments affect the value of Work, state such in writing to the Consultant prior to proceeding with the Work.

.6 Make changes in submittals as the Consultant may require, consistent with Contract Documents. When resubmitting, notify the Consultant in writing of any revisions other than those requested.

1.3 Shop Drawings and Product Data

.1 The terms "shop drawings" or "product data" mean drawings, diagrams, illustrations, schedules, performance charts, pump curves, brochures, manufacturer's installation instructions, and other data which are to be provided by the Contractor to illustrate details of a portion of the Work.

- .2 Shop drawings and product data shall be clear, legible copies or originals. Faxed, or copies of faxed materials are not acceptable.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work.
- .4 Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of the Section under which the adjacent items will be supplied and installed.
- .5 Indicate cross references to design drawings and specifications.
- .6 Identify and highlight information which applies to the specified materials and equipment selected to be supplied including manufacturer's model numbers, catalogue order numbers, dimensions, options, power requirements, materials, capacity. Strike out non-applicable information.
- .7 Submit one (1) pdf copy of shop drawings for each requirement requested in specification sections and as the Consultant may reasonably request.
- .8 Submit one (1) copy of product data sheets or brochures for requirements requested in specification Sections and as the Consultant may reasonably request where shop drawings will not be prepared due to standardized manufacture of product.

1.4 Samples

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples as to origin and intended use in the Work.
- .2 Deliver samples prepaid to Consultant's business address.
- .3 Notify the Consultant in writing, at the time of submission of deviations in samples from requirements of Contract Documents.

2. PRODUCTS

- .1 Not Applicable.

3. EXECUTION

- .1 Not Applicable.

END OF SECTION

1. FIRES

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

2. DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .3 Dispose of waste materials in Inuvik's waste disposal ground, as directed by the Town of Inuvik Department of Public Services.

3. DRAINAGE

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

4. POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant to local authorities emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Should any sewage be spilled on the site during the course of the Work, clean it up immediately to the satisfaction of the Consultant and Health Authorities. Such cleanup will include, but not be limited to:
 - .1 Spreading lime and absorbent material on the spill.
 - .2 Removal and disposal of the lime, absorbent material and contaminated soil.

END OF SECTION

1. WORKMANSHIP

1.1 General Requirements

- .1 Workmanship is to be of the best quality, executed by workers fully experienced and skilled in their respective trades. Immediately notify Consultant, if work is required in such a manner as to make it impracticable to produce required results.
- .2 At all times, enforce discipline and good order among workers. Do not employ any unfit person or anyone unskilled in the duties assigned to him. The Consultant reserves the right to require the removal from site of workers deemed incompetent, careless, insubordinate or otherwise objectionable.
- .3 All decisions as to the quality of or fitness of workmanship in cases of any dispute rest solely with the Consultant, whose decisions are final.

1.2 Site Housekeeping

- .1 Clean the site of all loose debris regardless of origin. Pay particular attention to materials or objects that pose any sort of safety risk.
- .2 Store materials, supplies and equipment neatly and in a manner to prevent damage and to avoid safety risks.

1.3 Cleaning

- .1 Remove waste materials and debris from the site at regular intervals. Do not burn waste materials and debris on site.

END OF SECTION

1. GENERAL

1.1 General:

- .1 This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.2 Transportation and Delivery:

- .1 Transport and handle items in accordance with manufacturer's printed instructions.
- .2 Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.
- .3 Identify each component with durable identifying labels or tags securely attached to each piece of equipment, crate or container.
- .4 Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- .5 Assume responsibility for equipment material and spare parts just before unloading from carrier at site.
- .6 All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- .7 Provide equipment and personnel to unload all items delivered to the site..
- .8 Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors). Notify Owner's Representative verbally, and in writing, of any problems.
- .9 Pay all demurrage charges if failed to promptly unload items.

1.3 Storage and Protection:

- .1 Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Owner's Representative by him. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.
- .2 Arrange storage of products and equipment to permit access for inspection. Periodically inspect to make sure products and equipment are undamaged and are maintained under specified conditions.

- .3 Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs or corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufacturers' requirements related to warranties. Log all protective maintenance for each piece of equipment in the written record noted above.
- .4 All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it shall be satisfactory to the Owner's Representative. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.
 - .1 All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.
 - .2 Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Log all rotation maintenance for each piece of equipment in the written record noted above.
 - .3 Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

2. PRODUCTS

- .1 (Not Used)

3. EXECUTION

- .1 (Not Used)

END OF SECTION

1. SITE CONDITIONS/LIMITS

1.1 Examination of Site

- .1 Prior to commencing actual construction work, inspect field conditions, obtain and confirm actual site dimensions, examine surface conditions, as required to ensure correct fabrication and execution of Work.
- .2 Commencement of construction constitutes acceptance of existing conditions, and means dimensions have been considered, verified and accepted.
- .3 When planning the Work, make due allowance from the site examination for the presence of existing structures, utilities, and the operations of others on the site.

1.2 Permafrost

- .1 The Inuvik townsite is located within the zone of continuous permafrost, and the Contractor will encounter permafrost within the limits of this project. The Contractor shall ascertain the existing soil conditions on site and shall make allowances for the presence of permafrost in arriving at the unit prices. The amount payable for any item under this Contract will not be increased due to the increased cost of the work brought about by the presence of permafrost conditions in the area.

2. DOCUMENTS/INSTRUCTIONS

2.1 Discrepancies/Omissions

- .1 Notify the Consultant immediately upon discovery of discrepancies or omissions in the Contract Documents or of any doubt as to the meaning or intent of any part thereof.

3. CHANGES TO THE WORK

- .1 Refer to General Conditions - Clause 23 and 24 regarding changes to the Work.
- .2 Addendum: issued prior to Tender closing to provide for certain revisions as noted therein. All such revisions will become part of the Contract and the effects shall be included in the Tender Price. All work shall be performed in accordance with the Contract Documents.
- .3 Bid Revisions: issued after receipt of Tenders but prior to executing the Agreement to provide a detailed description of Contract Document amendments mutually agreed upon between the Owner and the successful Bidder. All work shall be performed in accordance with the Contract Documents.
- .4 Contemplated Change Notice (CCN): issued after award of Contract, does not constitute an order to perform the change but is a notice of proposed change only. Submit to the Consultant within fourteen (14) days after receipt of "Contemplated Change Notice" a statement of cost adjustments and effect upon construction schedule required by the proposed change. Itemize statement in accordance with all items separately listed.

- .5 Field Order (FO): during Construction, the Consultant may issue a Field Order to authorize a change or additional work of an emergency nature. A firm total cost (extra or credit) or a method for determining this cost must be included (unit price, cost plus or time basis).
- .6 Change Order (CO): after receipt of the statement of cost adjustment and Owner's approval of same, the Consultant will issue a "Change Order" in the amount of the approved cost adjustment which will authorize the Contractor to proceed with the change to the Work, or alternatively will notify the Contractor that the proposed change is cancelled.

END OF SECTION

1. GENERAL

1.1 Section Includes

- .1 Cleaning.
- .2 Project record documents.
- .3 Spare parts and maintenance materials.
- .4 Take over procedures.
- .5 Operation and Maintenance seminar.

1.2 Related Sections

- .1 General Conditions and Special Provisions.
- .2 Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 Progressive Cleaning

- .1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.
- .2 Make arrangements with and obtain permits from authorities having jurisdiction for off-site disposal of waste and debris.
- .3 Remove waste material and debris from the site at the end of each working day.
- .4 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.4 Final Cleaning

- .1 In accordance with the General Conditions and Special Provisions.
- .2 At the completion of the construction work, all areas on which work has been done shall be left in a neat and presentable condition.
- .3 All gutters and drainage ditches which have been blocked as a result of the work shall be repaired or restored to their original condition or better.
- .4 Dispose of all surplus excavated material, trees, brush, rock, boulders and pieces of concrete or masonry.
- .5 The Contractor, with the Consultant, shall inspect all equipment, buildings, rooms, surfaces and permanent survey markers to ensure that no damage has occurred during the construction and clean up operations.
- .6 Remove dust, grease, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces.

- .7 Clean lighting reflectors, lenses and other lighting surfaces.
- .8 Broom clean paved surfaces and rake clean other surfaces of grounds.
- .9 Remove snow and ice from access to building.

1.5 Operation and Maintenance Manual

- .1 Refer to Section 01 77 01 - Operation and Maintenance Manual for requirements.
- .2 Submit one copy of completed Operation and Maintenance Manual, in draft form, six (6) weeks prior to Interim Inspection of the Work.
- .3 The submitted copy will be returned with Consultant's comments. Revise content of documents as required prior to final submittal.

1.6 Record Documents - Actual Site Conditions

- .1 Consultant will provide two sets of prints for record drawing purposes.
- .2 Maintain project record drawings current as work progresses and record neatly and accurately deviations from Contract Documents.
- .3 Record the following information:
 - .1 Depths of various elements of foundation in relation to bench mark indicated on drawings.
 - .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
 - .3 Location of internal utilities and appurtenance concealed in construction, referenced to visible and accessible features of structure.
 - .4 Valve tag numbers clearly marked on the P&ID.
 - .5 Field changes of dimension and detail.
 - .6 Changes made by Change Order or Field Order.
- .4 Identify each set of drawings as "Project Record Drawings" and date and sign each set.
- .5 Record changes in red. Mark on one set of prints and at completion of project and prior to interim inspection, neatly transfer notations to second set and submit both sets to Consultant.

1.7 Spare Parts and Maintenance Materials

- .1 Spare parts and maintenance materials provided shall be new, not damaged or defective, and of the same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.
- .2 Defective Products will be rejected, regardless of previous inspections. Replace products at own expense.

- .3 Store spare parts and maintenance materials in a manner to prevent damage, or deterioration.
- .4 Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification Sections.
- .5 Provide items of same manufacture and quality as items in the Work.

1.8 Inspection/Takeover Procedures

- .1 Refer to the General Conditions and Special Provisions for contractual requirements.
- .2 Refer to Section 01 77 01. Six (6) weeks prior to the Consultant performing an inspection for the Interim Certificate of Completion, a draft Operation and Maintenance Manual must be provided to and approved by the Consultant.
- .3 Accumulate all necessary data from subtrades and suppliers and present same in the specified format for the approval by the Consultant.
- .4 Perform the following items prior to Interim Inspection:
 - .1 Make necessary tests on equipment including those required by authorities. Obtain certificates of approval.
 - .2 Complete valve tagging and identify equipment.
 - .3 Lubricate equipment as per manufacturer's data.
 - .4 Complete the installation, start-up and commissioning in accordance with Section 01 79 00 - System Demonstrations and Training and submit completed forms.
 - .5 Complete operations and maintenance preventative maintenance training seminar.
- .5 Once the items of this section are completed and the Contractor has verified that the requirements of the Contract have been performed and commissioning has been completed, give five days notice to the Consultant, in writing, of satisfactory completion of the work and request an Interim Inspection.
- .6 The Interim Inspection will be performed by the Consultant. A list of deficiencies and defects will be tabulated. If in the opinion of the Consultant, the list indicates the project is excessively incomplete, an Interim Certificate of Completion will not be issued. Corrections shall be done expeditiously by the Contractor.
- .7 Once the Interim Certificate of Completion is issued and all deficiencies and defects have been corrected; request a Final Completion inspection, giving the Consultant five days notice.
- .8 The Final Completion inspection will be performed by the Consultant. If the deficiencies and defects from the Interim inspection are completely corrected, a Final Certificate of Completion will be issued.
- .9 If the Contractor requests either an Interim or Final Completion Inspection when an Interim or Final Completion Certificate cannot be issued, the Contractor will pay expenses for additional visits by the Consultant to re-perform the inspection.

- .10 A warranty period shall be in effect for two year starting from the date of the Interim Certificate of Completion as indicated in the General Conditions and Special Provisions. The expiry of the 24 month period does not relieve the Contractor of the responsibility to rectify any defect or fault which is observed prior to the expiry of the warranty period.

2 PRODUCTS

- .1 Not used.

3 EXECUTION

- .1 Not used.

END OF SECTION

1. GENERAL

1.1. Related Sections

- .1 Section 01 77 00 - Closeout Procedures.
- .2 Section 01 79 00 - Systems Demonstrations.

1.2. Manual

- .1 An organized compilation of operating and maintenance data including detailed technical information, documents and records describing operation and maintenance of individual products or systems as specified in individual sections of Divisions 02 – 40.

1.3. General

- .1 Assemble, coordinate, bind and index required data into Operation and Maintenance Manual.
- .2 Submit one (1) copy of draft operation and maintenance manual to Consultant for review six (6) weeks prior to application for Interim Certificate of Completion of project. All manuals are to be submitted fifteen (15) days prior to the operations and preventative maintenance training seminar detailed in Section 01 77 00-1.9.
- .3 Submit three (3) hard copies of final manual in English.
- .4 Submit five (5) electronic PDF copies of final manual in English on CD.
- .5 Each section shall be labelled with tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .6 Lists and notes shall be typed.
- .7 Drawings, diagrams and manufacturer's literature must be legible.

1.4. Binders

- .1 Prepare sets of manuals for various divisions using identical bindings, and the same indexing system and format for all manuals.
- .2 Provide 215 x 280 mm hard covered, three hole extension type catalogue binders with a 75 mm spine bound with heavy weight fabriccord, hot stamped in silver lettering front, back and spine. Acropress, Cerlox or similar light weight or special hole binders are not acceptable.
- .3 Wording shall be prepared by the Consultant prior to embossing.
- .4 Provide a sufficient number of binders so that the maximum finished thickness of each binder does NOT exceed 100 mm.

1.5. Contents

- .1 The information to be included in the binder(s) is as follows:
 - .1 Title sheet, labelled "Operations and Maintenance Instructions", containing project

- name and date.
- .2 Table of contents of individual binder.
 - .3 List with names, addresses, telephone numbers of Contractor, Subcontractors, Manufacturers, Suppliers and Agents, Service Companies.
 - .4 A section for all equipment supplied, with exploded views and parts numbered.
 - .5 Copies of all final shop drawings (review stamped) to go in the section "Manufacturer's Brochures and Data".
 - .6 Manufacturer's data sheets (operating and maintenance brochure) on all equipment.
 - .7 Installation and performance test data on all equipment including start-up and commissioning sheets from Section 01 79 00 – Systems Demonstrations.
 - .8 Reports and certificates of inspection including Electrical/Mechanical Inspection certificates.
 - .9 Operations, maintenance and lubrication instructions, for each section, including daily, weekly, monthly, semi-annual and annual checks for equipment and systems, including complete list of equipment and tools.
 - .10 A master check list with operations, maintenance and lubrication tasks for all equipment materials, surfaces in the facility organized into daily, weekly, monthly, bimonthly, biyearly categories.
 - .11 Valve directory listing tag numbers, serial number, purpose, location, size, make and other pertinent information of each valve.
 - .12 Operational information on all mechanical components.
 - .13 Parts list for all mechanical equipment.
 - .14 Recommended spare parts list.
 - .15 Motor Survey Sheets as per specifications, for each motor.
 - .16 Start-up reports prepared by manufacturer's representatives.
 - .17 List of maintenance tools supplied.
- .2 Information shall be provided in the form of original Manufacturer's printed literature, supplemented by typed sheets when necessary. Originals are to be provided for all five (5) manuals. Faxes or poor quality photocopies are not acceptable.

1.6. Documents by Consultant

- .1 The Consultant will insert the final Operation and Control Philosophy and reduced Record Drawings with changes submitted by the Contractor.
- .2 The Table of Contents shall identify that these documents are included in the Manual.

.3 Sufficient space shall be provided in the manual for these documents.

2. PRODUCTS

.1 Not applicable.

3. EXECUTION

.1 Not applicable.

END OF SECTION

1. GENERAL

1.1 Intent

- .1 Requirements for placing Work in a state of readiness for acceptance by the Owner.
- .2 Section supplements, but does not supersede, specific requirements of other Sections.
- .3 Arrange, coordinate and expedite services of equipment suppliers required for installation, start-up and commissioning of all equipment specified in Divisions 23, 26 and 40.
- .4 Include all costs for the supply of these services in the bid price.

1.2 Definitions

- .1 **Pre-Start-Up:** Pre-start-up consists of the non-operating functions required to bring work to a state of readiness for placing systems into service. It includes, but is not limited to cleaning, leakage and pressure testing, cold alignment checks, belt tension, running clearances, disinfection, system flushing, lubrication of mechanical equipment, rotation checks, wiring loop checks and workmanship. Contractor shall conduct inspections of all components and sub-components and shall arrange for inspections of equipment installations by qualified equipment manufacturers' representatives as required by the Contract Documents. At this stage, deficiency lists are prepared and Contractor is to remedy outstanding incomplete or incorrect work. Contractor shall obtain completed Equipment Installation Certification Forms for each specified piece of equipment and shall submit these to the Consultant for review. Once the Consultant is satisfied that each piece of equipment in a system or subsystem has been properly checked out and all apparent deficiencies have been remedied, a Green "Ready-to-Start" tag shall be placed on the equipment designating that the Pre-Start-Up Phase for that particular system is complete.
- .2 **Start-Up:** Once each piece of equipment within a defined system carries a "Ready-to-Start" tag, then that individual system shall be started and tested. Both "Dry-Run" and "Wet-Run" tests are required. Contractor shall conduct performance tests of all equipment in conjunction with the qualified manufacturers' representatives as required by the Contract Documents and witnessed by the Consultant. Deficiencies that are uncovered shall be corrected and retesting shall be conducted as required. Start-Up Completion Certificates shall be prepared by the Contractor certifying that the equipment or system is complete, successfully tested, started and ready for commissioning and continuous operation.
- .3 **Commissioning:** Commissioning consists of placing all the various systems in Work into continuous operation in an orderly manner. The Contractor is responsible for the commissioning activities and shall have qualified equipment manufacturers' representatives at the site, as well as qualified mechanical, electrical, control and instrumentation personnel. The Contractor may be assisted by the Consultant relative to process considerations and by the Owner's operations and maintenance staff. Commissioning is considered to be complete when all systems have been operating continuously for a period of 720 hours without fault and in accordance with the specified performance requirements.

1.3 Quality Control

- .1 Appoint a professional engineer or qualified operations specialist as the Testing and Commissioning Manager to manage, coordinate and supervise the Testing, Start-Up and Commissioning Program. Qualifications to include a minimum of five years experience managing, testing, start-up and commissioning of mechanical, electrical, instrumentation, building and piping systems. A resume shall be provided to the Consultant for review prior to commencement of program.
- .2 When specified in individual Sections of Contract Documents, require manufacturer or supplier to provide authorized representative(s).
- .3 Testing:
 - .1 Provide all required testing equipment and ancillary equipment to verify specified performance.
 - .2 Calibrate all test equipment to plus or minus two percent of actual value at full scale.
 - .3 Employ recognized, industry standard calibration procedures or as specified in individual Sections.
 - .4 Submit calibration plans and results to the Consultant.
- .4 Attend and participate in Pre-Start-Up, Start-Up and Commissioning workshops with the Consultant and Owner's representatives.

1.4 Safety

- .1 Ensure all requisite safety equipment, devices, detectors, materials and procedures are in place, tested and operational before commencing.
- .2 Conform to requirements of all regulatory authorities having jurisdiction.
- .3 Maintain communications with fire, police, environmental and health authorities.

1.5 Environmental Protection

- .1 Comply with all requirements of federal, provincial and local jurisdictions having authority.

1.6 Pre-Start-Up

- .1 Prepare Pre-Start-Up Equipment Checkout Listing, which includes all Process Mechanical, Commodity-retaining Structures, Building Mechanical, and Electrical Equipment. Group listing into logical systems or sub-systems for orderly progression of activities during start-up.
- .2 All pieces of equipment shall be identified by Tag Numbers.

- .3 To the extent practical, all scaffolding, debris, planks, tools and other construction-related material shall be removed.
- .4 Remove all sand, silt, dirt and debris from electrical panels and vacuum clean.
- .5 Conduct leakage and pressure tests in accordance with individual Sections.
- .6 Provide Checkout Tag for each piece of equipment.
- .7 Checkout Tags shall be filled in by each applicable trade verifying that all appropriate checks have been made including, but not limited to, cleaning, inspection, leakage testing, lubrication, rotation, calibration, alignment, adjustment and wire loop checks.
- .8 Equipment Manufacturer's Representatives shall inspect equipment in accordance with applicable individual Sections and certify equipment has been properly installed and is ready to start.
- .9 Submit an Equipment Checkout Listing to the Consultant. Equipment Checkout Listing to include the following:
 - .1 System description.
 - .2 Equipment Name and Tag Number of each component within System.
 - .3 Supplier's Name of each equipment component, complete with sign-off where applicable.
 - .4 Mechanical Trade sign-off (blue and white cards completed).
 - .5 Electrical Trades sign-off (red, yellow and white cards completed).
 - .6 Contractor sign-off (all cards completed).
- .10 Attach the following to Equipment Checkout Listing:
 - .1 Manufacturer's Representatives' Installation Certification Form.
 - .2 Electrical Equipment Loop Check Forms.
 - .3 Listing of outstanding contract deficiencies for each system.
- .11 Request, in writing, a Pre-Start-Up Inspection by the Consultant. Once the Consultant has conducted the Pre-Start-Up Inspection and is satisfied that each piece of equipment has been properly checked-out, a green "Ready-to-Start" tag will be attached to each piece of equipment in the system.

1.7 Start-Up and Commissioning

- .1 Prepare a Start-Up Plan which includes the following:

- .1 Plan objectives.
- .2 Facilities to be started.
- .3 Sequence of events and start-up schedule.
- .4 Responsibilities of each party.
- .5 List of individuals involved, complete with contact telephone numbers.
- .6 English language description of each systems' intended means of operation.
- .7 Initial operating conditions and parameters.
- .8 Intended final operating conditions and parameters.
- .9 Laboratory requirements and arrangements for outside testing services.
- .10 Contingency plans to respond to potential emergencies.
- .11 Safety and environmental considerations.
- .2 Develop Owner Training plan and implement.
- .3 Provide Operating and Maintenance Manuals as required by individual Sections.
- .4 Conduct Dry Run and Wet Run Tests for all equipment, witnessed by the Consultant.
- .5 Provide any necessary fuel, water and/or chemicals to demonstrate satisfactory operation.
- .6 Results of tests are to be recorded on forms attached to Forms 100 and 100A. The Interim Certificate of Completion will not be issued until these forms are submitted to the satisfaction of the Consultant.
- .7 Should subsequent visits to the site be required by the Consultant due to inadequate performance of equipment, the Consultant's costs shall, at the Consultant's discretion, be paid for by the Contractor.
- .8 The Owner's personnel will normally be present during the start-up and testing procedures for training purposes but they will not participate in operating the equipment.

2. PRODUCTS

- .1 Not applicable.

3. EXECUTION

- .1 Not applicable.

**Town of Inuvik
MSC Electrical Upgrades**

FORM 100A - EQUIPMENT INSTALLATION CERTIFICATION FORM

Contract No.: _____ Specification Section: _____

Equipment Tag #: _____ Equipment Description: _____

Contractor: _____

Vendor of Equipment Item: _____

The undersigned vendor of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project specifications, has been provided and installed in accordance with the manufacturer's recommendations and that the equipment item may be started and field tested.

Comments: _____

Date

Vendor

Signature of Authorized Representative

Date

Contractor

Signature of Authorized Representative

**Town of Inuvik
MSC Electrical Upgrades**

FORM 100 - START-UP AND COMMISSIONING

Contract No.: _____ Specification Section: _____

Equipment Tag #: _____ Equipment Description: _____

Contractor: _____

Vendor of Equipment Item: _____

The undersigned vendor of the equipment item described above hereby certifies that he has checked the equipment and its associated controls. The equipment and associated controls have operated for at least one hour to certify that it operates satisfactorily in accordance with the project specifications.

Comments: _____

Date

Vendor

Signature of Authorized Representative

Date

Contractor

Signature of Authorized Representative

A copy of the manufacturer's authorized representative's Start-Up and Commissioning Report is to be submitted with this form.

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Building Metal Fabrications Section 05 50 00

1.2 Reference Standards

- .1 Do structural steelwork to CAN/CSA-S16 (current edition), except where specified otherwise.
- .2 Do welding to CSA W59 (current edition), except where specified otherwise.

1.3 Design of Details and Connections

- .1 Design details and connections to requirements of CAN/CSA-S16 (current edition) to resist forces, moments and shears indicated on the drawings.

1.4 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Clearly indicate shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds. Indicate welds by CISC welding symbols.

2. PRODUCTS

2.1 Materials

- .1 Structural steel: to CSA G40.21 (current edition) Type 300W, shop primed.
- .2 Hollow structural sections: to CSA G40.21 (current edition), type 350W, Class C, shop primed.
- .3 Pipe piles: to ASTM - A53 (current edition)
- .4 Bolts, nuts and washers: to ASTM A325 (current edition), finished to match members to which they attach.
- .5 Welding materials: to CSA W59 (current edition).

2.2 Fabrication

- .1 Fabricate structural steel as indicated to CAN/CSA-S16 (current edition) and in accordance with shop drawings.
- .2 Reinforce openings to maintain required design strength.

2.3 Shop Painting

- .1 Clean, prepare surfaces and shop prime structural steel to CAN/CSA-S16 (current edition), SSPC-SP6 (current edition) except where members to be field welded.

3. EXECUTION

3.1 Erection

- .1 Erect structural steel as indicated to CAN/CSA-S16 (current edition) and in accordance with shop drawings.
- .2 Obtain written permission of Consultant prior to field cutting or altering of structural members.
- .3 Make adequate provision for all erection loads, and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.
- .4 Use only light drifting to draw parts together. Enlarge holes with reamers or twist drill only. Do not burn to form holes, enlarge holes or match unfair holes.
- .5 Touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion or erection.

3.2 Field Quality Control

- .1 Inspection and testing of materials and workmanship may be carried out by testing laboratory approved by Owner.
- .2 Owner will pay costs of tests.

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Structural Steel Section 05 12 00

1.2 Reference Standards

- .1 Do welding work in accordance with CSA W59 (current edition) unless specified otherwise.

1.3 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 Payment

- .1 Include the cost of the work of this section in prices quoted for building floor assemblies, and for building stairs and landings, as applicable.

2. PRODUCTS

2.1 Materials

- .1 Steel sections and plates: to CSA G40.21 (current edition), Type 300W.
- .2 Steel pipe to ASTM A53/A53M (current edition).
- .3 Welding materials: to CSA W59 (current edition).
- .4 Bolts: to ASTM A325 (current edition).
- .5 Inserts: Hilti Kwik bolts, manufactured by Hilti (Canada) Ltd., or approved equal.
- .6 Shop coat primer.

2.2 Fabrication

- .1 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Fabricate items from steel unless otherwise noted.
- .3 Where possible, fit and shop assemble work, ready for erection.

- .4 Ensure exposed welds are continuous for length or each joint. File or grind exposed welds smooth and flush.

2.3 Shop Painting

- .1 Apply one shop coat of primer to metal items, with exception of concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.
- .3 Clean surfaces to be field welded; do not paint.

3. EXECUTION

3.1 Erection

- .1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .2 Weld in accordance with CSA W59 (current edition) unless specified otherwise.
- .3 Make field connections with high tensile bolts, or weld to CSA S16 (current edition).
- .4 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .5 Handle, lift, and align AESS pieces using padded slings and/or other protection required to maintain the appearance of AESS through the process of erection.

END OF SECTION

1. GENERAL

1.1 Scope of Work

- .1 Furnish all labour and materials to paint the following:
 - .1 All miscellaneous metals and exposed structural steel.
 - .2 New steel piping and fittings (excluding galvanized).
 - .3 All exposed new wood items including but not limited to, where they exist on the project, electrical backboards.

1.2 Workmanship

- .1 Work is to be performed by tradesmen skilled in their trade, and strictly in accordance with the manufacturer's specifications.

1.3 Standards

- .1 Perform painting and finishing to CGSB 85-GP series standards including Appendix A and to material manufacturer's instructions, except where specified otherwise.

1.4 Payment

- .1 Include the cost of the work of this section in prices quoted for items to be painted, such as, for example, piles, steel skid, and other items of work listed for payment, as applicable.

2. PRODUCTS

2.1 Materials

- .1 All painting materials are to be premium quality manufactured by Tremco, RustOleum, Glidden Co., CPI, General Paint and listed on the CGSB Qualified Products List, correctly matched to interior or exterior exposure condition.
- .2 Paint materials for successive coatings on same surface are to be products of a single manufacturer.
- .3 Colors are to be:
 - .1 Exposed structural steel and miscellaneous metal: black
 - .2 Other piping, in junction buildings match existing scheme
 - .3 Wood items, including electrical backboards: flat grey

3. EXECUTION

3.1 Preparation

- .1 Examine all surfaces to be painted and report any defects to Consultant.
- .2 Remove grease, rust scale, slag with wire brush or other means to provide smooth surface completely free of impurities.
- .3 Protect all adjoining surfaces, materials, equipment, etc., during painting operation.

3.2 Finishes

Substrate	Interior System	Exterior System
Bare steel Bare piping	1 coat vinyl wash primer 2 coats enamel undercoat 2 coats semi-gloss enamel	as for interior, except exterior enamel
Primed steel	1 coat spot priming 1 coat enamel undercoat 2 coats gloss alkyd enamel	as for interior, except exterior enamel
Galvanized steel	phosphoric acid wash 1 coat vinyl wash primer 1 coat enamel undercoat 2 coats semi-gloss enamel	as for interior, except 1 coat Zinsser primer 2 coats exterior enamel
Wood	as for exterior	2 coats exterior primer 2 coats exterior enamel

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Complete and operational electrical system as required by the drawings and as herein specified.

1.2 Related Work

- .1 Division 01 - General Requirements.

1.3 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-[1958], Light Gray Colour for Indoor Switch Gear.
- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-[2000], The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.4 Definitions

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122

1.5 Drawings and Specifications

- .1 General Conditions, Supplementary Conditions and Division 01 are a part of this specification and apply to Division 26.
- .2 Intent of drawings and specifications is to include all labour, products and services necessary for complete work, tested and ready for operation.
- .3 Symbols used to represent various electrical devices often occupy more space on drawing than actual device does when installed. In such instances, do not scale locations of devices from electrical symbols. Install devices with primary regard for usage of wall space, convenience of operation and grouping of devices.
- .4 Specifications and drawings of all other divisions to be considered as an integral part of accompanying drawings. Any item or subject omitted from either specifications or

drawings but which is mentioned or reasonably specified in and by the others, to be considered as properly and sufficiently specified and be provided.

- .5 Provide all minor items and work not shown or specified but which are reasonably necessary to complete Work.
- .6 If discrepancies or omissions in drawings or specifications are found, or if intent or meaning is not clear, advise Consultant for clarification before submitting tender.
- .7 Responsibility to determine which Division provides various products and work rests with Contractor. Additional compensation will not be considered because of differences in interpretation of specifications.

1.6 Quality Assurances

- .1 Codes, Rules, Permits & Fees
 - .1 Comply with all laws, ordinances, rules, regulations, codes and orders of all authorities having jurisdiction relating to this work.
 - .2 Comply with all rules of Canadian Electrical Code, CSA Standard C22.1 and applicable building codes.
 - .3 Quality of work specified and/or shown on drawings shall not be reduced by foregoing requirements.
 - .4 Immediately after award of contract and prior to installation, verify location, arrangement and point of attachment for service and service entrance equipment with supply authority and inspection departments. Failure to do so will render this Division responsible for any corrections necessary without additional compensation.
 - .5 Give all required notices, submit drawings, obtain all permits, licenses and certificates and pay all fees required for this work.
 - .6 Furnish Certificate of Final Inspection and approvals from inspection authority to Consultant.
- .2 Standard of Workmanship:
 - .1 Execute all work in competent manner and to present an acceptable appearance when completed.
 - .2 Employ competent supervisor and sufficient number of licensed tradesmen to complete Work in required time.
 - .3 Arrange and install products to fit properly into designated building spaces.
 - .4 Unless otherwise specified, install products in accordance with recommendations and ratings of manufacturers.

- .3 Provide CSA certified equipment and material.
- .4 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for approval before delivery to site.
- .5 Submit test results of installed electrical systems and instrumentation.

1.7 Submittals

- .1 Upon award of contract, contractor to submit completed equipment procurement schedule which lists manufacturer and model of equipment, indicating projected ordering, shop drawing submittal date and delivery dates of all products to meet required construction schedule.
- .2 Prior to delivery of any products to job site and sufficiently in advance of requirements to allow ample time for checking, submit shop drawings for review as specified. Submit shop drawings for all equipment as required in each section of specification.
- .3 Prior to submitting shop drawings to Consultant, Contractor to review shop drawings to determine that equipment complies with requirements of specifications and drawings.
- .4 Term "shop drawing" means drawings, diagrams, illustrations, schedules, performance characteristics, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .5 Indicate materials, methods of construction and attachment of support wiring, diagrams, connections, recommended installation details, explanatory notes and other information necessary for completion of Work. Where equipment is connected to other equipment, indicate that such items have been coordinated, regardless of section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .6 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.
- .7 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
- .8 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
- .9 Manufacture of products to conform to revised shop drawings.
- .10 Keep one complete set of shop drawings at job site during construction.
- .11 If changes are required, notify Consultant of these changes before they are made.

1.8 Record Drawings

- .1 Contractor to keep one complete set of white prints at site office, including all addenda, change orders, site instructions, clarifications and revisions for purpose of record drawings. As work on site proceeds, Contractor to clearly record in Red Pencil all as-built conditions which deviate from original contract documents. Record drawings to include circuiting of all devices, conduit and feeder runs and locations of all electrical equipment. Contractor to turn over the record drawings to the consultant prior to substantial completion. Refer to section 01 78 39 for additional requirements.

1.9 Operation and Maintenance Manuals

- .1 Electrical operations and maintenance manuals to be prepared by the Electrical Contractor or his designate. The electrical contractor is to include all costs associated with preparation of O & M Manuals in tender price. Refer to section 01 78 23 for form, format and content requirements for all manuals.
- .2 The electrical contractor is to be responsible for:
 - .1 Supply and preparation of O & M Manual binders and tabs as specified.
 - .2 Preparation of all written system descriptions and schematics.
 - .3 Securing and assembling all necessary literature describing operational and maintenance procedures for all equipment into the O & M Manuals including preventative maintenance data.
 - .4 Preparation of safety in maintenance suggestions and procedures.
 - .5 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 The electrical contractor to be responsible for supplying appropriate number of copies of:
 - .1 Final shop drawings.
 - .2 All wiring diagrams.

- .3 List of all major sub-trades and suppliers including names of equipment supplied and by whom, addresses, phone and fax numbers and contact names.
- .4 Each manual shall contain a complete and original copy of all owners operating manuals for systems equipment and hardware.
- .5 Spare / replacement parts lists for all of the above.
- .6 Test results for all electrical systems.
- .4 O & M Manuals to be submitted for final review prior to Substantial Completion.
- .5 Provide sections and tabs as follows:
 - .1 Contractors Warranty & Supplier Information
 - .2 MDP, CDPs and Panelboards
 - .3 Lighting Fixtures
 - .4 Emergency and Exit Lighting
 - .5 Interior and Exterior Lighting and control
 - .6 Testing results

1.10 System Start-up

- .1 Instruct operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.11 Product Handling

- .1 Use all means necessary to protect products of this Division before, during and after installation and to protect products and installed work of all other trades.
- .2 Immediately make good any damage by repair or replacement at no additional cost to Owner and to approval of Consultant.
- .3 Remove advertising labels from all electrical equipment. Do not remove identification of certification labels.

- .4 Remove dirt, rubbish, grease, etc. resulting from this work from all surfaces, including inside of all cabinets, equipment enclosures, panels, etc.

1.12 Guarantee

- .1 Furnish written guarantee to Owner prior to final contract payment, which will be in effect for one year from date of final acceptance of complete work. Replace or repair at no cost to Owner any defective material or workmanship except where, in opinion of Consultant, such defects are due to misuse or neglect by Owner.
- .2 General guarantee to not act as waiver of any specified or special equipment guarantees which cover greater length of time.

1.13 Progress Claims

- .1 Upon award of contract, breakdown of material and equipment items including labour and expense components to be provided. Subsequent requests for payment to be documented accordingly.

2. PRODUCTS

2.1 Selected Products and Alternates

- .1 Products and materials provided to be new and free from all defects. Defective products or materials will be rejected, regardless of previous inspections. Contractor to be responsible to remove and replace defective products at their expense, and be responsible for any resulting delays and associated expenses which result from defective products being rejected.
- .2 Products and materials referred to in specifications by trade names, manufacturer's name and catalogue reference are those which shall be used as basis for Tender.

2.2 Alternative Products

- .1 All product substitutions must be approved by Consultant. Failure to obtain approval from Consultant during the tender process will result in proposed equal/alternative product being rejected, in which case Contractor to provide approved product at no additional cost to the Owner.
- .2 Contractor to assume full responsibility for ensuring that when providing equal/alternative products or materials, all space, weight, connections, power and wiring requirements etc. are considered. Any costs incurred for additional components, changes to services, structural or space requirements, layouts and plans, etc. that may be necessary will be borne by Contractor.

- .3 Suppliers to submit all requests for equal/alternative product approval to Consultant. Submissions must be received by Consultant prior to final addendum. All submissions which are approved by Consultant to be identified as "Approved Equal/Alternatives" in Addendum. Alternative products not listed in Addendum are considered to be rejected.
- .4 Approval of equal/alternate is not intended to change original specifications unless specified in addenda. Submitter is responsible for all costs incurred by other trades as well as his own, to install product/system in accordance with contract documents.
- .5 All submissions to be provided with technical data and whatever pertinent information that may be required by Consultant to evaluate equivalency to the specified product. Responsibility to provide sufficient technical data with respect to submissions will remain solely with those making submission.

2.3 Quality of Products

- .1 All products provided to be CSA Approved, Canadian Underwriters' Laboratory approved where applicable, and new, unless otherwise specified.
- .2 Products provided, if not specified, to be new, of quality best suited to purpose required and their use subject to approval by Consultant.

2.4 Uniformity of Manufacture

- .1 Unless otherwise specified, uniformity of manufacture to be maintained for similar products throughout.

2.5 Product Finishes

- .1 Finish all cabinets, panelboards, switchboards, equipment cabinets, etc. in ANSI 61 grey enamel for 120 / 208 Volt systems and sand enamel for 347 / 600 Volt systems.
- .2 Apply primer on all items which are to be finished on job site.
- .3 Touch up all damaged painted finishes with matching lacquer, or, if required by Consultant, completely repaint damaged surface.

2.6 Equipment Identification

- .1 3 mm thick plastic lamacoid name plates, black face, white core, mechanically attached with self-tapping screws, 6 mm high lettering, to be attached to the front face of the following equipment:
 - .1 Distribution centres (Indicate designation, bus capacity, voltage)
 - .2 Starters, contactors, disconnects (Designation, voltage, load controlled)
 - .3 Terminal cabinets and pull boxes (System, voltage)

- .4 Emergency lighting battery packs (equipment tag)
- .2 Color code exposed conduits (including conduits above T-bar ceilings), junction and pull boxes, and metallic sheathed cables with paint or plastic tape (25 mm wide band) at 15 metre intervals. Color coding to conform to the current color coding convention in use at the facility.
- .3 Provide neatly typed circuit directories in panels affected by work to indicate area or equipment controlled by each branch circuit.
- .4 All conductors to be identifiable by coloured insulation.
- .5 Conductors:
 - .1 Equipment Grounding – Green
 - .2 Neutral Conductor – White
 - .3 347/600 Volt System
 - .1 Phase A – Orange
 - .2 Phase B – Brown
 - .3 Phase C – Yellow
 - .4 120/208 Volt System
 - .1 Phase A – Red
 - .2 Phase B – Black
 - .3 Phase C – Blue
- .6 Low Voltage Wiring: per system manufacturer's color coding standard.
- .7 All interior distribution equipment to be color coded to identify voltage. Utilize sand for 347/600 volts and grey for 120/208 volts.
- .8 Provide red coverplates for all junction boxes associated with fire alarm system.
- .9 Provide plastic tape labels on all device coverplates to identify circuit number.

2.7 Wiring Identification

- .1 Identify wiring with permanent indelible identifying markings, 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.

	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 Finishes

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

2.10 Use of Products During Construction

- .1 Any equipment used for temporary or construction purposes to be approved by General Contractor and in accordance with General Conditions, "Use of Premises". Clean and restore to "as new" condition all equipment prior to time of substantial completion. Warranty period to not begin until date of substantial performance of work.

3. EXECUTION

3.1 Site Examination

- .1 Examine site of work and become familiar with all features and characteristics affecting this work before submitting tender.
- .2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.

- .3 Report to Consultant any unsatisfactory conditions which may adversely affect proper completion of work.

3.2 Coordination with Other Divisions

- .1 Examine drawings and specifications of all divisions and become fully familiar with their work. Before commencing work, obtain ruling from Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.
- .2 Lay out work and equipment with due regard to architectural, structural and mechanical features. Architectural and structural drawings take precedence over electrical drawings regarding locations of walls, doors and equipment.
- .3 Do not cut structural members without approval of Consultant.
- .4 Coordinate with all Division installing equipment and services, and ensure that there are no conflicts.
- .5 Install anchors, bolts, pipe sleeves, hanger inserts, etc. in ample time to prevent delays.
- .6 Examine previously constructed work and notify Consultant of any conditions which prejudice proper completion of work. Commencement of work without such notification to Consultant constitutes acceptance of other work.

3.3 Installation

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CSA C22.3 No.1 except where specified otherwise.

3.4 Nameplates and Labels

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.5 Conduit and Cable Installation

- .1 Install conduit and sleeves prior to pouring of concrete.
- .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.

3.6 Location of Outlets and Luminaires

- .1 Electrical drawings are, unless otherwise indicated, drawn to scale and approximate distances and dimensions may be obtained by scaling. Figured dimensions to govern over scaled dimensions. Where exact dimensions and details are required, refer to Architectural and Structural drawings.
- .2 Outlet and equipment locations shown on drawings are approximate. Locations may be revised up to 3 meters to suit construction and equipment arrangements without additional cost to Owner, provided that Contractor is notified prior to installation of outlets, or equipment.
- .3 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .4 Maintain luminaire locations wherever possible. Notify Consultant of conflicts with other services.
- .5 Locate light switches on latch side of doors.
- .6 Unless otherwise specified, install products in accordance with recommendations and ratings of manufacturers.

3.7 Separation of Services

- .1 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosion.
- .2 In particular, contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.
- .3 Do not support wiring from pipes, ductwork, etc. Hangers for suspended ceilings may be used for support of wiring only when approval is obtained from Consultant and ceiling installer, and approved clips or hangers are used.

3.8 Single Line Diagram

- .1 Provide and mount a framed 600x900 mm as-built single line diagram to be located adjacent to the main electrical equipment.

3.9 Wiring to Equipment Supplied By Others

- .1 Equipment supplied by Owner or under other Division will be moved to installation site by others. However, electrical connection to equipment to be done by this Division.

3.10 Mounting Heights

- .1 Unless a conflict exists, use the following as mounting heights from finished floors to centre of device.

Receptacles:

General	300 mm
In Mechanical Rooms	1200 mm
Above top of baseboard heater	200 mm
Light Switches	1200 mm
Emergency Lights	2200 mm
Exit Lights	300 mm above door
Panelboards, starters, and disconnects (to top of cover)	2000 mm

3.11 Coordination of Protective Devices

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

3.12 Sealing of Wall and Floor Openings

- .1 All conduit and cable entries through outside walls of buildings, through partition walls separating electrical rooms from other areas, through fire separations, and through floors above grade to be sealed to prevent passage of moisture, dust, gasses, flame, or to maintain pressurization.
- .2 Sealing material to be fire resistant and not contain any compounds which will chemically affect wiring jacket or insulating material. Cable penetrations through fire separations to be sealed.

3.13 Sprinkler Proof Equipment

- .1 Electrical equipment installed to be constructed so that water from sprinkler heads shall not impair effectiveness of equipment. This will include, but not be limited to: Distribution Centres, Equipment Enclosures, Cabinets, Transformer enclosures, Panelboards.
- .2 Separate and complete roof to be provided on free-standing or surface mounted equipment. Overhang at front, rear and sides to prevent entrance of water either at top or through projecting face plates, meters, etc.
- .3 Where conduits or cables are required to penetrate sprinkler proof roofs, rain tight connectors to be used in conjunction with T & B 5260 Series sealing rings. Connectors shall be equal to:
- .1 Rigid Conduit - T & B Bullet Hubs
 - .2 EMT - T & B 5123 Series (steel)
 - .3 Teck Cable - T & B 10460 Series.

- .4 Distribution, power and lighting panelboards and switchboards to be complete with gasketed covers and doors.
- .5 Louvres to be of outdoor type.

3.14 Sleeves

- .1 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.
- .2 For wall, partitions and ceilings the ends to be flush with finish on both sides but for floors they shall extend 100mm above finished floor level.
- .3 Space between sleeve and conduit to be filled with Dow Corning silicone RTV foam for fire stop and caulked around top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound and ensure that seal is compatible with floor and ceiling finishes.
- .4 Locate and position sleeves exactly prior to construction of walls, floors. Failure to comply with above requirements to be remedied at this Division's expense.

3.15 Temporary Lighting and Power

- .1 Provide grounded extension cords and temporary lights required for electrical work.
- .2 If Owner's operations will be affected by any power outage required for this work, give adequate notice to Owner and do not interrupt power until approval has been obtained.
- .3 Give adequate notice to Owner of any power outage required for this work. Schedule outages to provide least interference with other work.

3.16 Cleaning

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

1. GENERAL

1.1 Section Includes

- .1 Materials and installation for wire and box connectors.

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2No.65-93 (R1999), Wire Connectors.

2. PRODUCTS

2.1 Materials

- .1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper alloy sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, aluminum sheathed cable, flexible conduit, and non-metallic sheathed cable, TECK 90 cable as required to: CAN/CSA-C22.2 No.18.

3. EXECUTION

3.1 Installation

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .2 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provide complete system of wiring, making all connections necessary for installation shown on drawings.

1.2 References, Codes and Standards

- .1 Install and rate power cables in accordance with Canadian Electrical Code requirements or in accordance with ICEA requirements where permissible.

1.3 Related Work

- .1 Section 26 05 28 – Grounding – Secondary
- .2 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings
- .3 Section 26 05 34 – Conduits, Conduit Fastenings, and Conduit Fittings
- .4 Section 26 05 44 – Installation of Cables in Trenches and in Ducts

2. PRODUCTS

2.1 Building Wires

- .1 Conductors: stranded for #8 AWG and larger. Minimum size: #12 AWG for all applications.
- .2 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90 XLPE.

2.2 Armoured Cables

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90.
- .3 Armour: interlocking type fabricated strip.
- .4 Connectors: anti short connectors.

2.3 Luminaire Wire

- .1 Type TEW: Copper conductors, #12 AWG, with thermoplastic and glass braid insulation, flame retardant, heat and moisture resistant, rated 600 Volts, 105°C.

3. EXECUTION

3.1 General Cable Installation

- .1 Install cable in trenches in accordance with Section 26 05 44 Installation of Cables in Trenches and in Ducts.
- .2 Cable Colour Coding: to Section 26 05 01 Electrical General Requirements.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.
- .6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

3.2 Installation of Building Wires

- .1 Install all wiring in conduit systems in accordance with Section 26 05 34.

3.3 Installation of Armoured Cables

- .1 Group cables wherever possible. Ensure all cables run in ceiling space are adequately supported.
- .2 Use of armoured cable to be limited to individual drops from ceiling mounted junction boxes to light fixtures above accessible ceilings. Maximum length to be 3.0 m. Use one drop per fixture. No looping between fixtures.

3.4 Installation of Luminaire Wire

- .1 Run wires from outlet boxes through luminaire raceways, splice and connect in raceways. Connect continuous rows of luminaires to circuit without breaking conductors.

3.5 Workmanship

- .1 Before pulling wire, ensure conduit is dry and clean. If moisture is present, thoroughly dry out conduits; vacuum if necessary. To facilitate pulling, recognized specially manufactured wire pulling lubricants may be used. Do not use grease.
- .2 Employ suitable techniques to prevent damage to wire when ambient temperature is below the minimum permitted for each insulation type. Do not pull wires into incomplete conduit runs.

- .3 Installation to be free of opens and grounds.
- .4 Size all conductors to limit voltage drop from panels to farthest point of use, do not exceed 2% at full load in any case.
- .5 Conduit fill limitations for #12 AWG conductors as below to allow for future spare capacity, 75 degree equipment rating, and table 5C.
 - .1 21C-6#12, 1#12 ground.
 - .2 27C-8#12, 1#12 ground.

3.6 Identification, Coding and Balancing

- .1 For branch circuit wiring, follow identification system as specified.
- .2 Connect single phase equipment to minimize imbalance on feeders. Adjust branch circuiting shown as required for optimum balancing. Record all changes on "record" drawings.
- .3 Colour code all feeders at all terminations, at all points where taps are made, and at all panelboards, switchboards, etc. Use two wraps of 3M #471 plastic film tape 48 mm wide.
- .4 Conductors sized No. 10 and smaller are required to be factory coloured not taped on site.

3.7 Testing

- .1 All 208V and 600V panelboard feeders are to be meggered using a 1000V megger.
- .2 Record and tabulate all results and include in the O&M manuals.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Securely and adequately ground all components of electrical system in accordance with requirements of all related sections in Canadian Electrical Code, National Building Code and local Electrical Inspection Branch.
- .2 System is to consist of cables, clamps, lugs, supports, and all necessary materials and inter-connections to provide complete system. All ground conductors shall be run in conduit.
- .3 All branch circuit conduits shall contain a green ground conductor whether the conduits are metal or not.
- .4 Connect new generator building to existing MSC ground system.

2. PRODUCTS

2.1 Equipment

- .1 Cables #3/0 and smaller to be connected to ground bars via Burndy Quiklug Type QA-2B connectors. Connections for cables larger than #4/0 shall be brazed.
- .2 All ground wires to be stranded copper TWH complete with green jacket unless otherwise shown.
- .3 Uninsulated ground wires to be bare stranded copper, tinned, soft annealed. Size as indicated.
- .4 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Bonding jumpers, straps.
 - .5 Pressure wire connectors.

2.2 Grounding Bus

- .1 Copper grounding bus complete with insulated supports, fastenings, connectors.

3. EXECUTION

3.1 General Installation

- .1 New installation to provide continuous bonding to ground system including conductors and accessories. Where conduit is used, run ground wire in conduit. All connectors to be installed in accordance with manufacturers requirements. All frames and metallic enclosures of all electrical equipment and electrically operated equipment to be grounded via ground wire.
- .2 All panelboards and CDP's fed from main distribution centre to be grounded by grounding conductors sized in accordance with Canadian Electrical Code. Ground wire to be terminated at each end with appropriate grounding lug which be connected to equipment ground bus. Ground wire to be green TWH. Use mechanical connectors for grounding connections to equipment provided with lugs.
- .3 All panels such as lighting panels, local distribution panels, etc., to be grounded with green ground wire run back to panel from which it is fed. Ground conductor to be sized according to Canadian Electrical Code.
- .4 All bolted connections must be accessible.
- .5 Soldered joints not permitted.
- .6 All motors to be grounded by means of adequately sized green ground wire contained within feeder conduit.
- .7 Include separate green ground wire in all power conduits including branch circuit wiring sized to Canadian Electrical Code.
- .8 Expansion joints and telescoping sections of raceways to be bonded using jumper cables as per Canadian Electrical Code.
- .9 Install rigid conduit sleeves where ground wires pass through concrete slabs.
- .10 Conduit installed buried in earth or installed in or under grade floor slabs to have separate ground wire installed, whether conduits are metal or not.
- .11 Protect exposed grounding conductors from mechanical injury.
- .12 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.
- .13 Home run ground conductor back to main building ground bus.
- .14 Connect building structural steel and metal siding to ground.

3.2 Equipment Grounding

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, frames of motors, starters, control panels, building steel work, elevators, distribution panels, outdoor lighting.

3.3 Grounding Bus

- .1 Install copper grounding bus mounted on insulated supports on wall of generator building.
- .2 Ground items of electrical equipment in generator building to ground bus with individual bare stranded copper connections.

3.4 Field Quality Control

- .1 Perform tests in accordance with Section 26 29 13 - Testing, Adjustment and Balancing of Electrical Equipment and Systems.
- .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 prior to energizing the electrical system.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Supply and install all hangers, supports and inserts for the installation shown on drawings and specified herein, as necessary to fasten electrical equipment securely to building structure.

2. PRODUCT

2.1 Framing and Support System

- .1 Materials:
 - .1 Intermediate duty supporting structures to employ P1000 Unistrut or equal together with manufactures connecting components and fasteners for complete system.
 - .2 Heavy duty supporting structures to be fabricated and welded from steel structural members and prime painted before installation.
- .2 Finishes:
 - .1 Outdoors, wet locations: Hot dipped galvanized.
 - .2 Indoors, dry locations: Galvanized when available, prime painted if not available.
 - .3 Nuts, bolts, machine screws: Cadmium plated.
- .3 Unistrut:
 - .1 Section P1000 or as required for load and span, with mounting screws, or approved. P1000 or equal is minimum standard for supporting conduits 50 mm and larger.

2.2 Concrete and Masonry Anchors

- .1 Materials: Hardened steel inserts, zinc plated for corrosion resistance. All anchor bolts must be galvanized.
- .2 Components: non-drilling anchors for use in predrilled holes, sized to safely support the applied load with minimum safety factor of four.
- .3 Manufacturer: Hilti (Canada) Limited or approved equal.

2.3 Non-Metallic Anchors

- .1 Material: Plastic anchors for sheet metal screws.
- .2 Manufacturer: Fischer.

2.4 Conduit Supports

- .1 General: Malleable iron one-hole conduit straps where exposed to weather. Stamped steel two-hole straps indoors.
- .2 Structural Steel: Crouse-Hinds "Wedgetite" supports or equivalent manufactured by Appleton.
- .3 Masonry, concrete, stone, etc.: Anchors.
- .4 Title: Toggle bolts.
- .5 Metal studs, ceiling hangers, etc.: "Caddy-Clips".
- .6 Unistrut: Unistrut conduit clamps.

2.5 Cable Supports and Clamps

- .1 General: As per conduit supports, except that for single conductor cables, suitable non-ferrous, or approved stainless steel or aluminum clamps to be used.

3. EXECUTION

3.1 Workmanship

- .1 Do not cut or drill beams, joists or structural steel unless written permission of Consultants is obtained.
- .2 Distance between conduit or cable supports not to exceed code requirements.
- .3 Supports to be suitable for real loads imposed by equipment.
- .4 Do not support heavy loads from bottom chord of open web steel joists.
- .5 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .6 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.
- .7 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.
- .8 Provide conduit rack with 25% spare capacity for multiple runs.

3.2 Installation

- .1 Secure equipment to masonry, tile and plaster surfaces.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .5 Supports to be securely fastened, free from vibration and excessive deflection or rotation. Maximum deflections are 4 mm over 1 meter span and 8 mm over 2 meter span.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole malleable iron or 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 Use plastic anchors for light loads only. Use metal anchors for all other loads.
- .9 Shot driven pins may only be used with written approval of the structural engineer.
- .10 Use round or pan head screws for fastening straps, boxes, etc.
- .11 Support outlet boxes, junction boxes, panel tubs, etc., independent of conduits running to them. Support conduits within 600 mm of outlet boxes. Support surface mounted panel tubs with minimum of four 6 mm fasteners.
- .12 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.
- .13 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

- .14 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .15 Provide channel support with fittings for vertical runs of conduit and cables.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provide complete system of splitters boxes and cabinets for installation of wiring and equipment.

1.2 Shop Drawings and Product Data

- .1 Submit shop drawings and product data for cabinets in accordance with Section 26 05 01 Electrical General Requirements.

2. PRODUCTS

2.1 Junction Boxes and Pull Boxes, Weatherproof

- .1 Materials:
 - .1 Cast steel, Crouse Hinds, WBJ Series.

2.2 Junction Boxes and Pull Boxes, Indoor Dry Locations

- .1 Materials:
 - .1 Code gauge sheet steel, welded construction, phosphatized and factory paint finish.
- .2 Components:
 - .1 For flush mounting, covers to overlap box by 25 mm minimum all around with flush head cover retaining screws.
 - .2 Use rolled edges for surface boxes.
- .3 Junction boxes mounted in exterior walls to be complete with box vapour barriers.

2.3 Cabinets

- .1 Materials:
 - .1 Cabinets: Code gauge sheet steel, welded construction, phosphatized and factory paint finish, suitable for field painting.
 - .2 Locks: to match panelboards.
 - .3 Backboards: 19 mm GIS fir plywood, one piece per cabinet, covering entire cabinet interior.

.2 Components:

- .1 With hinged door and return flange overlapping sides, with handle, lock and catch for surface mounting, size as indicated or to suit.
- .2 Surface or flush with trim and hinged door, latch and lock and two keys, size as indicated or to suit. Keyed to match panelboard keys. 19 mm GIS Fir Plywood backboard.

2.4 Splitters

.1 Materials:

- .1 Code gauge sheet steel, welded construction, phosphatized and factory paint finish.

.2 Components:

- .1 Formed hinged cover suitable for locking in the closed position.
- .2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 Amp.

3. EXECUTION

3.1 Installation

.1 Junction Boxes and Pull Boxes:

- .1 Supply all pull boxes and junction boxes shown on drawings or required for installation.
- .2 Boxes installed in party walls to be offset by minimum of one stud space.
- .3 Install in inconspicuous but accessible locations, above removable ceilings or in electrical rooms, utility rooms or storage areas.
- .4 Identify with system name and circuit designation as applicable.
- .5 Size in accordance with Canadian Electrical Code, as minimum.

- .2 Cabinets:
 - .1 Mount cabinets with top not greater than 1980 mm above finished floor, coordinated with masonry, panelboards and similar items. Securely fasten backboards to cabinet interiors.
 - .2 Install terminal block where indicated.
- .3 Splitters
 - .1 Install splitters and mount plumb, true and square to the building lines.
 - .2 Extend splitters full length of equipment arrangement except where indicated otherwise.
- .4 Identification
 - .1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provide complete system of boxes for installation of wiring and equipment.

1.2 References

- .1 CSA C22.1-Canadian Electrical Codes, Part 1.

1.3 Submittals

- .1 Provide submittals in accordance with Section 26 05 01.

2. PRODUCTS

2.1 Outlet and Conduit Boxes General

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 Outlet Boxes for Metal Conduit

- .1 Materials:
 - .1 Surface or recessed concealed type: Die formed steel, hot dip galvanized, 1.25 oz/sq. ft. minimum zinc coating.
 - .2 Surface mounting exposed: Cast aluminum FSU boxes threaded for conduit, with attached internal lugs, corrosion resistant two coats finish.
 - .3 Wall boxes, concealed in concrete or masonry: for one and two gang applications shall be 101 mm square, 54 mm deep, 52171 series complete with suitable 52-C-49 series square cornered raised tile wall cover for proper device and wall surface application. Masonry boxes may be used for line voltage switching.
 - .4 Wall outlets, concealed non-masonry construction, with plaster finish: For one or two gangs used with switches, receptacles, etc., use 54 mm deep Iberville 52171 series, with matching plaster covers, depth to suit. Alternately, use 119 mm square boxes, Iberville 72171 series and covers as required.

- .5 For more than two gangs use solid boxes Iberville GSB series with GBC series cover.
- .6 Wall outlets, surface, exposed mounting or used for outdoor outlets: One or more gang, Crouse-Hinds FS series or FD series, conduit.
- .7 Covers: Unless wiring devices and plates are mounted, provide blank, round canopy covers to match boxes.

2.3 Outlet Boxes for Rigid PVC Conduit

- .1 Rigid PVC boxes and fittings: Unplasticized PVC.

2.4 Masonry Boxes

- .1 Electro-galvanized steel masonry single and multi-gang boxes for devices flush mounted in exposed block walls.

2.5 Concrete Boxes

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.6 Fittings - General

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

3. EXECUTION

3.1 Installation

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.
- .5 Install all outlets flush and surface mounted as required for installation.

- .6 Surface mounts above suspended ceilings, or in unfinished areas.
- .7 Adjust position of outlets in finished masonry walls to suit course lines. Coordinate cutting of masonry walls to achieve neat openings for all boxes.
- .8 Do not distort boxes during installation. If boxes are distorted, replace with new boxes.
- .9 Use plaster rings to correct depth. Use 30 mm on concrete block.
- .10 Do not use sectional boxes.
- .11 Provide boxes sized as required by Canadian Electrical Code.
- .12 Install vapour barrier material to surround and seal all outlet boxes located on exterior walls of building. Maintain wall insulation.
- .13 Ceiling outlet boxes shall be provided for every surface mounted fixture or row of fixtures installed on suspended "hard" ceilings.
- .14 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .15 Identify systems for outlet boxes as required.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provide complete system of conduit and fittings for installation of wiring.
- .2 Conduit system infrastructure shall be provided and installed for all power and system wiring as required for the installation of electrical work as described in the contract documents.

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45, Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83, Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2, Rigid PVC (Unplasticized) Conduit.

2. PRODUCTS

2.1 Rigid Steel Conduit

- .1 Galvanized with threaded joints and connections.
- .2 Connections in dry locations: steel or malleable iron locknuts inside and outside enclosures. Insulated bushings.
- .3 Connectors subjected to moisture interior and exterior: liquid and dust tight with insulated throat.
- .4 Fittings: cast metal including gasketted covers in damp locations.
- .5 Expansion joints: cast metal.

2.2 E.M.T. Conduit

- .1 Fittings in dry locations: Steel or zinc set screw connectors with insulated throat. Steel or zinc set screw couplings.
- .2 Fittings in locations subject to moisture: steel rain-tite connectors with insulated throat. Steel rain tite couplings.

2.3 Rigid P.V.C. Conduit

- .1 Conduit: rigid non-metallic conduit of un-plasticized polyvinyl chloride, Schedule 40.
- .2 Fittings: threaded male or female solvent weld connectors and solvent weld couplings, as supplied by conduit manufacturer.
- .3 Solvent: as recommended by conduit manufacturer.

2.4 Flexible Conduit

- .1 Connectors: slip-proof, insulated throat or non-metallic bushings, steel.

2.5 Rigid PVC Duct

- .1 Duct: Rigid non-metallic conduit of un-plasticized polyvinyl chloride Type DB-2, conforming to CSA Standard.
- .2 Accessories: Bell ends, couplings, adapters, bends and other fittings of same material as duct. Use solvent recommended by manufacturer. Use pre-manufactured horizontal, vertical and foundation spacers.

2.6 Liquid-Tight Flexible Conduit

- .1 Conduit: flexible metal conduit with liquid-tight PVC jacket.
- .2 Connectors: captive sealing jacket and ground cone insulated throat.

2.7 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 27 mm and larger conduits.
- .3 Watertight connectors and couplings for EMT.
 - .1 Set-screws are not acceptable.

2.8 Fish Cord

- .1 Polypropylene.

3. EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Rigid Steel Conduit

- .1 Use as raceways in all areas exposed to weather and locations where mechanical damage may occur.

.2 E.M.T. Conduit

- .1 Install all conduit and wiring concealed within wall, drywall framing bulkheads, furring or above dropped ceiling finishes. Conduits shall not be installed surface mounted in finished areas.
- .2 Use as raceways in surface and concealed areas or in poured concrete above ground level.
- .3 It may not be used in damp locations, corrosive atmosphere, underground, outdoors, nor in areas exposed to mechanical damage.
- .4 Do not recess conduit in columns without permission.

.3 Rigid P.V.C. Conduit

- .1 Use as raceways in poured concrete floors and walls and in underground runs exterior to buildings unless otherwise noted. Wiring installed in areas subject to intermittent or continuous moisture but not surface mounted. Rigid PVC conduit to not be surface mounted.
- .2 Structural Slab on grade: Install rigid PVC conduit in the gravel base below concrete slabs.
- .3 Use strictly in accordance with Canadian Electrical Code.
- .4 Provide insulated ground wire in all rigid PVC conduits in accordance with Canadian Electrical Code.
- .5 Where rigid PVC conduit is set in poured concrete, solvent joints must be completed and allowed to set as per manufacturer's instructions.

- .6 Bend rigid conduit in strict accordance with manufacturer's directions. Distorted bends will not be accepted.

- .4 Flexible Conduit
 - .1 Use as raceways for connections to fractional horsepower motors in dry locations.
 - .2 Use as raceway for connections to panelboards from transformer secondary.
 - .3 Provide separate insulated ground wire in all flexible conduits.

- .5 Rigid PVC Duct
 - .1 Provide separate green insulated copper ground wire in all ducts sized as required by Code.
 - .2 Arrange ducts in horizontal layer separated by plastic spacers to provide spacing between duct centers, as shown on drawings.
 - .3 Support duct bank on plastic spacers 35 mm between ducts. Foundation spacers to maintain at least 76 mm clearance between ducts and exterior coverage.
 - .4 Make joints with tapered couplings to provide a secure watertight connection. Stagger all joints to provide 200 mm vertical and horizontal clearance between adjacent couplings. Where needed, use factory bends to provide bends of radius required.
 - .5 When all ducts are installed, brace whole assembly at each spacer group to prevent duct floating when concrete is placed.
 - .6 Terminate ducts with standard bell ends where ducts enter cable pits, junction boxes and building interiors.
 - .7 Cap ends of unused ducts with plug ends of same material as ducts.
 - .8 Seal all joints in ducts with solvent cement.

- .6 Liquid-Tight Flexible Conduit
 - .1 Use as raceways at all motors, pipe mounted control devices, and other devices subject to movement or water.
 - .2 At all motors provide short length before connecting to motor terminal box. Minimum length to be 450 mm plus 4 times conduit diameter.

- .3 Provide separate ground wire within flexible conduit, bonded to motor frames and system ground.

3.3 Workmanship

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Size conduit in accordance with CEC 22.1-15 for all conductors larger than #12 AWG.
- .3 Provide spare capacity in all branch circuit and home run conduits. Conduit fill limitations for #12 AWG conductors as below:
 - .1 21C-6#12, 1#12 ground.
 - .2 27C-8#12, 1#12 ground.
- .4 Install all conduit and wiring concealed, unless otherwise indicated. Do not recess conduit in columns, except as noted, without permission.
- .5 Where conduit is run exposed in unfinished areas, run parallel or perpendicular to building lines. Where conduits are grouped (two or more), space evenly, make bends concentric and mount on Unistrut racks.
- .6 Lay out conduit to avoid interference with other work. Maintain minimum clearance of 150 mm from steam or hot water piping, vents, etc.
- .7 Route conduits to be concealed within other finishing elements such as furring, bulkheads etc.
- .8 Provide Brady underground warning tapes half way between underground conduits and grade. Tape to be yellow warning tape, 150 mm wide.
- .9 Where conduits or ducts enter or exit concrete structures below grade provide 16 mm x 1500 mm steel reinforcing dowels to prevent shearing. Extend dowel 1000 mm beyond concrete and band conduit to dowel. First 3 meter length of conduit extending from structure to be Polykin wrapped rigid steel.
- .10 Where conduit is required to be bent, do not heat, and do not bend conduit in such a way as to reduce pipe cross section area at any point. Radii of bends to be as per Canadian Electrical Code. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .11 Mechanically bend steel conduit over 21 mm diameter.
- .12 For all runs of conduits, do not include more than equivalent of 4 - quarter bends. Provide conduit fittings; pull boxes and junction boxes where necessary. Pulling elbows to not be used except by special permission.

- .13 Where possible, install conduits so that they are not trapped, cap turned up conduits to prevent entrance of dirt or moisture during construction. Swab out conduit and thoroughly clean internally before wires and cables are pulled.
- .14 Take extreme care in reaming ends of all conduits to ensure a smooth interior finish that will not damage the insulation of the wires.
- .15 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .16 Use insulated non-metallic bushings on all conduit terminations.
- .17 Ensure electrical continuity in all conduit systems.
- .18 All conduits in exposed ceiling finished areas are to be free of unnecessary labels and trademarks.
- .19 Install 90 lb. test line in all conduits left empty by Contractor including those which others will pull cables, wires, etc.
- .20 Conduits and ducts crossing building expansion joints to have conduit expansion fittings to suit type of conduit used.
- .21 Seal conduits with duct seal where conduits are run between heated and unheated areas. Where conduits, cables, or cable trays pierce fire separations, seal openings with Dow Corning 3-6548 sealant or approved equal.
- .22 Where conduits pass through walls, they shall be grouped and installed through openings. After all conduits shown on drawings are installed, wall openings to be closed with material compatible with wall construction. Review size and quantity of conduit sleeves with Consultant.
- .23 Where conduit finish is damaged, repair or replace.
- .24 Use "Conduit" fittings for power and telephone type conduit terminations in lieu of boxes where support is not provided.
- .25 All branch circuit wiring, home-runs, communication and data to be minimum 27 mm diameter unless otherwise stated.
- .26 Do not install EMT conduit in wet or damp locations.
- .27 Conduits underground: slope conduits to provide drainage.

END OF SECTION

1. GENERAL

1.1 Related Sections

- .1 Section 26 05 01 – Electrical General Requirements
- .2 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

1.2 References

- .1 Canadian Standards Association, (CSA International)
- .2 Insulated Cable Engineers Association, Inc. (ICEA)

2. PRODUCTS

2.1 PVC Ducts and Fittings

- .1 Rigid PVC duct: to CSA C22.2 No. 211.1, Type DB2/ES2, with moulded fittings, for direct burial, Trade size as indicated. Nominal length: 6 or 3 m plus or minus 12 mm.
- .2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make complete installation.
- .3 Rigid PVC 90° and 45° bends.
- .4 Rigid PVC 5° angle couplings.

2.2 Solvent Weld Compound

- .1 Solvent cement for PVC duct joints.

2.3 Cable Pulling Equipment

- .1 6 mm stranded nylon pull rope tensile strength 5 kN.

2.4 Markers

- .1 Continuous marker tape warning of buried power or telephone cables.

2.5 Pull Boxes

- .1 Approved for underground direct burial, PVC, watertight.

3. EXECUTION

3.1 Installation of Ducts

- .1 Install duct in accordance with manufacturer's instructions.

- .2 Clean inside of ducts before laying.
- .3 Ensure full and even support every 1.5 m throughout duct lengths.
- .4 Slope ducts with 1 to 400 minimum slope.
- .5 During construction, cap ends of ducts to prevent entrance of foreign materials.
- .6 Pull through each duct a wooden mandrel not less than 300 mm long and of a diameter 6 mm less than internal diameter of duct, followed by a stiff bristle brush to remove sand, earth and other foreign matter. Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .7 In each duct install polypropylene pull cord continuous throughout each duct run with 3 m spare rope at each end.
- .8 Install markers half way between conduit and grade for entire length of run.
- .9 After 150mm thick of sand bedding is in place, lay ducts maintaining 75 mm clearance from each side of trench to nearest duct, then cover with an additional 150 mm of sand fill.

3.2 Cable Installation in Ducts

- .1 Install cables as indicated in ducts.
 - .1 Do not pull spliced cables inside ducts.
- .2 Install multiple cables in duct simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .6 After installation of cables, seal duct ends with duct sealing compound.

3.3 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 01 – Electrical General Requirements.
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.

- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 50 megohms.

- .5 Pre-acceptance tests.
 - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.

- .6 Acceptance Tests
 - .1 Ensure that terminations and accessory equipment are disconnected.
 - .2 Ground shields, ground wires, metallic armour and conductors not under test.

- .7 Provide Engineer with list of test results showing location at which each test was made, circuit tested and result of each test.

- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

1. GENERAL

1.1 Arc Flash/Coordination Study

- .1 Prepare and submit short circuit study, arc flash/coordination study encompassing all electrical system components including but not limited to: Utility Service, MDP, CDP's, panels and VFD's
- .2 Report to be prepared and sealed by a P. Eng. licensed to practice in the Northwest Territories and Nunavut.

1.2 Description

- .1 Provide a coordination/protective study and short circuit study of all electrical equipment specified herein and submit for review.
- .2 The study shall also include an arc flash hazard analysis in accordance with CSA Z462 for the power distribution system. Flash hazard results shall be clearly marked in schematic and tabular form at each connection point on the distribution system in accordance with the referenced standard.
- .3 Data shall clearly state the operating time in cycles of each breaker and indicate whether the time current curves for relays are inclusive of breaker tripping time or otherwise.
- .4 Prepare a summation chart showing all ratings and settings with easy reference to the appropriate curve.
- .5 Symmetrical and asymmetrical fault current calculations shall be submitted to verify the correct choice of the protective elements of the system. Include a list of recommended settings.
- .6 This study shall be provided by the supplier of the new main switchboard.
- .7 Electrical contractor to provide all required data to supplier to facilitate completion of the study.
- .8 Submit the final copy of the study for review prior to carrying out calibration and verification.
- .9 Include the results of coordination and short circuit study in maintenance manuals.

2. PRODUCTS

2.1 Not Applicable

3. EXECUTION

3.1 Data

- .1 Provide the main switchboard supplier with all relevant data for equipment not provided by that supplier.
- .2 Provide a draft review copy of the study to the consultant along with the shop drawing submission of the electrical distribution equipment.
- .3 Provide a final copy of the report to the consultant prior to commissioning.

END OF SECTION

1. GENERAL

- .1 Supply and installation of transformers as indicated on the drawings and as specified herein.
- .2 Standards
 - .1 The latest versions of the following codes and standards and all standards cross-referenced by them shall apply:
 - .1 CSA Standard C9 Dry-Type Transformers
 - .2 ANSI / IEEE Std. C57.12.01 General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin Encapsulated Windings
 - .3 ANSI / IEEE Std. C57.12.91 IEEE Standard Test Code for Dry-Type Distribution and Power Transformers.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Include:
 - .1 Transformer plan and elevation views showing detailed dimensions, weights, centre of gravity, component locations, terminals and taps.
 - .2 Transformer nameplate drawing including ratings, winding configuration and transformer tag number.
 - .3 Bill of material.
 - .4 Priced recommended spare parts including quantities and manufacturer's part numbers.
 - .5 Listing of Vendor's standard tests.
 - .6 Certified test results.
 - .7 Technical data:
 - .1 kVA rating.
 - .2 Primary and secondary voltages.
 - .3 Frequency.
 - .4 Phase.

- .5 Polarity or angular displacement.
- .6 Full load efficiency.
- .7 Regulation at unity pf.
- .8 Insulation type.
- .9 Sound rating.

1.3 Operation and Maintenance Data

- .1 Provide operation and maintenance data for dry type transformers for incorporation into manual specified in Section 01 77 01.
- .2 Operation and maintenance instructions to include:
 - .1 Tap changing.
 - .2 Recommended periodic inspection and maintenance.
 - .3 Bushing replacement.

1.4 Storage

- .1 Store transformers indoors in a dry location.

2. PRODUCTS

2.1 Transformer Characteristics

- .1 Type: ANN.
- .2 Rating: kVA and voltage ratings as indicated on the drawings.
- .3 Class H insulation system, 150°C temperature rise.
- .4 BIL level: 10 kV for voltage up to 1.2 kV, 30 kV for voltage up to 5 kV
- .5 Transformer maximum noise levels shall conform to Table 10 requirements of CSA Standard C9.

2.2 Transformer Enclosure and Construction

- .1 The transformer enclosure shall be constructed from sheet steel with thickness and ventilation openings as specified in CSA Standard C9.
- .2 Lifting lugs and jacking facilities shall be provided to allow lifting or jacking of the transformer.

- .3 Paint the enclosure using the manufacturer's premium anti-corrosion paint.
- .4 Include one litre of touch up paint when shipping the transformer(s).
- .5 Bolted removable panels for access to tap connections and enclosed terminals.
- .6 Cable top entry top exit or close couple to distribution panel.
- .7 Designed for floor mounting.
- .8 Indoor, ventilated, cooled type. Temperature of exposed metal parts not to exceed 65°C rise.
- .9 Windings shall be copper with either circular or oval concentric construction.
- .10 The insulation system shall be non-hydroscopic high temperature silicone varnish or epoxy.

2.3 Voltage Taps

- .1 Primary tap changer with 2x2.5% FCAN and 2x2.5% FCBN positions, no load manual operation, pad-lockable operating handle and position indicator.

2.4 Accessories

- .1 Grounding terminal: inside of enclosure.
- .2 Winding temperature indicator (with alarm contact).

2.5 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01.
- .2 Equipment labels: nameplate size 7.

3. EXECUTION

3.1 Installation

- .1 Locate, install and ground transformers in accordance with manufacturer's instructions.
- .2 Set and secure transformers in place, rigid plumb and square.
- .3 Connect primary terminals to incoming circuit.
- .4 Connect secondary terminals to secondary feeder.
- .5 Use flexible conduit to make connections to transformer.
- .6 Energize transformers and check secondary no-load voltage.

- .7 Adjust primary taps as necessary to produce rated secondary voltage at no-load.
- .8 Use torque wrench to adjust internal connections in accordance with manufacturers' recommended values.
- .9 Check transformer for dryness before putting it into service and if it has not been energized for some considerable time.

3.2 Factory Testing

- .1 Transformer shall be tested in accordance with the ANSI/IEEE Standard C57.12.91.
- .2 Certified test results shall be included with the transformer shipment.

3.3 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 01.

END OF SECTION

1. GENERAL

1.1 Related Sections

- .1 Section 26 05 28 – Grounding - Secondary
- .2 Section 26 06 06 – Short Circuit and Coordination Study.

1.2 Electrical Services

- .1 Primary site services for the project will be provided by the local electrical utility. This contract is responsible to provide secondary ducts, work at the utility transformer pole and the secondary service conductors. Refer to electrical drawings for additional installation requirements. Coordinate installation of secondary service ducts on transformer pole with Utility.

1.3 Submittals

- .1 Submit for review by consultant shop drawings of all items specified in this Section.
- .2 At completion of work and prior to final acceptance provide maintenance manuals for all items specified in this Section, including all test reports.
- .3 Submit complete schematic wiring for all controls. Prepare drawing showing each control wire for all controls, instruments, switches, devices and terminals in one circuit on same drawing. Indicate all ratings and loads.

2. PRODUCTS

2.1 Service Entrance Equipment

- .1 Service entrance switchgear to consist of main circuit breaker of trip rating shown on drawings, main bus and line up of circuit breakers for major building loads of size and trip indicated; enclosed in code gauge galvanized steel box with cold rolled steel trim, painted as specified and suitable for wall mounting.
- .2 Circuit breakers to have minimum fault current rating of 65 KA RMS symmetrical.
- .3 Barrier metering section from adjoining sections.
- .4 Provision for installation of power supply authority metering in one barriered section.

2.2 Arrangement

- .1 Arrangement to be as indicated on drawings. Minor modifications to arrangement may be made to suit site conditions.

2.3 Housing Construction

- .1 Fabricate housing of metal enclosed dead front sections, made from code gauge sheet steel of formed and welded construction and built for 208 volt indoor rating. Isolate circuit breaker compartments from bus compartment by grounded metal barriers. Self-support on formed channel sills. When sections are bolted together, form continuous integral structure.
- .2 Housing to provide a vertical wireway to accommodate the incoming feeder conductors from below.
- .3 Before painting, clean and bonderize the metal and then apply a prime rust-resistant coat. Exterior finish to be grey in accordance with Section 26 05 01 - Electrical General Requirements; use white for interior. Touch up on site as required. Furnish ventilating louvres and screens to suit application.
- .4 Mount lamacoid nameplates on front of sections for each device, meter, switch, etc.
- .5 Equip each circuit breaker compartment with primary and secondary contacts, breaker mounting pan complete with integral rails, and required instrument current transformers.
- .6 Provide non-ferrous cable entry and non-magnetic exit plates as required.
- .7 Provide channel iron sills to be cast in concrete housekeeping pad under switchboard.
- .8 Provide steel isolation barriers between bus and cable compartments. (Such that only load stabs are accessible when rear panels are removed).
- .9 Provide steel isolation barriers between breaker cells of all vertical sections of switchboard.

2.4 Bus Bars

- .1 Provide 600 A three phase, four wire, 600 volt horizontal and vertical bus.
- .2 Design bus in accordance with NEMA Standard SG5-3-02 and amendments thereto. Use hard drawn copper bus with continuous ampere rating shown. Design cross section area of bus bars and connections so that temperature rise when carrying full rated current will not exceed 65°C, above an ambient temperature of 40°C. Adequately brace bus to withstand 65 KA RMS amperes symmetrical, three phase, 60 cycle short circuit at 600 volts. Silver flash all joints and connections. Use cadmium plated bolts, nuts and lock washers.
- .3 Extend copper ground bus full length of switchgear assembly complete with lugs for ground connections required. Connect all non-current carrying components of assembly to bus.

2.5 Main Circuit Breaker

- .1 Main Breaker: 3 pole, 600 A frame, 600 A trip, 600 V, 100% rated circuit breaker with interrupting capacity of 65 KA, solid state trip unit with adjustable long time pickup, long time delay, short time pickup, short time delay, instantaneous pickup and ground fault pickup/delay settings.
- .2 Draw out low voltage ANSI rated circuit breaker with the following features:
 - .1 Red mechanical trip flag pop-out indicator
 - .2 Accessory viewing window
 - .3 Digitrip rms trip unit
 - .4 Contact status indicators:
 - .1 Open—green
 - .2 Closed—red
 - .5 Spring status indicators:
 - .1 Charged—yellow
 - .2 Discharged—white
 - .6 Push off pushbutton—red
 - .7 Push on pushbutton—green
 - .8 Manual spring charging handle for manually charging the stored energy springs.
 - .9 Padlockable levering device shutter for drawout breakers
 - .10 Color-coded position indicator for drawout breakers:
 - .1 Connect—red
 - .2 Test—yellow
 - .3 Disconnect—green

2.6 Solid State Trip Breakers-400A and Larger

- .1 Moulded case circuit breaker to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous, tripping for phase and ground fault short circuit protection.

2.7 Transient Voltage Surge Suppression

- .1 A transient voltage surge suppressor for the protection of downstream electronic equipment connected to the building power supply. The specified unit shall be compatible with non-linear loads and shall provide effective high-energy transient voltage suppression, surge current diversion and high-frequency electrical noise filtering while connected in parallel with a facility's distribution system. The filtering unit shall utilize non-linear voltage dependent metal oxide varistors or selenium cells. The suppression system's components shall not utilize gas tubes, spark gaps, or silicon avalanche diodes.
- .2 Protection Modes: Transient voltage surge suppression paths shall be provided for all possible common and normal modes, between each line and ground, neutral and ground, line to line and each line and neutral. The primary suppression path shall not be to ground.
- .3 Peak Surge Current per Phase 240,000 Amps
- .4 Let Through Voltage (L-N) 600 V Units 1200V
- .5 TVSS clamping components response time < 1 nanosecond
- .6 TVSS shall contain a high frequency extended range tracking filter, noise attenuation ≥ 45 dB @ 100 kHz, main entrance panel application effective filtering bandwidth - 180 Hz to 50 Mhz.
- .7 The main service TVSS unit may be factory installed in the main gear or may be separately installed in its own NEMA 12 enclosure. Either location must be pre-planned so that the digital display remains visible while meeting the run and distance requirement of the manufacturer.
- .8 Enclosure: The specified system shall be provided in a heavy duty NEMA 12 dust tight enclosure. Indication of surge current module status shall be visible without opening the door.
- .9 Internal Connections: All surge current diversion connections shall be by way of low impedance wiring. Surge current diversion components shall be wired for reliable low impedance connections. No plug-in component modules, quick disconnect terminals or printed circuit boards shall be used in surge suppression paths.
- .10 Unit Status Indicators: Red status indicators shall be provided on the hinged front cover to indicate unit phase status. The absence of the red light shall reliably indicate that one or more surge current diversion phases have failed and that service is needed to restore full operation.
- .11 Fuses: The unit shall utilize internal fuses rated with a minimum interrupting capability of 200,000A or greater.

- .12 Install with manufacturer's recommended conductors tapped from the electrical service switchboard conductor system. Conductors are to be as short and straight as possible. Input conductors to the TVSS shall be twisted together to reduce impedance during high frequency filtering.
- .13 An appropriately sized manual safety disconnect shall be installed before and in line with the TVSS from the electrical service for the purpose of electrically isolating the device from the system should service be required without interrupting the main service. Coordinate required disconnect ampacity with TVSS manufacturer.
- .14 Warranty: The manufacturer shall provide a five-year warranty on the TVSS filter. These warranties shall commence from date of shipment.

2.8 Acceptable Products

- .1 Eaton
- .2 Schneider
- .3 Siemens.

3. EXECUTION

3.1 Installation

- .1 Switchboard to be mounted on building wall/sub floor.
- .2 Provide and connect main service and distribution system shown and specified. Make all necessary arrangements with utility company for service entrance, energization and metering of services.
- .3 Connect all system neutrals as required and connect switchboard ground stud to building ground wire. Check and test ground fault trip device.
- .4 Connect incoming bus and outgoing cables.
- .5 Check factory made connections for mechanical security and electrical continuity.
- .6 Provide drip hoods, nonferrous entry plates and other special features as required. Check trip unit settings against co-ordination study to ensure proper working and protection of components

END OF SECTION

1. GENERAL

1.1 Related Sections

- .1 Section 26 05 01 – Electrical General Requirements.
- .2 Section 26 28 21 - Moulded Case Circuit Breakers.

1.2 Shop Drawings

- .1 Submit shop drawings in accordance with Section 26 05 01 - Electrical General Requirements.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

2. PRODUCTS

2.1 Panelboards

- .1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.
 - .1 Install circuit breakers in panelboards before shipment.
 - .2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.
- .2 250V panelboards: bus and breakers rated for 22 A (symmetrical) interrupting capacity or as indicated.
- .3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .5 Two keys for each panelboard and key panelboards alike.
- .6 Copper bus with neutral of same ampere rating as mains.
- .7 Mains: suitable for bolt-on breakers.
- .8 Trim with concealed front bolts and hinges.
- .9 Surface mounted panelboards to be provided with covers and drip shields intended for surface mounted tubs.
- .10 Finish: grey.

2.2 Breakers

- .1 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .2 Lock-on devices for 10% of breakers installed as indicated. Turn over unused lock-on devices to Owner.
- .3 Lock-on devices for fire alarm, emergency, exit and night light circuits.

2.3 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.
- .2 Complete circuit directory with typewritten legend showing location and load of each circuit.

2.4 Acceptable Products

- .1 Eaton
- .2 Square D
- .3 Siemens

3. EXECUTION

3.1 Installation

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted panelboards on plywood backboards. Where practical, group on common backboard.
- .3 Connect loads to circuits.
- .4 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provide and connect all wiring devices for the complete installation.

2. PRODUCTS

2.1 Manufacturer

- .1 Wiring devices to be of one manufacture throughout project.
- .2 Manufacturers to be Hubbell, Leviton, Smith and Stone or Pass & Seymour.

2.2 Devices

- .1 Catalogue numbers shown below are for particular manufacturer's series and all necessary suffixes to be added for requirements as stated. All devices to be specification grade minimum and wherever possible be of same manufacture.
- .2 Devices to be white with type 302/304, #4 finished stainless steel coverplates in all but mechanical areas unless noted otherwise. Use galvanized steel coverplates in mechanical areas and for surface mounted devices.

2.3 Switches

- .1 120 volt, 20 amp, single and double pole, three and four-way: Hubbell No. 1221, 1222, 1223 and 1224 or equivalent.
- .2 Manually - operated general purpose AC switches to have the following features:
 - .1 Terminal holes approved for #10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine molding for parts subject to carbon tracking.
 - .4 Suitable for back and/or side wiring.
 - .5 White toggle.

2.4 Dimmers

- .1 120 V, solid state slider type suitable for dimming of LED loads, white color, Leviton.

2.5 Sensors (Occupancy Type)

- .1 DT – 120V line voltage dual technology occupancy sensor using passive infrared and Ultrasonic or Microphonic detection. Dual internal self-contained relays for two circuit

control where installed in new classrooms. Pushbutton field programmable detection and timing settings. These detectors to be integrated into local line voltage switching circuit and installed in locations where single technology detectors are not suitable such as large washrooms.

- .2 Locate occupancy sensors to maximize coverage in accordance with manufacturer's recommendations. In rooms with open ceilings higher than 16 feet, locate sensors as low as possible (on bottom of structural members).

2.6 Receptacles

- .1 The project is to utilize 15A receptacles throughout unless specifically noted otherwise on the electrical drawings or schedules.
- .2 Duplex 15 ampere, 120 volt, 3 wire, white, U-ground, Hubbell No. 5252W with the following features:
 - .1 White urea molded housing.
 - .2 Suitable for #10 AWG for back and side wiring.
 - .3 Eight back wired entrances, four side wiring screws.
 - .4 Break-off links for use as split receptacles.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .3 Duplex 20 ampere, t-slot, 120 volt, 3 wire, white, U-ground, Hubbell No. 5352W with the following features:
 - .1 White urea molded housing.
 - .2 Suitable for #10 AWG for back and side wiring.
 - .3 Eight back wired entrances, four side wiring screws.
 - .4 Break-off links for use as split receptacles.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .4 Duplex 20 ampere, 120 volt, 3 wire, white, U-ground ground fault receptacle, Hubbell No. GF-5361 or equivalent.

2.7 Cover Plates

- .1 Cover plates from one manufacturer throughout project.
- .2 Provide cover plates for all wiring devices.

- .3 Sheet steel utility box cover for wiring devices installed in surface mounted utility boxes.
- .4 Stainless steel 1 mm thick coverplates on all wiring devices mounted in flush-mounted outlet boxes unless otherwise specified.
- .5 Weatherproof coverplates where receptacles would be exposed to weather when in use.

3. EXECUTION

3.1 Installation

- .1 Wherever possible, mount equipment in straight line at uniform mounting height, coordinated with other equipment and materials.
- .2 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height in accordance with Section 26 05 01 – Electrical General Requirements.
- .3 Occupancy sensors:
 - .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets
 - .2 Locate occupancy sensors to maximize coverage in accordance with manufacturer's recommendations. In rooms with open ceilings higher than 16 feet, locate sensors as low as possible (on bottom of structural members).
 - .3 Actuate control units in presence of Consultant to demonstrate lighting circuits are controlled as designated
- .4 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height in accordance with Section 26 05 01 – Electrical General Requirements.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

- .5 Cover plates:
 - .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not distort plates by tightening screws excessively.
 - .4 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

1. GENERAL

1.1 Description

- .1 Equipment and installation for ground fault circuit interrupters (GFCI).

2. PRODUCTS

2.1 Materials

- .1 Components comprising ground fault protective system to be of same manufacturer.

2.2 Breaker Type Ground Fault Interrupter

- .1 Single pole ground fault circuit interrupter for 15A, 120V, 1 phase circuit c/w test and reset facilities.

2.3 Ground Fault Protector Unit

- .1 Self-contained with 15 A, 120 V circuit interrupter and duplex receptacle complete with:
 - .1 Solid state ground sensing device
 - .2 Facility for testing and reset
 - .3 CSA Enclosure 1, flush mounted with stainless steel face plate.

3. EXECUTION

3.1 Installation

- .1 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 Field Quality Control

- .1 Perform tests in accordance with Section 26 29 13 - Testing, Adjustment and Balancing of Electrical Equipment and Systems.

END OF SECTION

1. GENERAL

1.1 Product Data

- .1 Submit product data in accordance with Section 26 05 01 - Electrical General Requirements.
- .1 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 Bolt-On Moulded Case Circuit Breaker: Quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.
- .2 Common-Trip Breakers: With single handle for multi-pole applications.
- .3 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting. Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .4 Circuit breakers with interchangeable trips as indicated.

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.

2.3 Magnetic Breakers

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

2.4 Solid State Trip Breakers

- .1 Moulded case circuit breaker to operate by means of a solid-state trip unit with associated current monitors and self-powered shunt trip to provide inverse time current trip under overload condition, and long time, short time, instantaneous tripping for phase fault short circuit protection.

3. EXECUTION

3.1 Installation

- .1 Install circuit breakers as indicated.
- .2 All breakers 400A and larger to have a solid state trip unit type breaker.
- .3 Identification: Provide lamacoid plate on each breaker showing voltage, source of supply and load being fed (i.e. CDP-1, 120/208 V, 400A fed from MDP-1).

END OF SECTION

1. GENERAL

1.1 Description

- .1 Provide disconnect switches for 120/208 volt and 600V distribution as indicated.

2. PRODUCTS

2.1 Disconnect Switches

- .1 Ratings: 240 volts for 120/208 volt distribution and 600V for 600V distribution. Unless otherwise shown, 3 pole for 3 phase, 3 wire distribution, 3 pole and solid neutral for 3 phase 4 wire distribution. Ampere ratings as shown on drawings or to suit load requirements. For motors, use disconnect switches with HP ratings at least equal to motor HP.
- .2 Enclosures: CSA code gauge galvanized steel, hinged doors, external operating handles. Disconnect switches in dry locations shall be EEMAC-1 and EEMAC-3 where exposed to weather. Provide ON-OFF switch position indication on switch enclosure cover.
- .3 Finish: One primer coat and one finish coat on all metal surfaces, gray finish for 208 Volt equipment.
- .4 Switch mechanisms: Quick make and quick break action with self wiping contacts, solderless pressure lug connectors. For switches 100 amperes and over, provide non-tracking arc shrouds. All switch poles to operate together from a common operating bar. Provide for padlocking disconnect switches in "Off" position. Doors to be interlocked and complete with defeat mechanism, to prevent opening when handle in ON position.
- .5 Neutral Bars: Where distribution system has grounded neutral conductor, provide neutral bar where required with ampere rating equal to switch rating, in enclosure. Provide ground bar for terminating ground conductors.
- .6 Fuse Holders: Provide fuse holders (relocatable and suitable without adapters) on load side of switches, ampere rating equal to switch ratings, suitable for fuses specified.
- .7 Finish: grey in accordance with voltage rating.

2.2 Acceptable Products

- .1 Eaton
- .2 Schneider
- .3 Siemens.

3. EXECUTION

3.1 Disconnect Switches

- .1 Mounting: Provide supports independent of conduits. Wall mount where possible, otherwise provide Unistrut frame support. Where switches are grouped mount in uniform arrangement.
- .2 Wiring: Connect line and load cable to all switches.
- .3 Identification: Provide lamacoid plate in accordance with Section 26 05 01 - Electrical General Requirements, on each switch showing voltage, source of supply and load being fed.

END OF SECTION

1. GENERAL

1.1 Starter Requirements

- .1 In general, there are categories of starting equipment for three phase motors.
 - .1 Integral Mounted Starters: Some items of mechanical equipment have starter mounted as part of equipment. For this equipment, supply disconnects and wire to terminals of equipment.
 - .2 Separately Mounted Starters: For motors without integral mounted starters, supply separately mounted starters as indicated on Drawings and wire equipment.
- .2 Provide manual starters for all single phase motors unless otherwise indicated on motor schedule.
- .3 Provide interlocking between starters where required.
- .4 All starter accessories such as pilot lights, Hand-Off-Auto, Start-Stop, etc. whether integrally or remote mounted to be heavy duty oil tight, unless otherwise specified.

1.2 Shop Drawings and Product Data

- .1 Product Data: Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit shop drawings in accordance with Section 26 05 01 - Electrical General Requirements.
- .3 Indicate:
 - .1 Mounting method and dimensions
 - .2 Starter size and type
 - .3 Layout of identified internal and front panel components
 - .4 Enclosure types
 - .5 Wiring diagram for each type of starter
 - .6 Interconnection diagrams.

1.3 Operation and Maintenance Data

- .1 Provide operation and maintenance data for each type and style of motor starter for incorporation into manual specified in Section 26 05 01 - Electrical General Requirements.

1.4 Maintenance Materials

- .1 Provide maintenance materials in accordance with Division 01.
- .2 Provide listed spare parts for each different size and type of starter:
 - .1 3 contacts, stationary.
 - .2 3 contacts, movable.
 - .3 1 contacts, auxiliary.
 - .4 1 control transformer.
 - .5 1 operating coil.
 - .6 2 fuses.
 - .7 10% indicating lamp bulbs used.

2. PRODUCTS

2.1 Materials

- .1 Starters: to IEC 947-4 with AC4 utilization category.

2.2 Enclosure

- .1 All individually mounted motor starters to be enclosed in general purpose sheet steel enclosure unless in wet areas where they shall be watertight EEMAC 4.

2.3 Manual Motor Starters

- .1 Manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break
 - .2 Overload heaters, manual reset, trip indicating handle
 - .3 Rated volts and poles to suit application.

- .2 Accessories:
 - .1 Toggle switch heavy duty labelled as indicated.
 - .2 Indicating lights: heavy duty type and colour as indicated.
 - .3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.4 Full Voltage Non Reversing (FVNR) Magnetic Starters

- .1 Magnetic and 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. Overload relays to provide class 10 single phase protection.
 - .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 Pushbuttons/Selector switches heavy duty labelled as indicated.
 - .2 Indicating lights: heavy duty type and red pilot light to indicate energized motor circuit and where called for, green pilot light to indicate de-energized motor circuit. Pilot lights to be push-to-test transformer type.
 - .3 In addition to standard, 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.

2.5 Control Transformer

- .1 Control transformer of sufficient VA capacity, dry type, with primary voltage as indicated and 120V secondary, complete with primary and secondary fuses (HRC Form J), installed in with starter as indicated.

- .2 Size control transformer for control circuit load plus 20% spare capacity.

2.6 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.
- .2 Starter designation label, white plate, black letters, engraved as indicated.

2.7 Acceptable Products

- .1 Eaton
- .2 Schneider
- .3 Siemens

3. EXECUTION

3.1 Installation

- .1 Install starters and control devices in accordance with manufacturer's instructions.
- .2 Install starters, connect power and control as indicated.
- .3 Ensure correct fuses and overload device elements installed.
- .4 Confirm motor nameplate and adjust overload device to suit.

3.2 Starter Verification

- .1 Field check motor starters supplied prior to commissioning equipment. As minimum, verify the following:
 - .1 Check of control circuits
 - .2 Verify that overload relay installed is correctly sized for motor used
 - .3 Record overload relay size and motor nameplate amperage
 - .4 Visual inspection of fuses and contactors
 - .5 Ensure all connections are tight.
- .2 Measure and record motor amps, under load conditions and compare with full load amps and motor service factor. Report any excessive readings and unbalance. Measure voltage as close to motor terminals as possible while motor is running

- .3 Set all motor circuit protectors to the minimum level which will consistently allow motor to start under normal starting conditions.

3.3 Overload Relays

- .1 For starters provided, select overload relays in accordance with relay and motor manufacturers' recommendations, considering motor service factors, ambient temperature, temperature differences between motor and starter locations. Monitor motor operation during start-up to ensure motor operation is satisfactory and relays provide proper protection. For side inlet fans and other long acceleration time loads, provide special overload relays to suite the start-up condition. Provide manufacturers' curves and data sheets where necessary to provide supporting data for motor protection.

3.4 Field Quality Control

- .1 Perform tests in accordance with Section 26 29 13 - Testing, Adjustment and Balancing of Electrical Equipment and Systems and manufacturer's instructions.
- .2 Operate switches, 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

1. GENERAL

1.1 Description

- .1 Supply and install contactors as indicated to ensure complete operational system.
- .2 Specification covers contactors for voltages up to 600 V.

1.2 Product Data

- .1 Submit product data in accordance with Section 26 05 01 - Electrical General Requirements.

2. PRODUCTS

2.1 Contactors

- .1 Contactors: to CSA C22.2 No.14, Industrial Control Equipment.
- .2 Electrically held controlled by pilot devices as indicated and rated for type of load controlled. Half size contactors are not acceptable.
- .3 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.
- .4 Mount in CSA Enclosure 1 unless otherwise indicated.
- .5 Include the following options in cover:
 - .1 One (1) red indicating light for "on"
 - .2 One (1) green indicating lamp for "off"
 - .3 Hand-Off-Auto selector switch.
- .6 Finish: sand or grey in accordance with voltage rating.

2.2 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 - Electrical General Requirements.
- .2 Provide nameplate indicating name of load controlled.

3. EXECUTION

3.1 Installation

- .1 Install contactors and connect auxiliary control devices where indicated on drawings and specified herein.
- .2 Contactors to be mounted separately in suitable CEMA-1 enclosures.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Unless specified, wire and leave in operation all electrically operated equipment supplied under all contracts related to this project. Examine drawings and shop drawings of all Divisions for extent of electrically operated equipment supplied under other contracts.

1.2 Related Work

- .1 Divisions 20, 21, 22, 23 – Mechanical.
- .2 Section 26 29 01 – Motor Starters to 600V.

1.3 Requirements

- .1 Provide complete system of wiring to motors and as specified herein and as shown on drawings.
- .2 All control wiring diagrams shown on drawings illustrate typical control circuits applicable to equipment. Control circuits may vary with different manufacturers of equipment. Verify all control circuits with suppliers of equipment and make any corrections that may be required.
- .3 Unless specified, supply all pushbuttons, relays, starters, etc., necessary for operation of equipment. Check all starters, relay coils and thermal elements to ensure that they provide necessary protection for motors.
- .4 Do not operate motors and controls until approval is obtained from trade providing equipment.
- .5 Examine drawings and shop drawings of other Divisions to obtain exact location of motors and equipment shown on drawings. Where necessary, obtain conduit locations from other trades' drawings and shop drawings.
- .6 Assist in placing in operation all mechanical equipment having electrical connections.
- .7 Provide three phase starters with fused 120 volt control transformers and overload relays.
- .8 Provide all power wiring for all motors
- .9 Installation of electrical systems to comply with all requirements of Canadian Electrical Code 2015 Edition

2. PRODUCTS

2.1 3 Phase Motor Disconnect Switches

- .1 Industrial Type "A", having quick make, quick break visible blade mechanism, cover interlocks and padlocking switch in closed or open position. Use EEMAC 4 enclosures outdoors and EEMAC 1 indoors switches to be H.P. rated, heavy duty type.
- .2 All motors with branch circuit wiring installed under this contract are to be provided with a local disconnect switch.
- .3 Install a weatherproof disconnect switch under rain cowling for roof mounted exhaust fans. Provide plastic label on cowl "disconnect under cover".

2.2 120 Volt, 1 Phase Disconnect Switches

- .1 Manual starter without overload relay.
- .2 All new motors with new branch circuit wiring installed under this contract are to be provided with a local disconnect switch.
- .3 Install a weatherproof disconnect switch under rain cowling for roof mounted exhaust fans. Provide plastic label on cowl "disconnect under cover".

2.3 208 Volt, 1 Phase Motor Disconnect Switches

- .1 Manual starter without overload relay.
- .2 All motors with branch circuit wiring installed under this contract are to be provided with a local disconnect switch.

3. EXECUTION

3.1 Installation

- .1 Provide disconnect switches adjacent to all motors.
- .2 Provide all wiring between all force flow and unit heaters and their thermostats.

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Section 26 29 13 – Testing, Adjustment and Balancing of Electrical Equipment and Systems.

1.2 Coordination

- .1 Coordinates starting of electrical equipment and systems with testing, adjusting and balancing, and demonstration and instruction of:
 - .1 Electrical equipment and systems specified in Division 26.
 - .2 Where any equipment or system requires testing, adjusting or balancing prior to starting, ensure that such work has been completed prior to starting of electrical equipment and systems.

2. PRODUCTS

2.1 (Not Used)

3. EXECUTION

3.1 Starting Motors

- .1 Prior to starting motors:
 - .1 Verify phase rotation at motor starter.
 - .2 Confirm motor nameplate data with motor starter heater overloads.

3.2 Energizing Equipment

- .1 Prior to energizing equipment, confirm equipment nameplate data with characteristics of power supply.

END OF SECTION

1. GENERAL

1.1 Intent

- .1 All building electrical systems to be commissioned in accordance with requirements as set out in Division 01. Division 26 to provide testing, adjusting and balancing of electrical systems and equipment as specified herein.
- .2 Except where otherwise specified, arrange and pay for testing, adjusting, balancing and related requirements.
- .3 If test results do not conform with applicable requirements, repair, replace, adjust or balance equipment and systems. Repeat testing as necessary until acceptable results are achieved.
- .4 Provide all labour, materials, instruments and equipment necessary to perform the tests specified.

1.2 Related Work

- .1 Division 01 – Related sections 01 91 01, 01 91 05 and 01 91 10
- .2 Section 26 05 01 – Electrical General Requirements.
- .3 Section 26 29 12 – Starting of Electrical Systems and Equipment.

1.3 Manufacturer's Production Test Records

- .1 If requested, submit copies of production test records for production tests required by EEMAC and CSA standards for manufactured electrical equipment.

1.4 Site Testing Reports

- .1 Log and tabulate test results on appropriate test report forms.
- .2 Submit forms to Consultant for approval prior to use.

1.5 Reference Documents

- .1 Perform tests in accordance with:
 - .1 The Contract Documents
 - .2 Requirements of authorities having jurisdiction
 - .3 Manufacturer's published instructions
 - .4 Applicable CSA, IEEE, IPCEA, EEMAC and ASTM standards

- .2 If requirements of any of the foregoing conflict, notify Consultant before proceeding with test and obtain clarification.

1.6 Manufacturer's Site Services

- .1 Arrange and pay for site services of appropriately qualified manufacturer's representatives where site testing, adjusting, or balancing of electrical equipment or systems' performed by Manufacturer's representatives is specified, or otherwise required to ensure that electrical equipment and systems are operational in full compliance with Contract Documents

1.7 Sequencing and Scheduling

- .1 Except where otherwise specified, perform all testing, adjusting, balancing and related requirements specified herein prior to Interim Acceptance of the Work.
- .2 Perform voltage testing and adjusting after user occupancy or utilization of facility.

2. PRODUCTS

2.1 Test Equipment

- .1 Provide all equipment and tools necessary to perform testing, adjusting and balancing specified herein and as otherwise required.

3. EXECUTION

3.1 Testing Of Wiring and Wiring Devices

- .1 Test service grounding conductors for ground resistance.
- .2 Test all wiring devices for correct operation.
- .3 Test all receptacles for proper polarity and circuitry.

3.2 Load Balance Testing

- .1 Perform load tests when as many loads as possible, prior to Interim Acceptance of the Work, are operable.
- .2 Turn on all possible loads.
- .3 Test load balance on all feeders at distribution centres, motor control centre and panelboards.
- .4 If load balance exceeds 15%, reconnect circuits to balance loads.

3.3 Voltage Testing and Adjusting

- .1 Test voltage at all panelboards.
- .2 Test voltage at all elevators.
- .3 Test voltage at motor control centre.
- .4 Adjust transformer tap settings to compensate for under-voltage or over-voltage conditions, if directed to do so by Consultant.

END OF SECTION

1. GENERAL

1.1 Related Sections

- .1 Section 26 05 01 – Electrical General Requirements.

1.2 Intent

- .1 Provide demonstration and instruction sessions to familiarize Owner's operation and maintenance personnel with electrical systems and their operation, maintenance and safety aspects.
- .2 Submit system sign off sheets for each system listed prior to substantial completion.

1.3 Manufacturer's Site Services

- .1 Arrange and pay for appropriately qualified manufacturer's representatives to provide or assist in providing electrical equipment and system demonstration and instruction as specified herein.

1.4 Contractor/Owner Coordination

- .1 Contractor will chair demonstration and instruction sessions.
- .2 Establish agendas for demonstration and instruction sessions in conjunction with Owner. Coordinate scheduling of sessions with Owner.

2. PRODUCTS

2.1 Not Applicable.

3. EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Systems Demonstration

- .1 Demonstrate operation of following but not limited to the following systems:
 - .1 347/600V and 208/120 Volt Power Distribution Systems
 - .2 Standby Power Distribution Systems
 - .3 Standby Power Generation Systems

- .4 Normal/ Standby Transfer equipment
- .5 Mechanical Equipment Connections and Controls
- .6 Grounding System

END OF SECTION

1. GENERAL

1.1 Section Includes

- .1 Diesel engine driven standby generator set rated 450 kW, 600/347V 3 PH 4W.

1.2 References

- .1 American National Standards Institute (ANSI)/American Petroleum Institute (API)
 - .1 ANSI/API 650-1988 (A2000), Welded Steel Tanks for Oil Storage Tenth Edition; Addendum 1.
- .2 American National Standards Institute (ANSI)/National Electrical Manufacturers' Association (NEMA)
 - .1 ANSI/NEMA MG1-1998, Motors and Generators.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-C282.-2009, Emergency Electrical Power Supply for Buildings.
- .4 International Organization for Standardization (ISO)
 - .1 ISO 3046-1-2002, Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations Of Power, Fuel And Lubricating Oil Consumptions, And Test Methods.
- .5 Underwriters' Laboratories of Canada (ULC)
 - .1 ULC-S601-00, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.
- .6 National Fire Protection Association (NFPA)
 - .1 NFPA 110 Standard for Emergency and Standby Power Systems.
- .7 Latest Edition of National Building Code (NBC).

1.3 General Description

- .1 Generating system will consist of a Diesel fuelled engine, close coupled single bearing alternator, with an attached control panel housing voltage regulator, panel metering, alarm annunciation and shutdown functions in accordance with CSA C282-09. The unit is complete with insulated, sound attenuated, NEMA 3R weather protective walk-in enclosure and dual-wall sub-base fuel tank.
- .2 Genset shall be to 450 kW diesel, 3ph, 600V, PMG, 105C temp rise by Cummins or approved equivalent.

1.4 Building Description

- .1 Refer to the project drawings S-01 Structural Skid Plan and Elevations, and S-02 Structural Sections and Details for further information and requirements.
- .2 Enclosure shall be designed for approved generator set mounted on spring isolators.
- .3 Type of Enclosure: Insulated, sound attenuated NEMA 3R weather protective walk-in enclosure.
- .4 Attenuation: The sound pressure level shall not exceed 85dBA at 1m in a free field condition.
- .5 Size: Approximately 23' – 2" long x 12' – 2" wide x 15' – 9" high. Final dimensions to be confirmed with approved generator unit.
- .6 Construction: 14 gauge galvanized steel to ASTM A-653, all welded construction.
- .7 Walls: 4" thick with wall studs approximately every 16". Designed to withstand wind loads as per National Building code (NBC).
- .8 Roof: 5" deep with cross members approximately every 16". Designed to withstand snow loads as per NBC. Roof has a 2% slope to minimize ponding of water.
- .9 Insulation: 4" & 5" thick mineral wool.
- .10 Interior Liner: 22 gauge perforated galvanized steel.
- .11 Doors: One (1) double door 14 gauge galvanized steel (6'-0" x 6'-8") c/w panic hardware with exterior thumb latch, weather stripping and drip edge.
- .12 Stairs and landings shall be provided by the enclosure manufacturer. Stairs and landings including hand rails shall be as shown on drawing S-01 and S-02 in accordance with Specification Section 05 50 00 Metal Fabrications.
- .13 Penetrations: Exhaust opening in the roof complete with rain shield. Muffler mounting shall be within the enclosure.
- .14 Ventilation: Intake – 24 volt DC motorized intake damper (spring to open power to close) with intake silencer, hood and galvanized bird screen. Run contact in the control panel by client. Discharge – Supply and install motorized discharge and recirculation dampers with discharge duct, silencer, snow hood and galvanized bird screen. Damper motor wiring run to modulating thermostat and then to control panel location.
- .15 Provide 350 CFM ventilation fan complete with inlet motorized damper, hood and galvanized bird screen and motorized backdraft exhaust damper c/w hood with galvanized bird screen. Unit shall operate based on a space thermostat. At a temperature

- of 25 C degree the unit shall start and operate until the space temperature falls to below 20 C degree.
- .16 Primary Heat: Two (2) Toyostove L730 Vented Heater, running on diesel from the generator fuel tank or approved equivalent.
- .17 Electrical: Provide 600 volt to 120/208 three phase 45KVA transformer complete with upstream local disconnect switch. Provide warning sign instructing Operation to ensure transfer switch shall be on close position all times; open only during maintenance if needed.
- .18 Transformer secondary shall be wired to:
- .1 200 amp 120/208 three phase combination panel with main circuit breaker, wired to the following.
 - .2 Interior LED fixtures.
 - .3 Minimum three duplex receptacles distributed within the enclosure for convenient service use.
 - .4 Block heater wiring.
 - .5 Battery charger wiring.
 - .6 Back-up Heaters: Two 10KW fan forced heaters with thermostat. Units to run in the event that the primary heaters fail
 - .7 Two exterior LED lights with photocell and motion sensors
 - .8 One battery pack emergency lighting c/w two LED lamp heads and additional two remote LED lamp heads installed on the opposite wall
 - .9 One exit sign.
 - .10 Provide 20% additional spare circuit breakers with a minimum one spare 3P, 15A.
 - .11 All wiring shall be surface-mount EMT conduit.
- .19 Paint: All surfaces cleaned to SSPC-SP1, all seams sealed, primed with epoxy primer. The exterior shall be top coated with semi-gloss polysiloxane paint. Shop Drawings shall present Colour choices available for main colour and for trim colours.
- .20 Exhaust System: Manufacturer to supply and install a super critical pancake muffler inside the enclosure c/w mounting bands, discharge elbow, and raincap. Muffler shall be insulated with high temperature removable blankets.

- .21 Certification: Enclosure shall have a CSA label. All welding of enclosure shall be to CSA W59. Enclosure shall be CSA A660 certified.
- .22 Equipment Install: Install of client supplied genset, spring isolators and battery charger.
- .23 Freight: FOB project site at Town of Inuvik, Northwest Territories
- .24 Sub-Base Main Storage Tank: 3,218 Litre (850 US gallons) ULC-S601, 921mm deep double wall fuel tank. The tank shall be constructed of corrosion resistant steel and shall be UL listed. The equipment, as installed, shall meet all local and regional requirements for above ground tanks. The tank shall contain an integral fuel pump and be provided with On/Off/Emergency Run Switch, Test/Reset Switch, AC Circuit Breaker, DC Circuit Breaker, and Indicator lamps. Tank to be complete with the following options:
 - .1 2" fill
 - .2 2" vent c/w whistle (piped to exterior)
 - .3 2" level gauge
 - .4 2" low fuel contact – 30%
 - .5 2" high fuel alarm float – 90%
 - .6 1" supply with check valve
 - .7 Emergency vent
 - .8 1" return
 - .9 Secondary Emergency vent
 - .10 2" leak detection floats
 - .11 Two 2" spares
 - .12 Tank is pressure tested to 3 psi.
 - .13 Remote fuel fill exterior station complete with level indication lights.
 - .14 Connections for heaters.
- .25 The building shall have an opening suitable to accommodate for the power cables. The supplier shall provide instructions on power routing into the generator building. The generator ducts are as follows:
 - .1 4X78 mm DB-2 with:
 - .1 Two ducts used for Utility Power to Generator Building

- .2 Two ducts used for power feed from generator building to existing service MDP

- .26 Building shall be equipped with a warning sign the door; at minimum warning sign shall read "DANGER – EQUIPMENT IN THIS ROOM STARTS AND STOPS AUTOMATICALLY" and "PERSONAL PROTECTION EQUIPMENT REQUIRED" or as specified by the Owner's Representative. Use porcelain enamel signs, minimum 175 x 250 mm size.

1.5 Generator System Description

- .1 Refer to the project electrical drawing E02 Single Line Diagram for further information and requirements.
- .2 System shall include automatic transfer equipment (located within the new generator building), batteries and chargers as required, automatic room ventilation control, fuel supply control, metering, alarms and control relays, and exhaust system.
- .3 System designed to operate as standby power, unattended, in remote location.
- .4 System includes all auxiliaries and shall be suitable for installation in Inuvik, Northwest Territories.
- .5 Generating system consists of:
 - .1 Diesel engine.
 - .2 Alternator.
 - .3 Alternator control panel.
 - .4 Automatic transfer equipment.
 - .5 Battery charger and battery.
 - .6 Automatic engine room ventilation system.
 - .7 Fuel supply system.
 - .8 Exhaust system.
 - .9 Tank, Dual Wall Sub-Base as specified herein.
 - .10 Steel mounting base.
 - .11 Set operation including:

- .1 Automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
- .2 Manual starting.
- .12 Automatic shut down and alarm on:
 - .1 Overcrank/fail to start.
 - .2 Overspeed.
 - .3 High engine temp.
 - .4 Low lube oil pressure.
 - .5 Electrical Fault (external).
 - .6 Alternator overvoltage.
 - .7 Lube oil high temperature.
 - .8 Over temperature on alternator.
- .13 Manual emergency stop.

1.6 Submittals

- .1 Submit one (1) electronic copy in PDF format of shop drawings for review. An electronic copy of the reviewed shop drawing will be returned to the Supplier.
- .2 Submit a copy of this specification section with each paragraph check-marked to indicate compliance, or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
- .3 Submit shop drawings with a transmittal letter which identifies:
 - .1 Date and revision dates.
 - .2 Project title.
 - .3 Contract title.
 - .4 Number of each shop drawing.
 - .5 Supplier's pertinent data.
- .4 Shop Drawings will be returned to the Supplier with one of the following notations:

- .1 When stamped "REVIEWED - NO COMMENT", distribute additional copies as required for execution of the Work.
- .2 When stamped "REVIEWED - AS NOTED", ensure that all copies for use are modified and distributed, same as specified for "REVIEWED - NO COMMENT".
- .3 When stamped "REVIEWED - REVISE AND RESUBMIT", make the necessary revisions, as indicated, and submit again for review.
- .5 Only Shop Drawings stamped "REVIEWED – NO COMMENT" or "REVIEWED - AS NOTED" shall be used on the Work unless otherwise authorized by the Owner's Representative.
- .6 After submittal is stamped "REVIEWED – NO COMMENT" or "REVIEWED - AS NOTED", no further revisions are permitted unless re-submitted to the Owner's Representative for further Review.
- .7 Any adjustments made on Shop Drawings by the Owner's Representative are not intended to change the Contract Price. If it is deemed that such adjustments affect the Contract Price, clearly state as such in writing prior to proceeding with fabrication and installation of work.
- .8 Make changes in shop drawings which the Owner's Representative may require consistent with Contract Documents. When re-submitting, notify the Owner's Representative in writing of any revisions other than those requested by the Owner's Representative.

1.7 Product Data

- .1 Submit the following information:
 - .1 Engine: make and model, with performance curves.
 - .2 Alternator: make and model.
 - .3 Voltage regulator: make, model and type
 - .4 Battery: make, type and capacity.
 - .5 Battery charger: make, type and model.
 - .6 Alternator control panel: make and type of meters and controls.
 - .7 Governor type and model.
 - .8 Cooling air requirements in m³/s.
 - .9 British standard or DIN rating of engine.

- .10 Flow diagrams for:
 - .1 Diesel fuel.
 - .2 Cooling air.
- .11 Dimensioned drawing showing complete generating set mounted on steel base, including vibration isolators, exhaust system, drip trays, and total weight.
- .12 Continuous full load output of set at 0.8 PF lagging.
- .13 Illustrated parts lists with parts catalogue numbers.
- .14 Schematic diagram of electrical controls.
- .15 Flow diagrams for:
 - .1 Fuel system.
 - .2 Lubricating oil.
 - .3 Cooling system.
- .16 Certified copy of factory test results.
- .17 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

1.8 Operation and Maintenance Data

- .1 Submit Operation and Maintenance Data that include:
 - .1 Manufacturer's name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list with names and addresses.
- .2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier and:
 - .1 Operation and maintenance instructions for engine, alternator, control panel, battery charger, battery, fuel system, exhaust system and accessories, to permit effective operation, maintenance and repair.
 - .2 Maintenance and overhaul instructions and schedules.
 - .3 Daily/ monthly and annual instructions and checklists required for proper maintenance.

1.9 Spare Parts

- .1 Provide maintenance materials in accordance with Section 01 77 00 – Closeout Procedures.
- .2 Include:
 - .1 Two (2) lube oil filter replacement elements.
 - .2 Two (2) liters lube oil.
 - .3 Two (2) replaceable cartridge filters for fuel system.
 - .4 Two (2) air cleaner filter elements.
 - .5 Four (4) liters antifreeze (ethylene glycol).
 - .6 Two (2) spare sets of fuses and indicating lights for the installation equipment including but not limited to control panel, transfer switch, battery charger etc.
 - .7 Special tools for standard unit servicing.

1.10 Warranty

- .1 Provide a 5 year basic power warranty; travel, parts and labor.

2. PRODUCTS

2.1 Diesel Engine

- .1 Diesel engine: to ISO 3046-1.
 - .1 Engine: standard product of current manufacture, from a company regularly engaged in production of such equipment.
- .2 Turbocharged, synchronous speed 1800 r/min.

2.2 Capacity

- .1 Rated continuous power in kW at rated speed, after adjustment for system losses in auxiliary equipment necessary for engine operation; to be calculated as follows: Rated continuous output = Generator kW divided by Generator efficiency at full load under following conditions:
 - .1 Altitude: 15 m.
 - .2 Ambient temperature: from - 40°C to +70°C (- 40°F to +158°F).
 - .3 Relative humidity: 50 %.

- .2 Engine capacity to deliver 100% load continuously for the duration of the power failure.

2.3 Performance

- .1 Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
- .2 Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.5%.
- .3 The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
- .4 The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 50.
- .5 The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

2.4 Connections

- .1 Unit shall be complete with load circuit breaker as shown on the electrical single line diagram drawings and another additional circuit breaker for load bank testing.
- .2 The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
- .3 Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.
- .4 Generator set control interfaces to other system components shall be made on a permanently labelled terminal block assembly. Labels describing connection point functions shall be provided

2.5 Construction

- .1 The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

- .2 All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

2.6 Cooling System

- .1 Liquid cooled: heavy duty industrial radiator mounted on generating set base with engine driven pusher type fan to direct air through radiator from engine side, with ethylene glycol anti-freeze.
- .2 To maintain manufacturer's recommended engine temperature range at 100% continuous load in ambient temperature of 40 degrees C.
- .3 Block heater: thermostatically controlled lube oil or liquid coolant heater to allow engine to start in room ambient 10 degrees C.
- .4 Fuel:
 - .1 Diesel Grade 2: to CAN/CGSB-3.6.
- .5 Fuel system: direct injection, mechanical fuel transfer pump , fuel filters and air cleaner, fuel rack solenoid energized when engine running.

2.7 Governor

- .1 Electronic type, electric actuator, speed droop externally adjustable from isochronous to 5%, temperature compensated with steady state speed maintenance capability of plus or minus 0.25%.
- .2 Governor to be compatible with the use of variable frequency drives (pulse width modulated type).

2.8 Lubrication System

- .1 Pressure lubricated by engine driven pump.
- .2 Lube oil filter: replaceable, full flow type, removable without disconnecting piping.
- .3 Lube oil cooler.
- .4 Engine sump drain valve.
- .5 Oil level dip-stick.

2.9 Starting System

- .1 Positive shift, gear engaging starter 24V dc.

- .2 Cranking limiter to provide 3 cranking periods of 10s duration, each separated by 5s rest.
- .3 Lead acid, 24V storage battery with sufficient capacity to crank engine for 1 minute at 0 degrees C without using more than 25% of ampere hour capacity.
- .4 Battery charger: constant voltage, solid state, four- stage from trickle charge at standby to boost charge after use. Regulation: plus or minus 1% output for plus or minus 10% input variation. Equipped with dc voltmeter, dc ammeter and on-off switch.

2.10 Vibration Isolation

- .1 Vibration isolated engine instrument panel to be provided with:
 - .1 Lube oil pressure gauge.
 - .2 Lube oil temperature gauge.
 - .3 Coolant temperature gauge.
 - .4 Running time meter: non-tamper type.
 - .5 Guards to protect personnel from hot and moving parts. Locate guards so that normal daily maintenance inspections can be undertaken without their removal.
 - .6 Drip tray.

2.11 Alternator

- .1 The alternator shall be synchronous type, single bearing, brushless, self-ventilated, of drip-proof construction with amortisseur rotor windings and skewed for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-22.40 and 16.40), Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Maximum temperature rise of the rotor and stator at full load to be 105 degrees C.
- .2 The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within +/- 2% at any constant load from 0% to 100% of rating. The regulator must be isolated to prevent tracking when connected to PWM variable speed drive loads, and provide individual adjustments for voltage range, stability, and volts-per-hertz operations.
- .3 Rating: 3 phase, 347/600 V, 4 wire, 60 hz, output 500 kW at 0.8 PF.
- .4 Output at 40 degrees C ambient:
 - .1 100% full load continuously.
- .5 Dynamically balanced rotor permanently aligned to engine by flexible disc coupling.
- .6 Exciter: PMG source controlled by automatic voltage regulator.

- .7 NEMA class H insulation on windings.
- .8 Voltage regulator: thyristor controlled rectifiers with phase controlled sensing circuit:
- .9 Alternator: capable of sustaining 300% rated current for period not less than 10s permitting selective tripping of down line protective devices when short circuit occurs.

2.12 Control Panel

- .1 Totally enclosed, mounting base isolated from diesel generator.
- .2 Instruments:
 - .1 Digital back lit LCD or LED, 100% solid state circuitry or dial indicating type 2% accuracy, rectangular face, flush panel mounting:
 - .1 Voltmeter: ac, scale 0 to 750 V.
 - .2 Ammeter: ac, scale 0 to 800 A.
 - .3 Frequency meter: scale 55 to 65 Hz.
 - .2 Voltmeter selector switch, rotary, panel mounting, seven position "Off-Phase A-Phase B-Phase C" and "Phase AB, Phase BC, Phase CA".
 - .3 Ammeter selector switch, rotary, maintained contacts, panel mounting, designed to prevent opening of current circuits, four position labelled "OFF- Phase A-Phase B-Phase C".
 - .4 Instrument Transformers
 - .1 Potential-dry type for indoor use:
 - .2 Ratio: 600 to 120.
 - .3 Rating: 600 V, 60 Hz
 - .4 Current-dry type for indoor use:
 - .1 Ratio: as recommended by manufacturer.
 - .2 Rating: 600 V, 60 Hz.
 - .3 Positive action automatic short-circuiting device in secondary terminals.
- .3 Controls:
 - .1 Engine start button.

- .2 Selector switch: Off-Auto-Manual. Alarm to sound when not in Auto.
- .3 Engine emergency stop button and provision for remote emergency stop button.
 - .1 Alternator output breaker:
 - .1 Generator Supplier will provide alternator machine characteristics (ratios, synchronous reactance, X"d) to permit proper setting of the breaker. The breaker will be equipped with a solid state tripping relay with Long, Short, Instantaneous and Ground Fault functions
 - .2 Voltage control rheostat: mounted on inside of control panel.
 - .3 Solid state indicator lights for alarm with manually reset NO/NC contacts wired to terminal block for remote annunciation on:
 - .1 Low fuel level (from sub base tank, provided by generator supplier).
 - .2 Low / High battery voltage (from battery charger provided by generator manufacturer.)
 - .3 Ventilation failure (from an external device by others).
 - .4 Low coolant temperature (from unit mounted thermostat provided by generator manufacturer).
 - .4 Solid state controller for automatic shutdown and alarms with one set manually reset NO/NC contacts wired to terminal block for remote annunciation on:
 - .1 Engine over-crank / failed to start.
 - .2 Engine pre-high temperature alarm
 - .3 Engine low lube oil pressure alarm (locked out when starting or stopped).
 - .4 Genset common fault alarm
 - .5 Genset running
 - .6 Genset not in Auto
 - .7 DC System common alarm as indication of Low batteries or troubled DC charger conditions
 - .8 Tank fuel low level and high level alarms

- .9 Electrical Fault (from external breaker)
- .10 AC over voltage (from internal device)
- .5 Lamp test button.
- .1 Provide auxiliary relay board with Form C NO/NC contacts for each of the following:
 - .1 Engine over-crank / failed to start.
 - .2 Engine pre-high temperature alarm
 - .3 Engine low lube oil pressure alarm (locked out when starting or stopped).
 - .4 Genset common fault alarm
 - .5 Genset running
 - .6 Genset not in Auto
 - .7 90% Fuel Level
 - .8 30% Fuel Level

2.13 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.
- .2 Control panel:
 - .1 Size 4 nameplates for controls including alternator breakers and program selector switch.
 - .2 Size 2 nameplates for meters, alarms, indicating lights and minor controls.

2.14 Fabrication

- .1 Shop assemble generating unit including:
 - .1 Base and vibration isolators.
 - .2 Engine and radiator.
 - .3 Alternator.
 - .4 Control panel.

- .5 Battery and charger.

2.15 Finishes

- .1 Alternator control cubicle: paint inside, exterior to match engine and alternator.
- .2 Ducts and racks grey.
- .3 Supply 0.25L of grey touch-up enamel.

2.16 Source Quality Control

- .1 Tests at Factory:
 - .1 The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.
 - .2 Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.
- .2 Demonstrate:
 - .1 Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.

2.17 Automatic Transfer System

- .1 Refer to Sections 26 24 02 - Service Entrance Board and to Section 26 36 23 Automatic Load Transfer Equipment.

2.18 Manufacturer

- .1 Generator shall be Cummins, 450 kW, PMG excitation, Alternator Temp rise 105 degree C or approved equivalent.

3. EXECUTION

3.1 Field Testing and Start-up

- .1 Provide services for start-up, inspection, and completing performance testing.
- .2 Provide field testing procedure for approval by Owner's Representative before testing occurs.

- .3 Fuel for all testing shall be provided by the Contractor. At completion of all field testing, the fuel tank shall be topped up to 100%. All fuel costs shall be borne by the Contractor.

3.2 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 01 – Electrical General Requirements.
- .2 Notify Consultant 10 working days in advance of test date.
- .3 Provide fuel for testing and leave full tank on acceptance.
- .4 Provide load testing bank equipment required and all accessories required to performing the field testing described hereinafter.
- .5 Demonstrate:
 - .1 Unit start, transfer to load, retransfers to normal power, unit shut down, on "Automatic" control.
 - .2 Unit start and shut down on "Manual" control
 - .3 Unit start and transfer on "Test" control.
 - .4 Unit start on "Engine start" control.
 - .5 Operation of automatic alarms and shut down devices.
 - .6 With 100% rated load, operate set for 4 h, taking readings at 30 min intervals, and record following:
 - .1 Time of reading.
 - .2 Running time.
 - .3 Ambient temp in degrees C.
 - .4 Lube oil pressure in kPa.
 - .5 Lube oil temp in degrees C.
 - .6 Engine coolant temp in degrees C.
 - .7 Exhaust stack temp in degrees C.
 - .8 Alternator voltage: phase 1, 2, and 3.
 - .9 Alternator current: phase 1, 2, and 3.
 - .10 Power in kW.

- .11 Frequency in Hz.
- .12 Power Factor.
- .13 Battery charger current in A.
- .14 Battery voltage.
- .15 Alternator cooling air outlet temp.
- .7 After completion of 4 hours run, demonstrate following shut down devices and alarms:
 - .1 Overcranking.
 - .2 Overspeed.
 - .3 High engine temp.
 - .4 Low lube oil pressure.
 - .5 Short circuit.
 - .6 Alternator overvoltage.
 - .7 Low battery voltage, or no battery charge.
 - .8 Manual remote emergency stop.
- .6 Run unit on load for minimum period of 4 hours using portable load bank to provide 100% load, to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling.
- .7 Reconnect to building load. Open building main breaker to simulate a power fail condition and prove operation of transfer system, automatic starting of generator set and load acceptance, run on actual building load for minimum 1 hour.
- .8 At conclusion of building load test, restore main utility power by re-closing main breaker. Demonstrate automatic time delay and return to normal power, generator cool down and shutdown, and reset to ready condition.
- .9 At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.

3.3 Service and Support

- .1 The manufacturer of the generator set shall maintain service parts inventory at a central location.

- .2 Manufacturer to supply names of nearest service locations that have spare parts and trained service personnel.
- .3 The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

END OF SECTION

1. GENERAL

1.1 Description

- .1 Materials, components and installation for electric power generating equipment and system start-up.
- .2 Standby generator has been pre-ordered by Owner. See Appendix B of these specifications for generator information.

1.2 Related Sections

- .1 Section 26 05 01 – Electrical General Requirements.
- .2 Section 01 79 00 – Training
- .3 Section 26 32 13.01 – Power Generation Diesel
- .4 Section 26 36 23 – Automatic Load Transfer Equipment.

1.3 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-B139-00(October 2001), Installation Code for Oil-Burning Equipment.
- .2 Underwriters' Laboratories of Canada (ULC)

1.4 Qualifications

- .1 Provide proof of diesel electric technician qualification to the Owner's Representative.

1.5 System Start-Up

- .1 Preparation: before starting unit, carry out thorough mechanical and electrical inspection of equipment, and perform following checks and adjustments:
 - .1 Disconnect battery cables from batteries to prevent accidental starting.
 - .2 Turn engine several revolutions by means of hand-barring devices to ensure parts are free and there are no obstructions to its running.
 - .3 Check engine/generator alignment readings to ensure they match readings attained at time of manufacture.
 - .4 Check fluid levels and top up as necessary. Pre-lubricate engine and turbochargers as recommended by engine manufacturer. Install drip pan beneath engine.

- .5 Ensure cooling system antifreeze is effective to at least minus 40 degrees C and filled with ethylene glycol.
- .6 Check belts for correct tension and adjust as necessary.
- .7 Check and grease all grease points.
- .8 Check and tighten properly nuts, bolts, etc.
- .9 Ensure safety guards are in place and properly secured.
- .10 Check linkages for damage and freedom of movement.
- .11 Check fuel supply system for leakage.
- .12 Ensure fuel supply and fuel injection systems are properly primed.
- .13 Check and tighten properly electrical connections.
- .14 Check starting battery electrolyte level and specific gravity and for proper installation.
- .15 Check battery charger for proper operation and adjust as necessary.
- .16 Carry out generator winding insulation resistance test. If reading is unacceptable, carry out recognized drying procedure. Do not start unit until satisfactory reading has been achieved.
- .17 Check jacket coolant heater for proper operation.
- .18 Complete additional preparations deemed necessary.
- .2 Performance verification: on completion of start-up preparations, take following action:
 - .1 Have at hand, during initial start-up, means for choking off air supply to engine air induction manifold in event of engine run away or other emergency.
 - .2 Reconnect starting battery cables to starting battery.
 - .3 Start unit and allow to warm up. Stop unit if abnormal conditions are encountered.
 - .4 Check for and correct leakage from exhaust system, fuel system, cooling system, and lubricating oil system.
 - .5 Adjust vibration isolators.
 - .6 Observe and ensure that lubricating oil pressure and coolant temperature are within limits and no harmful vibration or sounds are evident.

- .7 Ensure voltage is within operating parameters and automatic voltage regulator is operating correctly.
- .8 Ensure manual voltage control is operating correctly.
- .9 Ensure frequency is within operating parameters and electronic governor is operating correctly.
- .10 Check engine air ventilation system for proper operation.
- .11 Check operation of engine-mounted protective sensing devices and adjust as necessary.
- .12 Check phase sequence of normal power supply and ensure emergency power supply are in same sequence.
- .13 Check operation of electronic controller protection, transfer, timing, metering, and annunciator functions and adjust as necessary.
- .14 Check operation and calibration of analog metering and adjust as necessary.
- .15 Apply electrical load, read the meters, and correlate these readings.
- .16 Demonstrate:
 - .1 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "automatic" control.
 - .2 Unit start, transfer to load, retransfer to normal power, unit shutdown, on "full load test" control. Unit start and shutdown, on "no load test" control.
 - .3 Unit cranking, start, and shut down by means of engine-mounted key switch.
 - .4 Run unit on load for minimum period of 4 hours to show load-carrying capability, stability of voltage and frequency, and satisfactory performance of engine ventilating system to provide adequate cooling.
 - .5 Every 1/2 hour carry out and record readings on Test Chart.
- .17 Perform additional tests as required by the Owner's Representative to ensure unit is operating satisfactorily.

2. PRODUCTS

2.1 Materials

- .1 Provide following materials:
 - .1 Conduits and boxes as required.
 - .2 Copper fuel lines and fittings as required.
 - .3 ULC automatic fire shut-off valve.
 - .4 Primary fuel filter/water separator.
 - .5 Insulation for exhaust system.
 - .6 Electrical components as indicated.
 - .7 Wiring material.
 - .8 Antifreeze, propylene glycol.
 - .9 Diesel fuel; storage and day tank initial fill, plus top-up after testing.
 - .10 All wiring and materials, including necessary rigid and flexible steel conduits and fittings for making connections.
 - .11 The control circuit cables will not be less than No. 14, RW90, multiple conductors, colour or number coded.
 - .12 Electronic governor control cable shall be minimum size No. 18 stranded copper conductor, shielded complete with drain wire and overall PVC jacket.
 - .13 Battery cable shall be welding cable type, extra flexible, rope stranded copper conductor with neoprene oil-resistant insulation, sized to limit voltage drop to 5% at time of peak load.

3. EXECUTION

3.1 Installation

- .1 Coordinate provision of start-up services, inspection, and performance testing with Supplier. Field testing procedure to be submitted by Supplier and approved by Owner's Representative before testing is to occur.
- .2 Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labelling of UL listed products.

- .3 Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The Contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- .4 Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- .5 Equipment shall be initially started and operated by representatives of the manufacturer.
- .6 All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

3.2 Locating and Mounting

- .1 Locate unit as indicated.
- .2 Fit and adjust isolators in accordance with manufacturer's installation and adjustment instruction bulletin contained in unit manual.
- .3 Do not bolt housings to foundation if isolator housing feet are equipped with 6 mm rubber sound pads.

3.3 Alignment Check

- .1 Since Engine-generator shaft alignment is adjusted at factory, check to ensure that no change has occurred due to shipment and handling.
- .2 Where engine and generator housings are close coupled and instruments at hand are not suitable for measuring alignment within confines of housings, just loosen engine and generator hold down bolts and ensure that each foot is carrying proportionate amount of weight and feet are level on base plate.

3.4 Fuel Supply System

- .1 Install fuel tanks in accordance with CAN/CSA-B139.
- .2 Inspect thoroughly fuel tank and lines to ensure they are clean and free of foreign material before connecting fuel system.
- .3 Install primary fuel filter/water separator and servicing shut-off valves as indicated. Provide 3 spare filter elements.
- .4 Install ULC automatic fire shut-off valve. Locate upstream of any combustible fuel system component.

- .5 Install supply and return fuel lines between engine and fuel day tank. Install flexible sections between the engine and fixed end of fuel lines from fuel tank, using materials supplied with unit.
- .6 Hard drawn copper pipe joints to be brazed or silver soldered.
- .7 Brazing or soldering alloys to have minimum melting point of 450 degrees C.
- .8 Neatly install fuel lines parallel or perpendicular to building lines with no kinks or dents.
- .9 Install soft drawn copper fuel lines using brass 45 degrees flare and pipe fittings as required and bend with correct size lever type bending tool. Entirely replace leaking fuel lines.
- .10 Protect fuel lines from mechanical damage.

3.5 Batteries and Charger

- .1 For dry charged batteries, activate in accordance with manufacturer's instructions in the unit manual prior to installation.
- .2 For wet batteries, inspect individually each battery cell and check electrolyte level. Check charge condition by measuring temperature and specific gravity of electrolyte. Consult manufacturer's instructions for recommended readings. If readings are lower, give batteries freshening charge until reading are reached.
- .3 Locate batteries as indicated and ensure that batteries are accessible for service. Run and protect cables to starting motor using cables supplied with unit.
- .4 Install battery charger on wall, adjacent to batteries and make connection to batteries.
- .5 Clean connections and tighten securely.
- .6 Install removable plexiglass cover on batteries.

3.6 Exhaust System

- .1 Install exhaust pipe and silencer using material supplied with unit.
- .2 Arrange silencer above and approximately in line with engine exhaust manifold with exhaust tail pipe protruding through thimble in wall.
- .3 Extend tail pipe not less than one metre beyond outside wall.
- .4 Support silencer with hangers so no weight or stress is applied to engine exhaust manifold or turbocharger.
- .5 Install flexible exhaust pipe between silencer and manifold.

- .6 Install exhaust system fireproof insulating material, after test run.
 - .1 Removable fibreglass jacket insulation rated for 650 degrees C with stainless lacing hooks and wires.
 - .1 Jacket to be enclosed on inside by stainless steel mesh with outside cover silicone coated or aluminized fibreglass cloth: to USCG approved Non-Combustible Materials No. 164.009 and TCMS Non-Combustible Materials - Certificate No. F3-Series.
 - .2 Calcium Silicate removable insulation rated for 650 degrees C with exterior stainless steel protective cover and fastenings.

3.7 Cooling and Ventilation

- .1 Install air outlet and inlet louvres and hoods in their respective openings.
- .2 Install louvre motors and linkages, adjust to ensure louvres are tight in closed position and give free damper movements from fully closed to fully open.
- .3 Where canvas boot is not provided, maintain 13 mm clearance between radiator and air outlet duct.
- .4 Mount thermostat in strategic position, away from inlet louvre or as indicated.
- .5 Install conduits and junction boxes and make connections from louvre motors to thermostat and to 120/24 V AC transformer.
- .6 Fill engine radiator with water/ethylene glycol antifreeze mix good for -40 degrees C.
- .7 Install remote radiator including piping, valves, fittings and pumps as indicated.

3.8 Control and Transfer Panel

- .1 Locate panels as indicated.
- .2 Make control and power circuit connections as indicated.
- .3 Identify cables at both ends.
- .4 Tag with slip-on wire maker, each wire end with number corresponding to number in panel.
- .5 Make terminations with self-insulated terminals of flanged fork or ring type.

3.9 Additional Works

- .1 Complete any additional work as instructed by the Owner's Representative to:

- .1 Ensure equipment is safe to operate.
- .2 Provide complete and operating system.

3.10 Field Quality Control

- .1 Qualified diesel electric technician to: inspect and verify that installation of interruptible power unit is acceptable and complete. Provide inspection report to the Owner's Representative.

3.11 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 01 – Electrical General Requirements.
- .2 Notify the Owner's Representative 10 working days in advance of test date.
- .3 Provide fuel for testing and leave full tanks on acceptance.
- .4 Demonstrate:
 - .1 Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.
 - .2 Unit start and shut down on "Manual" control
 - .3 Unit start and transfer on "Test" control.
 - .4 Unit start on "Engine start" control.
 - .5 Operation of automatic alarms and shut down devices.
- .5 Run unit on load for minimum period of 4 hours using portable load bank, provided by Contractor, to provide 100% load, to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling. With 100% rated load, operate set for 4 h, taking readings at 30 min intervals, and record following:
 - .1 Time of reading.
 - .2 Running time.
 - .3 Ambient temp in degrees C.
 - .4 Lube oil pressure in kPa.
 - .5 Lube oil temp in degrees C.
 - .6 Engine coolant temp in degrees C.

- .7 Exhaust stack temp in degrees C.
- .8 Alternator voltage: phase 1, 2, and 3.
- .9 Alternator current: phase 1, 2, and 3.
- .10 Power in kW.
- .11 Frequency in Hz. Power Factor.
- .12 Battery charger current in A.
- .13 Battery voltage.
- .14 Alternator cooling air outlet temp.
- .15 After completion of 4 hours run, demonstrate following shut down devices and alarms:
 - .1 Overcranking.
 - .2 Overspeed.
 - .3 High engine temp.
 - .4 Low lube oil pressure.
 - .5 Short circuit.
 - .6 Alternator overvoltage.
 - .7 Low battery voltage, or no battery charge.
 - .8 Manual remote emergency stop.
- .6 Reconnect to building load. Open building main breaker to simulate a power fail condition and prove operation of transfer system, automatic starting of generator set and load acceptance, run on actual building load for minimum 1 hour.
- .7 At conclusion of building load test, restore main utility power by re-closing main breaker. Demonstrate automatic time delay and return to normal power, generator cool down and shutdown, and reset to ready condition.
- .8 At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.

3.12 Demonstration and Training

- .1 As directed by the Owner's Representative and in accordance with Section 01 79 00. Carry out demonstrations of complete interruptible power unit.
- .2 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 Provide fuel required for performing diesel-generator Work Site test and top-up after acceptance test completion.

END OF SECTION

1. GENERAL

1.1 Description

- .1 Materials and installation for automatic load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator unit, transfer loads and shut down standby unit.

1.2 Related Sections

- .1 Section 26 05 01 – Electrical General Requirements.
- .2 Section 01 33 00 – Submittal Procedures.
- .3 Section 01 77 00 – Closeout Procedures

1.3 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN3 C13 M83 (R1998), Instrument Transformers.
 - .2 CSA C22.2No.178 1978 (R2001), Automatic Transfer Switches.
- .2 American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA ICS 2 2000, Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

1.4 System Description

- .1 Automatic load transfer equipment to:
 - .1 Monitor voltage on all phases of normal power supply.
 - .2 Initiate start-up of standby generator unit on normal power failure or abnormal voltage on any one phase below pre-set adjustable limits for adjustable period of time.
 - .3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.
 - .4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on all phases above adjustable pre-set limit for adjustable time period.

- .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.

1.5 Shop Drawings and Product Data

- .1 Submit in accordance with Section 26 05 01 – Electrical General Requirements.
- .2 Include in shop drawings:
 - .1 Make, model and type.
 - .2 Single line diagram showing controls and relays.
 - .3 Description of equipment operation including:
 - .1 Automatic starting and transfer to standby unit and back to normal power.
 - .2 Test control.
 - .3 Manual control.
 - .4 Automatic shutdown.

1.6 Operations and Maintenance Information

- .1 Provide operation and maintenance data for automatic load transfer equipment to Installing Contractor and Owner's Representative.
- .2 Detailed instructions to permit effective operation, maintenance and repair.
- .3 Technical data:
 - .1 Schematic diagram of components controls and relays.
 - .2 Illustrated parts lists with parts catalogue numbers.
 - .3 Certified copy of factory test results.

2. PRODUCTS

2.1 Materials

- .1 Instrument transformers: to CAN3 C13.
- .2 Contactors: to ANSI/NEMA ICS2.

2.2 Contactor Type Transfer Equipment

- .1 Contact Type Transfer Equipment: to CSA C22.2No.178.
- .2 Two 3 phase contactors mounted on common frame, in double throw arrangement, mechanically, motor or solenoid operated, open type, installed in stand-alone enclosure.
- .3 Rated: 600V, 60 Hz, 600 A. 3 PH. 4 P, overlapping neutral, solidly grounded.
- .4 Main contacts: silver surfaced, protected by arc disruption means including separate arcing contacts, arc splitters and blow out coils for load current.
- .5 Switch and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel without removal of switch panel or disconnection of drive linkages and power conductors.
- .6 Auxiliary contact: silver plated, to initiate emergency generator start up on failure of normal power.
- .7 Fault withstand rating: min 65 kA symmetrical for 3 cycles.
- .8 Lever to operate switch manually.

2.3 Controls

- .1 Selector switch two position "Test" and "Auto".
 - .1 Test position Normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.
 - .2 Auto position Normal operation of transfer switches on failure of normal power; retransfers on return of normal voltage and shuts down engine.
- .2 Control transformers: dry type with 120V secondary to isolate control circuits from:
 - .1 Normal power supply
 - .2 Standby power supply
- .3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:
 - .1 Voltage sensing: 3 phase for normal power and on one phase only for standby, solid state type, adjustable drop out and pick up, close differential, 2V minimum under voltage and over voltage protection.
 - .2 Time delay: normal power to standby, adjustable solid state, 5 to 180s.

- .3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 3 to 20s delay.
- .4 Time delay on retransfer from standby to normal power, adjustable 20s to 10 mins.
- .5 Time delay for engine cool off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20s intervals to 10 min.
- .6 Either:
 - .1 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5s intervals to 180s; or
 - .2 Solid state, in-phase transfer controller to initiate high speed transfer when normal and emergency supplies are synchronous;
 - .3 Indicate on the shop drawings which of the above standards are met.
- .7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches pre-set adjustable values.

2.4 Accessories

- .1 Pilot lights to indicate power availability normal and standby, switch position, green for normal, red for standby.
- .2 Isolated auxiliary contacts or relays to provide 2 N.O. and 2 N.C. contacts for remote status for each of the following:
 - .1 Transfer switch in normal position
 - .2 Transfer switch in emergency position
 - .3 Normal Power Available
 - .4 Standby Power Available
 - .5 Transfer switch not in Auto
 - .6 Auxiliary Power Failure outputs

2.5 Equipment Identification

- .1 Provide equipment identification in accordance with Section 26 05 01 – Electrical General Requirements.

- .2 Control panel:
 - .1 For selector switch and manual switches, meters, indicating lights, and minor controls.

2.6 Manufacturer

- .1 Equipment specifications for this equipment are microprocessor-based transfer switch manufactured by Emerson Asco Electric Model 300 series or approved equivalent.

2.7 Source Quality Control

- .1 Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.
- .2 Notify the Owner's Representative 7 days in advance of date of factory test.
- .3 Tests:
 - .1 Operate equipment both mechanically and electrically to ensure proper performance.
 - .2 Check selector switch, in modes of operation Test, Auto, and record results.
 - .3 Check voltage sensing and time delay relay settings.
- .4 Check:
 - .1 Automatic starting and transfer of load on failure of normal power.
 - .2 Retransfer of load when normal power supply resumed.
 - .3 Automatic shutdown.
 - .4 In phase monitor operation.

3. EXECUTION

3.1 Installation

- .1 Provide transfer equipment installed in stand-alone enclosure.
- .2 Check relays and solid state monitors and adjust as required.
- .3 Install and connect remote alarms.

3.2 Field Quality Control

- .1 The Supplier shall assist the Installing Contractor in start-up, testing, and commissioning. Specific testing required of the Supplier includes;
 - .1 Perform tests and provide test records in accordance with Section 26 05 01 – Electrical General Requirements.
 - .2 Energize transfer equipment from normal power supply.
 - .3 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.
 - .4 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 min, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

3.3 Training

- .1 Upon installation completion, provide demonstration and instruction training session in accordance with section 01 79 00 Systems Demonstrations (Start and Commissioning).

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Supply and install lighting fixtures complete with lamps, ballasts and all fittings.

1.2 Code Requirements

- .1 Installation of lighting equipment to conform to Section 30, Canadian Electric Code, Part 1, and as amended or supplemented by provincial, municipal or other regulatory agencies having jurisdiction.

1.3 Shop Drawings

- .1 Submit complete list of types of lighting fixtures, lamps, ballasts and accessories with catalogue illustrations, data sheets, etc. for review.
- .2 Submit complete photometric data, based on actual fixtures proposed for project. Substantiate brightness and efficiency requirements. Photometric data must be produced by recognized independent laboratory.

2. PRODUCTS

2.1 Materials

- .1 Provide only lighting fixtures which are structurally well designed and constructed and which use new parts and materials of highest commercial grade available.
- .2 Use cadmium plated chains for suspended fixtures in unfinished areas.

2.2 Lamps

- .1 LED lamps: input watts and lumen output as per individual fixture specification. Color temperature, 3500K, dimmable integral driver.

2.3 Luminaire Requirements

- .1 All fixtures will be required to meet the testing and documentation requirements as described below. Include for additional testing in accordance with the referenced IES standards if required.
- .2 All linear luminaires to have photometric data in accordance with IES LM-79 "Electrical and Photometric Measurements of Solid State Lighting Products".
- .3 The LED's to be tested and have test results in accordance with IES LM-80 "Measuring Lumen Maintenance of LED Light Sources".
- .4 Lumen maintenance as per IES TM-21-11 "Projecting Long Term Lumen Maintenance of LED Light Sources" to be minimum of 60,000 hours at L70.

- .5 The luminaire must have replaceable drivers and LED arrays.
- .6 Luminous efficacy of the source to be a minimum of 85 lumens per watt, delivered fixture lumens.
- .7 Provide 2 spare drivers of each different type of driver on the project at project completion.

2.4 Request for Approval Process during Tender

- .1 Request for approval for equal / alternate fixtures to be submitted in accordance with Section 26 05 01 – General Electrical Requirements. If submitted products are deemed acceptable, notification will be made in the form of a formal addendum.

3. EXECUTION

3.1 Installation

- .1 Install fixtures in accordance with manufacturer's requirements, code requirements, and as shown on drawings.
- .2 Confirm compatibility and interface of other materials with luminaire and ceiling systems.
- .3 Ground lighting equipment to metal raceway, armour of armoured cable, or to a separate grounding conductor.
- .4 Coordinate with other trades to avoid conflicts between luminaires, supports and fittings and mechanical and structural equipment.
- .5 Provide guards where fixtures are subject to mechanical damage.
- .6 Location of lighting control occupancy sensor is diagrammatic only. Confirm final location of all sensors on site with the Engineer. Calibrate time settings for all sensors and submit settings with testing documentation.

3.2 Workmanship

- .1 Completely clean all glassware, lamps, and hangers. Polish metal parts before completion.
- .2 Protect fixtures, hangers, supports, fastenings and accessory fittings at site prior to and during installation. Unless fixtures are erected immediately, after delivery to site, deliver in original cartons or enclosed in air-tight plastic wrapping. Store in dry and secure space on site. Protect hangers, supports, fastenings and accessory fittings against corrosion. Take care during installation to ensure that insulation and corrosion protection is not damaged.

- .3 Fixtures which show evidence of corrosion, rough handling, scratching of finishes, etc. are to be replaced with new fixtures at no additional cost.
- .4 Hang and mount fixtures to prevent distorting fixture frame, housing, sides or lens frame, and permit correct alignment of several fixtures in a row.
- .5 Support fixtures level, plumb and true with structure and other equipment in horizontal or vertical position as intended. Install wall or side bracket mounted fixture housings rigidly and adjust to neat flush fit with mounting surface.
- .6 Metal inserts expansion bolts or toggle bolts which do not carry wiring to be accurately located in relation to outlet boxes, for perfect alignment and spacing of suspension stems or other hangers.
- .7 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .8 Align luminaires mounted individually parallel or perpendicular to building grid lines.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Supply emergency lighting units throughout the school as shown on the electrical drawings.

1.2 Special Codes

- .1 Canadian Electric Code, Part 1, Section 46 "Emergency Systems, Unit Equipment and Exit Signs".
- .2 CSA Standard C22.2 No. 141 "Unit Equipment for Emergency Lighting".
- .3 National Building Code

1.3 Product Data

- .1 Submit product data in accordance with Section 26 05 01 - Electrical General Requirements.
- .2 Data to indicate system components, mounting method, source of power and special attachments.

1.4 Warranty

- .1 For batteries, extend the 12 months warranty period to a 10 year warranty period with a no-charge replacement during the first year and a pro-rate charge on the next 9 years.

2. PRODUCTS

2.1 General

- .1 Supply and install battery power emergency lighting where shown on the drawings. Lights are to switch "ON" automatically in the event of failure of normal power, and "OFF" on restoration of power. The batteries shall be automatically recharged from a 120 VAC supply.

2.2 Equipment

- .1 Supply voltage: 120V ac.
- .2 Output voltage: 12V dc.
- .3 Operating time: 60 min.
- .4 Battery: sealed, maintenance free.

- .5 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01V for plus or minus 10% input variations.
- .6 Solid state transfer circuit.
- .7 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .8 Signal lights: solid state, for 'AC Power ON' and 'High Charge'.
- .9 Lamp heads: dual heads integral on unit and remote, 345° horizontal and 180° vertical adjustment. Lamp type: 9 watt LED PAR style lamps.
- .10 Cabinet: suitable for direct or shelf mounting to wall and c/w knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .11 Auxiliary equipment:
 - .1 Test switch
 - .2 Time delay relay
 - .3 Battery disconnect device
 - .4 AC input and DC output terminal blocks inside cabinet
 - .5 Cord and single twist-lock plug connection for AC

2.3 Line Connection

- .1 Each battery unit shall be equipped with AC line cord and twistlock plug.

2.4 Units

- .1 Units to contain solid state battery charger, transfer switch and batteries. Provide all relays, hardware and circuitry for operation specified. Units to have push-to-test switch, "ON" and "charging" lights with extended lamp life.

2.5 Batteries

- .1 Unless specifically indicated provide batteries of sufficient watt-hour capacity to power the loads connected to each individual unit for 60 minutes, 12 volt, 10 year long life, maintenance free, sealed lead acid batteries, contained within the units.

2.6 Remote Lighting Units

- .1 12VDC input voltage, injection molded thermoplastic, white with 2 x Par38 lamp holders, adjustable swivel heads, 9 watt LED PAR style lamps. Provide matching white wire guards on fixtures in the Gymnasium and all service areas.

2.7 Acceptable manufacturers:

- .1 Airlite, Lumacell, Redilite, Stanpro.

3. EXECUTION

3.1 Installation

- .1 Mount battery units with the bottom of the enclosure not less than 2.4 m above the floor, where practicable.
- .2 Install twistlock receptacle adjacent to unit and connect to 1Ø, 120V circuit indicated.
- .3 Provide lock dogs on circuit breakers feeding emergency lighting equipment.
- .4 Connect exit lights to unit equipment.

END OF SECTION

1. GENERAL

1.1 Work Included

- .1 Provision of exit lighting units connected to a 120VAC and 12VDC circuit wiring.
- .2 Submit product data in accordance with Section 26 05 01 - Electrical General Requirements.

2. PRODUCTS

2.1 Standard Units

- .1 Fixture type X1
 - .1 Housing: steel housing, painted white finish.
 - .2 Face and back plates: painted white steel.
 - .3 Lamps: LED-2W, 120 VAC/ 12VDC.
 - .4 Operation: designed for 25 years of continuous operation without re-lamping.
 - .5 Running man snap in universal face, directional indicators on plate as required to indicate direction of travel. Green in color.
 - .6 Downlight: white glass in bottom of unit.
 - .7 Emergency power connection: 12VDC
 - .8 Universal mounting with directional arrows as shown on the drawings.
 - .9 Provide matching white wire guards on fixtures in the Gymnasium and all service areas.

2.2 Acceptable manufacturers:

- .1 Airlite, Lumacell, Redilite, Stanpro.

3. EXECUTION

3.1 Installation

- .1 Install exit lights.
- .2 Connect fixtures to emergency 120VAC and 12VDC circuits.
- .3 Ensure that exit light circuit breaker is locked in on position.

END OF SECTION

1. GENERAL

1.1 Related Work

- .1 Metal Fabrications Section 05 50 00
- .2 Exterior Painting Section 09 91 13

1.2 Scope

- .1 This section covers the supply and installation of steel pipe piles, for generator building foundation.

1.3 Quality Assurance

- .1 Codes and Standards
 - .1 In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations of the following:
 - .1 CAN/CSA-S16
 - .2 CSA W59 and CSA W47.1 for welding and fabrication.
 - .2 Construction Methodology
 - .1 Unless waived by the Consultant in writing, submit to the Consultant for review, not less than 4 weeks prior to commencement of pile construction, a complete detailed description of pile drilling, splicing and installation procedures.
 - .2 The Contractor shall modify, as required, the materials, methods and equipment to comply with specified requirements or field conditions. The Contractor shall replace damaged or defective piles at no additional cost.
 - .3 Piles are to be installed in pre-drilled holes. Provide temporary casing if needed to prevent sloughing of native soil or rock fill working pad.
 - .4 Minimize warming of permafrost. Steam jetting, hot water flooding and other operations likely to melt or soften frozen soil are prohibited.
 - .3 Inspection
 - .1 Maintain records of pile placement as follows and submit to the Consultant upon completion.
 - .1 Pile location, diameter, and embedment length below original ground surface.
 - .2 Final bottom and cut-off elevations.

- .3 Date and time placed; air temperature; other weather conditions.
- .4 Volume of sand slurry placed.
- .5 Other pertinent information such as interruption of placement, pile damage, splicing.

1.4 Measurement and Payment

- .1 Supply and installation of steel pipe piles will be paid for at the Unit Price per pile of each classification as quoted in the Tender.
- .2 For payment, piles are classified as to diameter, depth of embedment, and overall length, as tabulated below. Depth of embedment is measured from original ground surface, before placement of utilidor working pad or building pads, or from excavated ground surface, whichever is lower. Pile length is measured from the base of designed embedment to a point 150 mm above designed cut-off. The length listed is the maximum for the particular class of piles, and typical or average lengths will be shorter than the maximum length listed.

**Table 1.4.2 T1
Pile Classification**

Pile Class	Pile Dia. mm	Pile Wall mm	Embedment m	Length, up to m
DN200 STD	219	8.2	9.0	10
DN80 STD	88.9	5.5	9.0	10

.3 Pay Factors

- .1 If a deficiency in vertical alignment is found the contract unit price shall be adjusted as follows.

Deviation of Vertical Alignment (%)	Pay Factor %
1.5	100
3.0	95
4.5	90
6.0	85
7.5	80
9.0	75
10.5	70
12.0	65
13.5	60
Rejected	0

- .2 If a deficiency in horizontal alignment is found the contract unit price shall be adjusted as follows.

Deviation from Horizontal Alignment (mm)	Pay Factor %
25	100
50	90
75	75
Rejected	0

2. PRODUCTS

2.1 Steel Piles

- .1 Steel Piles – Type PS
- .1 Seamless or welded steel pipe piles of sizes and wall thicknesses indicated, bevelled cut ends, minimum grade 240 MPa, weldable steel.
- .2 Allowable Tolerances, all pile types:
- .1 Deviation from straight line, specified diameter, wall thickness and out-of-roundness on body of pipe and at pipe ends to conform to API 5L Check pipe for deviation before leaving mill.
- .3 Splices, all pile types: to CSA G40.21.

- .4 Steel pile caps: to CSA G40.21, Grade 300W.
- .5 Welding electrodes to CSA W48 series.
- .6 Shop paint: to CBSB-1-GP-81, Air Drying Metal Primer, or other heavy duty shop primer approved by the Consultant.
- .7 Grease: heavy consistency, non-softening at temperatures up to 40°C.
- .8 Polyethylene: film, 0.15 mm (6 mil) to CGSB 51-GP-51M.

2.2 Pile Surface Preparation and Pre-Treatment

- .1 Sandblast the entire length of the pile to provide a roughness of 25 to 50 micrometers, using a coarse, sharp, hard grit such as copper slag grit.
- .2 For pile surface treatment, the “Adfreeze Section” of the pile is the portion of the pile’s length that will be embedded below ground from a depth 2.0 m below existing ground surface to the bottom of the pile. The “Upper Section” of the pile is the remainder, from a point that will be embedded 2.0 m below existing ground surface to the top of the pile.
- .3 The Adfreeze section is left bare not painted. Protect the newly-sandblasted Adfreeze Section from paint overspray, grease or any other matter which could interfere with steel-to-ice and freeze bond.
- .4 Apply two coats of steel primer paint to the Upper Section of the pile. Standard of Acceptance: Tremclad or RustOleum. Refer to Section 09 91 13.

2.3 Slurry Backfill

- .1 The annular space around the pile and inside the piles shall be filled with properly mixed and placed sand slurry.
- .2 The backfill material shall be free-running dry sand or gravelly sand meeting the following gradation requirements.

Particle Size mm	Finer Than %	Particle Size mm	Finer Than %
9.50	100	0.43	15 - 57
4.75	93 - 100	.075	0 - 2
2.00	70 - 100		

- .3 The slurry shall be free of any organic material and salinity. Maximum temperature 5°C.

3. EXECUTION

3.1 Delivery, Storage and Handling of Piles

- .1 Store pipe piles horizontally on timber sills.
- .2 Provide timber separators to avoid metal to metal contact of piles.
- .3 Protect piles from grease or other matter which could interfere with steel-to-ice adfreeze bond.
- .4 Protect open pipes from intrusion of foreign materials.

3.2 Splicing and Welding

- .1 Weld in accordance with CSA W59. Welding certification of companies in accordance with CSA W47.1.
- .2 Splicing of pile sections shall be by means of full strength butt welds, and shall conform to the requirements of this section. All splicing shall be done before installation of piling. Splices are not to be located within 4.5 m of the underside of the pile cap plate.
- .3 All structural welding for splicing of piles shall conform to all requirements of CSA W59, General Specification for Welding of Steel Structures (Metal-Arc Welding).
- .4 If requested, submit welding procedures to the Consultant.

3.3 Preparation of Piles for Installation

- .1 Apply a coating of heavy grease on top of primer coat from a level 2.0 m below existing grade (before installation of working pad), to final top of grade elevation, 2 mm thick. Wrap greased area with 160 micrometer polyethylene, two wraps, securely taped.
- .2 Perform visual inspection of steel pipe, joints and base to ensure pipe inside is free from foreign materials.

3.4 Drilling Equipment

- .1 Ensure that drilling equipment is suitable for use in the ground conditions to be encountered. Equipment designed primarily for use in seismic exploration is not acceptable and shall not be used.
- .2 Characteristics required of the drilling rig include
 - .1 Means of aligning the bit accurately over the intended hole centre
 - .2 Adequate rigidity and support to maintain alignment
 - .3 Bits of sizes properly matched to the piles to be placed, and spares

- .4 Sufficient power to auger efficiently, using bits of the sizes needed for the project
- .5 Means of pushing open ended pipe piles down through unfrozen sand slurry, unless separate driving hammer is provided
- .6 Sound mechanical condition.
- .3 Give full characteristics of proposed equipment where indicated in the Tender Form.

3.5 Site Preparation

- .1 Ensure that ground conditions at pile locations are suitable for accurate layout and adequate to support pile installation operation. Make provision for access and temporary support of piling equipment during performance of work.
- .2 Measure and mark pile locations accurately using optical or laser survey equipment.

3.6 Drilling and Installation

- .1 Drill the pile shaft vertically to correct depth maintaining the following tolerances:
 - .1 Pile heads to be within 25 mm of locations indicated.
 - .2 Piles to be not more than 1.5 % of length out of vertical.
- .2 Drill the pile holes to the following diameters:

Pile Dia. mm	Hole mm	Pile Dia. mm	Hole mm
89	152	219	305

- .3 Thoroughly clean pile hole of loose soil cuttings.
- .4 Half fill the pile hole with non-saline water. Place the open ended pile to the bottom of the hole. Press the pile firmly into place with the drill rig.
- .5 Install piles in holes not later than 24 hours after drilling if daily minimum temperatures are above freezing; not later than 8 hours after drilling if daily minimum temperatures are below freezing.
- .6 Wedge piles in correct position. The pile location and alignment tolerances listed earlier are maximum deviations permitted for acceptance.
- .7 Once pile is placed and seated on the bottom of the pile hole, fill the remainder of the annulus with sand and water, as necessary. Rod the sand around the annulus continuously during this procedure, or vibrate the pile effectively using, for example, a pneumatic drill. Sand slurry backfill shall be placed in this manner to the existing ground surface elevation.

- .8 Fill centre of piles with a mixture of sand and water to height of ground surface.
- .9 Where steel casing has been used, withdraw casing in conjunction with slurry filling operation, keeping bottom of casing 600 mm below level of slurry until surface is reached.
- .10 Complete each pile from hole drilling to placement and backfilling within 24 hours.
- .11 Allow one week for pile freezeback before measuring cutoffs.
- .12 Remove surplus drill spoil and re-level site before proceeding with cutoffs.
- .13 Measure cutoff elevations using a surveyor's optical level.
- .14 Cut off piles neatly and squarely at correct elevation using a bevelling clamp. Freehand work is not acceptable.
- .15 Do not apply building loads or other heavy loads to piles until 30 days after installation or until freeze-back has been confirmed.

3.7 Damaged or Defective Piles

- .1 Consultant will reject any pile that is installed out of position, or is damaged during installation or handling.
- .2 Leave rejected pile in place. Cut-off as directed and place adjacent additional piles as directed by Consultant at no additional cost to the Owner.
- .3 No extra compensation will be made for removing and replacing or other work made necessary through rejection of a defective pile.

3.8 Clean Up

- .1 Maintain the working area in an orderly manner. On completion of the work, remove all temporary construction, rubbish and waste materials resulting from the piling operations.

END OF SECTION