



RETURN BIDS TO - RETOURNER LES SOUMISSIONS A:

AAFC - AAC

Bid Receiving/Réception des soumissions

Attn: Jacques Toussaint

aafc.espprocurement-cseapprovisionnement.aac@agr.gc.ca

INVITATION TO TENDER

INVITATION À SOUMISSIONNER

Proposal to: Agriculture and Agri-Food Canada

We hereby offer to sell to His Majesty the King in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services and construction listed herein and on any attached sheets at the price(s) set out therefore.

Proposition aux: Agriculture et Agroalimentaire Canada

Nous offrons par la présente de vendre à Sa Majesté le Roi du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments – Commentaires :

Delivery Required - Livraison exigée: See herein.	Delivery Offered - Livraison proposée:
Vendor/Firm Name, Address and Representative – Raison sociale, adresse et représentant du fournisseur/de l'entrepreneur:	
Telephone No. – No. de téléphone:	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) – Nom et titre de la personne autorisée à signer au nom du fournisseur/de l'entrepreneur (taper ou écrire en caractères d'imprimerie) :	
Signature	Date

Title-Sujet: AAFC – Guelph - Basement UPS System		Date : October 13, 2023
Solicitation No. – N° de l'invitation : 01B46-23-154		
Client Reference No. - No. De Référence du Client :		
Solicitation Closes –L'invitation prend fin		
at/à:	2:00PM	EDT(Eastern Daylight Time)
on/le:	October 30 th , 2023	
Delivery – Livraison : See herein.	Taxes : See herein.	Duty – Droits : See herein.
Destination of Goods and Services – Destinations des biens et services : See herein.		
Instructions : See herein.		
Address Enquiries to - Adresser toute demande de renseignements à : Jacques Toussaint jacques.toussaint@agr.gc.ca		
Telephone No. – No. de téléphone: 438-455-8237		



INVITATION TO TENDER

Basement UPS System
RDC Guelph
93 Stone Rd W, Guelph ON N1G 5C9

IMPORTANT NOTICE TO BIDDERS

Note to Bidders, there will no Public Opening for the purposes of this solicitation. See SI07 for further Instructions.

SI03 Optional Site Visit has changed

LISTING OF SUBCONTRACTORS AND SUPPLIERS

Take note that R2710T, GI07 "Listing of Subcontractors and Suppliers" has been amended. See SI10 of the Special Instructions. **Failure to do so will result in the disqualification of its bid.**



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SPECIAL INSTRUCTIONS TO BIDDERS (SI)

SI01 BID DOCUMENTS

1. The following are the Bid Documents:
 - a. Invitation to Tender - Page 1;
 - b. Special Instructions to Bidders;
 - c. General Instructions - Construction Services - Bid Security Requirements R2710T (2021-04-01)

Delete: Subsection GI16 Performance Evaluation: in its entirety

Insert: GI16 intentionally left blank

- d. Clauses & Conditions identified in "Contract Documents";
- e. Drawings and Specifications;
- f. Bid and Acceptance Form and related Appendix(s); and
- g. Any amendment issued prior to solicitation closing.

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

2. General Instructions - Construction Services - Bid Security Requirements R2710T is incorporated by reference and is set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site: <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R>

SI02 ENQUIRIES DURING THE SOLICITATION PERIOD

1. Enquiries regarding this bid must be submitted in writing to the Contracting Authority named on the Invitation to Tender - Page 1 at e-mail address jacques.toussaint@agr.gc.ca Except for the approval of alternative materials as described in GI15 of R2710T, enquiries should be received no later than 5 business days prior to the date set for solicitation closing to allow sufficient time to provide a response. Enquiries received after that time may result in an answer NOT being provided.
2. To ensure consistency and quality of the information provided to Bidders, AAC will examine the content of the enquiry and will decide whether to issue an amendment.
3. All enquiries and other communications related to this bid sent throughout the solicitation period must be directed ONLY to the Contracting Authority named in paragraph 1 above. Failure to comply with this requirement may result in the bid being declared non-compliant.

SI03 OPTIONAL SITE VISIT

1. There will be a site visit on October 19th @ 10.30 AM. Interested bidders are to meet at 93 Stone Rd W, Guelph ON N1G 5C9

SI04 REVISION OF BID

A bid may be revised by email, CPC Connect in accordance with GI10 of R2710T.

Section GI10 of R2710T is replaced by the following;

1. A bid submitted in accordance with these instructions may be revised, provided the revision is received through Canada Post Corporation's (CPC) Connect service, on or before the date and time set for the closing of the solicitation. The revision shall be on the Bidder's letterhead or bear a signature that identifies the Bidder.



- a. The only acceptable email address to use with CPC Connect is: aa.fc.procbidreceiving-receptiondesoumissionapro.v.aac@agr.gc.ca
2. A revision to a bid that includes unit prices must clearly identify the change(s) in the unit price(s) and the specific item(s) to which each change applies.
3. Multiple revisions to a bid must clearly identify the sequence of the revisions (i.e. Bid revision #1; Bid revision #2, etc.).
4. Failure to comply with any of the above provisions may result in the rejection of the non-compliant revision(s) only. The bid shall be evaluated based on the original bid submitted and all other compliant revision(s).
5. For revised bids transmitted by CPC Connect service, Canada will not be responsible for any failure attributable to the transmission or receipt of the bid including, but not limited to, the following:
 - i. receipt of a garbled, corrupted or incomplete bid;
 - ii. availability or condition of the CPC Connect service;
 - iii. incompatibility between the sending and receiving equipment;
 - iv. delay in transmission or receipt of the bid;
 - v. failure of the Bidder to properly identify the bid;
 - vi. illegibility of the bid;
 - vii. security of bid data; or,
 - viii. inability to create an electronic conversation through the CPC Connect service.

SI05 BID SECURITY REQUIREMENTS

R2710T - General Instructions - Construction Services - Bid Security Requirements is modified as follow:

Delete GI08.2 and replace with the following:

2. A bid bond (form PWGSC-TPSGC 504) shall be in an approved form, properly completed, with valid and enforceable signatures and sealed by the approved bonding company whose bonds are acceptable to Canada either at the time of solicitation closing or as identified in Treasury Board Appendix L, Acceptable Bonding Companies.
- 2.1 A bid bond may be submitted in an electronic format (Electronic Bonding (E-Bond)) if it meets the following criteria:
 - a. The version submitted by the Bidder must be an electronic encrypted file with embedded digital certificate verifiable by Canada with respect to the totality and wholeness of the bond form, including: the content; all digital signatures; all digital seals; with the Surety Company, or an approved verification service provider of the Surety Company.
 - b. The version submitted must be viewable, printable and storable in standard electronic file formats compatible with Canada, and in a single file, allowable format pdf.
 - c. The verification may be conducted by Canada immediately or at any time during the life of the Bond and at the discretion of Canada.
 - d. The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding Item 2.1.a.
 - e. Submitting copies (**non-original, non-verifiable or scanned copy**) of signed and sealed bid bond are not acceptable. Failure to submit an original or verifiable bond will render the bid non-compliant. Non-compliant bids will be given no further consideration. A scanned copy of a bond does not constitute a digital bond.
- 2.2 Bonds failing the verification process will NOT be considered valid.
- 2.3 Bonds passing the verification process will be treated as original and authentic.

SI06 SUBMISSION OF BID



Section GI09 of R2710T is modified by the following:

Insert the following text under subparagraph 4.

5. Electronic Bid Submission by Canada Post Corporation (CPC) Connect service

- a. Unless specified otherwise in the bid solicitation, bids may be submitted by using the [Connect service](#) provided by Canada Post Corporation.

The only acceptable email address to use with CPC Connect for responses to bid solicitations issued by Agriculture and Agri-Food Canada is: aafc.procbidreceiving-receptiondesoumissionaprov.aac@agr.gc.ca

Note: Bids will not be accepted if emailed directly to this email address. This email address is to be used to open a CPC Connect conversation, as detailed in "c." below of this solicitation, or to send bids through a CPC Connect message if the bidder is using its own licensing agreement for CPC Connect service.

- b. To submit a bid using CPC Connect service, the Bidder must either:
 - i. send directly its bid only to the specified AAFC Bid Receiving Unit, using its own licensing agreement for CPC Connect provided by Canada Post Corporation; or
 - ii. send as early as possible, and in any case, at least six business days prior to the solicitation closing date and time, (in order to ensure a response), an email that includes the bid solicitation number to the specified AAFC Bid Receiving Unit requesting to open a CPC Connect conversation. Requests to open a CPC Connect conversation received after that time may not be answered.
- c. If the Bidder sends an email requesting CPC Connect service to the specified AAFC Bid Receiving Unit in the bid solicitation, an officer of the AAFC Bid Receiving Unit will then initiate a CPC Connect conversation. The CPC Connect conversation will create an email notification from Canada Post Corporation prompting the Bidder to access and action the message within the conversation. The Bidder will then be able to transmit its bid afterward at any time prior to the solicitation closing date and time.
- d. If the Bidder is using its own licensing agreement to send its bid, the Bidder must keep the CPC Connect conversation open until at least 30 business days after the solicitation closing date and time.
- e. The bid solicitation number should be identified in the CPC Connect message field of all electronic transfers.
- f. It should be noted that the use of CPC Connect service requires a Canadian mailing address. Should a bidder not have a Canadian mailing address, they may use the AAFC Bid Receiving Unit address specified in the solicitation in order to register for the CPC Connect service.
- g. For bids transmitted by CPC Connect service, Canada will not be responsible for any failure attributable to the transmission or receipt of the bid including, but not limited to, the following:
 - i. receipt of a garbled, corrupted or incomplete bid;
 - ii. availability or condition of the CPC Connect service;
 - iii. incompatibility between the sending and receiving equipment;
 - iv. delay in transmission or receipt of the bid;
 - v. failure of the Bidder to properly identify the bid;
 - vi. illegibility of the bid;
 - vii. security of bid data; or,
 - viii. inability to create an electronic conversation through the CPC Connect service.
- h. AAFC Bid Receiving Unit will send an acknowledgement of the receipt of bid document(s) via the CPC Connect conversation, regardless of whether the conversation was initiated by the supplier using its own license or AAFC Bid Receiving Unit. This acknowledgement will confirm only the receipt of bid document(s) and will not confirm if the attachments may be opened nor if the content is readable.
- i. Bidders must ensure that they are using the correct email address for the AAFC Bid Receiving Unit when initiating a conversation in CPC Connect or communicating with the AAFC Bid Receiving Unit and should not rely on the accuracy of copying and pasting the email address into the CPC Connect system.



- j. A bid transmitted by CPC Connect service constitutes the formal bid of the Bidder.
- k. Alternate arrangements of bid receipt can be made by contacting the Contracting Authority identified on page 1 of the solicitation package no later than one (1) business day prior to bid closing.

SI07 BID RESULTS

1. There will be no Public Opening for the purposes of this solicitation.
2. The responsive bid carrying the lowest price will be recommended for contract award.
3. Following solicitation closing, bid results may be obtained by e-mail a request to jacques.toussaint@agr.gc.ca

SI08 INSUFFICIENT FUNDING

In the event that the lowest compliant bid exceeds the amount of funding allocated for the Work, Canada in its sole discretion may

- a. cancel the solicitation; or
- b. obtain additional funding and award the Contract to the Bidder submitting the lowest compliant bid.

SI09 BID VALIDITY PERIOD

1. Canada reserves the right to seek an extension to the bid validity period prescribed in BA04 of the Bid and Acceptance Form. Upon notification in writing from Canada, Bidders will have the option to either accept or reject the proposed extension.
2. If the extension referred to in paragraph 1. above is accepted, in writing, by all those who submitted bids, then Canada will continue immediately with the evaluation of the bids and its approvals processes.
3. If the extension referred to in paragraph 1. above is not accepted in writing by all those who submitted bids then Canada will, at its sole discretion, either
 - a. continue to evaluate the bids of those who have accepted the proposed extension and seek the necessary approvals; or
 - b. cancel the invitation to tender.
4. The provisions expressed herein do not in any manner limit Canada's rights in law or under GI11 of R2710T

SI10 RIGHTS OF CANADA

1. Canada reserves the right to:
 - a. Reject any or all bids received in response to the bid solicitation;
 - b. Enter into negotiations with bidders on any or all aspects of their bids;
 - c. Accept any bid in whole or in part without negotiations;
 - d. Cancel the bid solicitation at any time;
 - e. Reissue the bid solicitation;
 - f. If no compliant bids are received and the requirement is not substantially modified, reissue the bid solicitation by inviting only the bidders who bid to resubmit bids within a period designated by Canada; and
 - g. Negotiate with the sole compliant Bidder to ensure best value to Canada.



SI11 Security Clearance Requirements

There is no security requirement associated with the work

SI11 LISTING OF SUBCONTRACTORS AND SUPPLIERS

R2710T, GI07 has been amended to the following.

GI0/7 (2015-02-25) Listing of Subcontractors and Suppliers

The Bidder must submit the names of Subcontractors and Suppliers for the part or parts of the Work listed. See APPENDIX 3. **Failure to do so will result in the disqualification of its bid.**

SI12 BID CHALLENGE AND RECOURSE MECHANISMS

- (a) Several mechanisms are available to potential suppliers to challenge aspects of the procurement process up to and including contract award.
- (b) Canada encourages suppliers to first bring their concerns to the attention of the Contracting Authority. Canada's [Buy and Sell](#) website, under the heading "[Bid Challenge and Recourse Mechanisms](#)" contains information on potential complaint bodies such as:
- Office of the Procurement Ombudsman (OPO)
 - Canadian International Trade Tribunal (CITT)
- (c) Suppliers should note that there are **strict deadlines** for filing complaints, and the time periods vary depending on the complaint body in question. Suppliers should therefore act quickly when they want to challenge any aspect of the procurement process.

SI13 CONSTRUCTION DOCUMENTS

The successful Contractor will be provided **with 1 electronic copy** of the sealed and signed drawings, the specifications and the amendments upon acceptance of the offer. Additional copies, up to a maximum (0), will be provided free of charge upon request by the Contractor. Obtaining more copies will be the responsibility of the Contractor including costs.

SI16 WEB SITES

The connection to some of the Web sites in the solicitation documents is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Treasury Board Appendix L, Acceptable Bonding Companies

<http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494§ion=text#appl>

Buy and Sell

<https://www.achatsetventes-buyandsell.gc.ca>

Canadian economic sanctions

<http://www.international.gc.ca/sanctions/index.aspx?lang=eng>

Bid Bond (form PWGSC-TPSGC 504)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/504.pdf>

Performance Bond (form PWGSC-TPSGC 505)

http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/505_eng.pdf

Labour and Material Payment Bond (form PWGSC-TPSGC 506)

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/506.pdf>



Standard Acquisition Clauses and Conditions (SACC) Manual

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R>

Declaration Form

<http://www.tpsgc-pwgsc.gc.ca/ci-if/formulaire-form-eng.html>

Trade agreements

<https://buyandsell.gc.ca/policy-and-guidelines/Policy-and-Legal-Framework/Trade-Agreements>



R2710T GENERAL INSTRUCTIONS - CONSTRUCTION SERVICES - BID SECURITY REQUIREMENTS (GI) (2021-04-01)

The following GI's are included by reference and are available at the following Web Site

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/5/R/R2710T/23>

- GI01 Integrity Provisions - Bid
- GI02 Completion of Bid
- GI03 Identity or Legal Capacity of the Bidder
- GI04 Applicable Taxes
- GI05 Capital Development and Redevelopment Charges
- GI06 Registry and Pre-qualification of Floating Plant
- GI07 Listing of Subcontractors and Suppliers
- GI08 Bid Security Requirements
- GI09 Submission of Bid
- GI10 Revision of Bid
- GI11 Rejection of Bid
- GI12 Bid Costs
- GI13 Procurement Business Number
- GI14 Compliance with Applicable Laws
- GI15 Approval of Alternative Materials
- GI16 Performance Evaluation
- GI17 Conflict of Interest-Unfair Advantage
- GI18 Code of Conduct for Procurement—bid



CONTRACT DOCUMENTS (CD)

1. The following are the Contract Documents:

- a. Contract Page when signed by Canada;
- b. Duly completed Bid and Acceptance Form and any Appendices attached thereto;
- c. Drawings and Specifications;
- d. General Conditions and clauses

GC1	General Provisions – Construction Services	R2810D	(2017-11-28);
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Subsection GC1.22 Performance-evaluation: incorporated by reference above, is amended as follows:

Delete: in its entirety

Insert: GC1.22 Intentionally left blank

- | | | | |
|------|--|--------|---------------|
| GC2 | Administration of the Contract | R2820D | (2016-01-28); |
| GC3 | Execution and Control of the Work | R2830D | (2019-11-28); |
| GC4 | Protective Measures | R2840D | (2008-05-12); |
| GC5 | Terms of Payment | R2850D | (2019-11-28); |
| GC6 | Delays and Changes in the Work | R2860D | (2019-05-30); |
| GC7 | Default, Suspension or Termination of Contract | R2870D | (2018-06-21); |
| GC8 | Dispute Resolution | R2880D | (2019-11-28); |
| OR | | | |
| GC8 | Dispute Resolution | R2882D | (2019-11-28); |
| GC9 | Contract Security | R2890D | (2018-06-21); |
| GC10 | Insurance | R2900D | (2008-05-12); |
| | Allowable Costs for Contract Changes Under GC6.4.1 | R2950D | (2015-02-25); |
- e. Supplementary Conditions
 - f. Any amendment issued or any allowable bid revision received before the date and time set for solicitation closing;
 - g. Any amendment incorporated by mutual agreement between Canada and the Contractor before acceptance of the bid; and
 - h. Any amendment or variation of the contract documents that is made in accordance with the General Conditions.

2. The documents identified by title, number and date above are incorporated by reference and are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is available on the PWGSC Web site:
<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. The language of the contract documents is the language of the Bid and Acceptance Form submitted.



SUPPLEMENTARY CONDITIONS (SC)

SC01 SECURITY CLEARANCE REQUIREMENTS, DOCUMENT SAFEGUARDING

This section is intentionally left blank.

SC02 LIMITATION OF LIABILITY

GC1.6 of R2810D is deleted and replaced with the following:

GC1.6 Indemnification by the Contractor

1. The Contractor shall indemnify and save Canada harmless from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings whether in respect to losses suffered by Canada or in respect of claims by any third party, brought or prosecuted and in any manner based upon, arising out of, related to, occasioned by, or attributable to the activities of the Contractor in performing the Work, provided such claims are caused by the negligent or deliberate acts or omissions of the Contractor, or those for whom it is responsible at law.

The Contractor's obligation to indemnify Canada for losses related to first party liability shall be limited to:

- a. In respect to each loss for which insurance is to be provided pursuant to the insurance requirements of the Contract, the Commercial General Liability insurance limit for one occurrence as referred to in the insurance requirements of the Contract .
 - b. In respect to losses for which insurance is not required to be provided in accordance with the insurance requirements of the Contract, the greater of the Contract Amount or \$5,000,000, but in no event shall the sum be greater than \$20,000,000.
2. The limitation of this obligation shall be exclusive of interest and all legal costs and shall not apply to any infringement of intellectual property rights or any breach of warranty obligations.
 3. The Contractor's obligation to indemnify Canada for losses related to third party liability shall have no limitation and shall include the complete costs of defending any legal action by a third party. If requested by Canada, the Contractor shall defend Canada against any third party claims.
 4. The Contractor shall pay all royalties and patent fees required for the performance of the Contract and, at the Contractor's expense, shall defend all claims, actions or proceedings against Canada charging or claiming that the Work or any part thereof provided or furnished by the Contractor to Canada infringes any patent, industrial design, copyright trademark, trade secret or other proprietary right enforceable in Canada.
 5. Notice in writing of a claim shall be given within a reasonable time after the facts, upon which such claim is based, became known.

SC03 INSURANCE TERMS

1) Insurance Contracts

- (a) The Contractor must, at the Contractor's expense, obtain and maintain insurance contracts in accordance with the requirements of the Certificate of Insurance. Coverage must be placed with an Insurer licensed to carry out business in Canada.
- (b) Compliance with the insurance requirements does not release the Contractor from or reduce its liability under the Contract. The Contractor is responsible for deciding if additional insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any additional insurance coverage is at the Contractor's expense, and for its own benefit and protection.



2) Period of Insurance

- (a) The policies required in the Certificate of Insurance must be in force from the date of contract award and be maintained throughout the duration of the Contract.
- (b) The Contractor must be responsible to provide and maintain coverage for Products/Completed Operations hazards on its Commercial General Liability insurance policy, for a period of six (6) years beyond the date of the Certificate of Substantial Performance.

3) Proof of Insurance

- (a) Before commencement of the Work, and no later than thirty (30) days after contract award, the Contractor must deposit with Canada a Certificate of Insurance on the form attached herein.
- (b) Upon request by Canada, the Contractor must provide originals or certified true copies of all contracts of insurance maintained by the Contractor pursuant to the Certificate of Insurance.

4) Insurance Proceeds

In the event of a claim, the Contractor must, without delay, do such things and execute such documents as are necessary to effect payment of the proceeds.

5) Deductible

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

SC06 TYPES AND AMOUNTS OF CONTRACT SECURITY

Remove and Replace GC9.2.2. with the following

A performance bond (form PWGSC-TPSGC 505) and a labour and material payment bond (form PWGSC-TPSGC 506) referred to in subparagraph 1)(a) of GC9.2 shall be in a form and be issued by a bonding or surety company (see Treasury Board Appendix L, Acceptable Bonding Companies) that is approved by Canada. They can be in the form of electronic digital version.

Electronic digital versions must meet the following;

1. A performance bond and a labour and material payment bond may be submitted in an electronic or digital format if it meets the following criteria:
 - 1.1. The versions submitted by the Contractor must be verifiable by Canada with respect to the totality and wholeness of the bonds form, including: the content; all digital signatures; all digital seals; with the Surety Company, or an approved verification service provider of the Surety Company.
 - 1.2. The versions submitted must be viewable, printable and storable in standard electronic file formats compatible with Canada, and in a single file. Allowable formats include pdf.
 - 1.3. The verification may be conducted by Canada immediately or at any time during the life of the bonds and at the discretion of Canada with no requirement for passwords or fees.
 - 1.4. The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding Item 1.1.
2. Bonds failing the verification process will NOT be considered to be valid.

**BID AND ACCEPTANCE FORM (BA)****BA01 IDENTIFICATION**

Basement UPS System

BA02 LEGAL NAME AND ADDRESS OF BIDDER

Legal Name:					
Operating Name (if any):					
Address:					
Telephone:		Fax:		PBN:	
E-mail address:					
Contract Security Program Organisation Number (when required)					

BA03 THE OFFER

The Bidder offers to Canada to perform and complete the Work for the above named project in accordance with the Bid Documents for the Total Bid Amount of

\$ _____ excluding Applicable Taxe(s).
(amount in numbers)

BA04 BID VALIDITY PERIOD

The bid must not be withdrawn for a period of 30 days following the date of solicitation closing.

BA05 ACCEPTANCE AND CONTRACT

Upon acceptance of the Bidder's offer by Canada, a binding Contract will be formed between Canada and the Bidder. The documents forming the Contract will be the Contract Documents identified in "Contract Documents (CD)" section.

BA06 CONSTRUCTION TIME

The Contractor must perform and complete the Work on or before **March 31st 2024**

BA07 BID SECURITY

The Bidder must enclose bid security with its bid in accordance with GI08 - Bid Security Requirements of R2710T - General Instructions - Construction Services - Bid Security Requirements.

BA08 SIGNATURE

--

Name and title of person authorized to sign on behalf of Bidder (Type or print)

--

Signature

--

Date



DRAWINGS AND SPECIFICATIONS

1 GENERAL

1.01 REFERENCES

- .1 Division 00 applies to and is a part of this Section.

1.02 SCOPE OF WORK

- .1 Supply and install all materials, labour and equipment necessary to complete a fully operational UPS system as designed.

1.03 APPLICATION

- .1 This Section specifies requirements that are common to Electrical Divisions work and it is a supplement to this Section and is to be read accordingly. Where requirements of this Section contradict requirements of Divisions 00, conditions of Division 00 are to take precedence, as confirmed with Departmental Representative prior to Bid submission.
- .2 Advise product vendors of the requirements of this Section.

1.04 DEFINITIONS

- .1 "concealed" – means hidden from normal sight in furred spaces, shafts, ceiling spaces, walls and partitions.
- .2 "exposed" – means work normally visible, including work in equipment rooms, service tunnels, and similar spaces.
- .3 "finished" - means when in description of any area or part of an area or a product which receives a finish such as paint, or in case of a product may be factory finished.
- .4 "provision" or "provide" (and tenses of "provide") – means supply and install complete.
- .5 "install" (and tenses of "install") – means secure in position, connect complete, test, adjust, verify and certify.
- .6 "supply" – means to procure, arrange for delivery to site, inspect, accept delivery and administer supply of products; distribute to areas; and include manufacturer's supply of any special cables, standard on site testing, initial start-up, programming, basic commissioning, warranties and manufacturers' assistance to Contractor.
- .7 "delete" or "remove" (and tenses of "delete" or "remove") – means to disconnect, make safe, and remove obsolete materials including back boxes and exposed piping and raceways; and patch and repair/finish surfaces to match adjoining similar construction; include for associated re-programming of systems and/or change of documentation identifications to suit deletions, and properly dispose of deleted products off site unless otherwise instructed by Departmental.
- .8 "barrier-free" - means when applied to a building and its facilities, that building and its facilities can be approached, entered and used by persons with physical or sensory disabilities in accordance with requirements of local governing building code.
- .9 "BAS" – means building automation system.
- .10 "governing authority" and/or "authority having jurisdiction" and/or "regulatory authority" and/or "Municipal authority" – means government departments, agencies, standards, rules and regulations that apply to and govern work and to which work must adhere.

- .11 "OHSA" – stands for Occupational Health and Safety Act, and wherever used, it is to be read to mean local governing occupational health and safety regulations that apply to and govern work and to which work must adhere.
- .12 "Electrical Divisions" – typically, refers to Divisions 26, 27, 28 and other Divisions as specifically noted, and which work as defined in Specifications and/or on drawings is the responsibility of Electrical Contractor, unless otherwise noted.
- .13 "Departmental Representative" – means person, firm or corporation identified as such in Agreement or Documents designated by the Owner to act for the Owner as a main contact with the Contractor in relation to the Work.
- .14 Wherever words "indicated", "shown", "noted", "listed", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean product referred to is "indicated", "shown", "listed", or "noted" on Contract Documents.
- .15 Wherever words "reviewed", "satisfactory", "as directed", "submit", or similar words or phrases are used in Contract Documents they are understood, unless otherwise defined, to mean that work or product referred to is "reviewed by", "to the satisfaction of", "submitted to", etc., Departmental Representative.

1.05 DOCUMENTS

- .1 Documents for bidding include but are not limited to issued Drawings, Specifications and Addenda.
- .2 Specification is typically generally arranged in coordination with guidelines of CSI/CSC 50 Division MasterFormat.
- .3 Drawings and Specifications are portions of Contract Documents and identify labour, products and services necessary for performance of work and form a basis for determining pricing. They are intended to be cooperative. Perform work that is shown, specified, or reasonably implied on drawings but not mentioned in Specification, or vice-versa, as though fully covered by both.
- .4 Review Drawings and Specification in conjunction with documents of other Divisions and, where applicable, Departmental Representative's report.
- .5 Unless otherwise specifically noted in Specifications and/or on Drawings, Sections of Electrical Divisions are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and Sections are to be read as a whole.
- .6 Drawings are performance drawings, diagrammatic, and show approximate locations of equipment and materials. Any information regarding accurate measurement of building is to be taken on site. Do not scale Drawings, and do not use Drawings for prefabrication work.
- .7 Drawings are intended to convey scope of work and do not show architectural and structural details. Provide fittings, offsets, transformations and similar items required as a result of obstructions and other architectural and/or structural details but not shown on Drawings.
- .8 Locations of equipment and materials shown may be altered, when reviewed by the Departmental Representative, to meet requirements of equipment and/or materials, other equipment or systems being installed all at no additional cost to Contract.
- .9 Specifications are intended to provide product data and installation requirements. Refer to schedules, Drawings (layouts, riser diagrams, schematics, details) and Specification to

provide correct quantities. Singular may be read as plural and vice versa.

- .10 Drawings and Specifications are prepared solely for use by the party with whom the Owner has entered into a contract and there are no representations of any kind made by the Owner to any other party.
- .11 In case of discrepancies or conflicts between Drawings and Specifications, Documents will govern in order specified in "General Conditions", however, when scale and date of Drawings are same, or when discrepancy exists within Documents, include most costly arrangement.
- .12 Language of Documents is in many cases are written in imperative mode for brevity. Clauses containing instructions or directions are directed to Contractor.

1.06 METRIC AND IMPERIAL MEASUREMENTS

- .1 Generally, both metric and imperial units of measurement are given in Sections of Specification governed by this section. Measurement conversions may be generally "soft" and rounded off. Exact measurements to be confirmed based on application. Where measurements are related to installation and onsite applications, confirm issued document measurements with applicable local code requirements, and/or as applicable, make accurate measurements onsite. Where significant discrepancies are found, immediately notify the Departmental Representative for direction.

1.07 EXAMINATION OF BID DOCUMENTS AND SITE

- .1 Carefully examine Documents and visit site to determine and review existing site conditions that will or may affect work and include for such conditions in Bid Price.
- .2 Report to the Departmental Representative, prior to Bid Submittal, any existing site condition that will or may affect performance of work as per Documents. Failure to do so will not be grounds for additional costs.
- .3 Upon finding discrepancies in, or omissions from Documents, or having doubt as to their meaning or intent, immediately notify the Departmental Representative prior to Bid Submittal, in writing.

1.08 WORK STANDARDS

- .1 Where any code, regulation, bylaw, standard, contract form, manual, printed instruction, and installation and application instruction is quoted it means, unless otherwise specifically noted, latest published edition at time of submission of Bids adopted by and enforced by local governing authorities having jurisdiction. Include for compliance with revisions, bulletins, supplementary standards or amendments issued by local governing authorities.
- .2 Where regulatory codes, standards and regulations are at variance with Drawings and Specification, more stringent requirement will apply unless otherwise directed by Departmental Representative.
- .3 Supplementary mandatory Specifications and requirements to be used in conjunction with project include but are not limited to following:
 - .1 American National Standards Institute (ANSI);
 - .2 Canadian Standards Association (CSA);
 - .3 CSA C282, "Emergency Electrical Power Supply for Buildings";

- .4 CSA Z432, "Safeguarding of Machinery";
 - .5 CSA Z460, "Control of hazardous energy - Lockout and other methods"
 - .6 CSA Z462, "Workplace Electrical Safety";
 - .7 Electrical and Electronic Manufacturers Association of Canada (EEMAC);
 - .8 Electrical Safety Authority (ESA);
 - .9 Electronic Industries Association (EIA);
 - .10 Institute of Electrical and Electronic Engineers (IEEE);
 - .11 National Building Code of Canada (NBC);
 - .12 National Electrical Manufacturers Association (NEMA);
 - .13 National Fire Protection Association (NFPA);
 - .14 Occupational Health and Safety Act (OHSA);
 - .15 Ontario Building Code (OBC);
 - .16 Ontario Electrical Safety Code (OESC);
 - .17 Technical Standards and Safety Authority (TSSA);
 - .18 Underwriters' Laboratories of Canada (ULC);
 - .19 Material Safety Data Sheets by product manufacturers;
-
- .4 Where any governing Code, Regulation, or Standard requires preparation and submission of special details or drawings for review they are to be prepared and submitted to appropriate authorities. The Contractor is responsible for costs associated with these submittals.
 - .5 Unless otherwise specified install, equipment in accordance with equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions. Notify the Departmental Representative in writing of conflicts between Contract Documents and manufacturer's instructions.
 - .6 Work is to be performed by journeyperson tradesmen who perform only work that their certificates permit, or by apprentice tradesmen under direct on-site supervision of experienced journeyperson tradesman. Journeyperson to apprentice ratio is not to exceed ratio determined by the Board as stated in Ontario College of Trades and Apprenticeship Act or local equivalent governing body in Place of the Work.
 - .7 Journeyperson tradesmen are to have copy of valid trade certificates available at site for review by Departmental Representative at any time.
 - .8 Maintain an experienced and qualified superintendent on-site at times when work is being performed.
 - .9 Protect existing areas above, below and adjacent areas of Work from any debris, noise, or interruptions to existing services to satisfaction of the Departmental Representative. Maintain operation of existing services to these areas to allow the Owner to continue use

of these areas. If services that are required to be maintained run through areas of renovations, provide necessary protection to services or reroute, in coordination with Departmental Representative. Include for required premium time work to meet these requirements.

- .10 Work being performed within occupied spaces and work affecting surfaces adjacent to occupied spaces may need to be performed after regular business hours. For areas where spaces are used by Owner on a 24 hours basis or over various hours, coordinate hours of work with Departmental Representative on a regular basis to suit Departmental Representative's schedule. Execute work at times confirmed with reviewed and agreed to by Departmental Representative so as not to inconvenience Owner's occupation or in any way hinder Owner's use of building. Include for required premium timework to meet these requirements.
- .11 Coordinate work inspection reviews and approvals with governing inspection department to ensure construction schedule is not delayed. Be responsible for prompt notification of deficiencies to the Departmental Representative and submission of reports and certificates to the Departmental Representative.
- .12 Properly protect equipment and materials on site from damage and defacement due to elements and work of trades to satisfaction of the Departmental Representative. Equipment and materials are to be in new condition.
- .13 Electrical items associated with mechanical equipment are to be certified and bear stamp or seal of a recognized testing agency such as CSA or ULC or bear a stamp to indicate special electrical utility approval.

1.09 PERMITS, CERTIFICATES, APPROVALS AND FEES

- .1 As specified in Instructions to Bidders, be responsible for application and payment for permits, certificates, and approvals required to complete Work.
- .2 Contact and confirm with local authorities having jurisdiction including utility providers, requirements for approvals from such authorities.
- .3 Submit required applications, shop drawings, electrical distribution system protection device coordination studies, and short circuit calculations, and any other information requested by local authority.
- .4 Provide ample notification to authorities having jurisdiction to perform required on-site inspection of work, allowing sufficient lead time to correct deficiencies in a manner that will not impede schedule of completion of Work. If any defect, deficiency or non-compliance is found in work by inspection, be responsible for costs of such inspection, including any related expenses, making good and return to site, until work is passed by governing authorities.
- .5 Obtain and submit to the Departmental Representative, approval/inspection certificates issued by governing authorities to confirm that Work as installed is in accordance with rules and regulations of local governing authorities and are acceptable by such authorities.
- .6 Include in each copy of operating and maintenance instruction manuals, copies of approvals and inspection certificates issued by regulatory authorities.

1.10 WHMIS REQUIREMENTS

- .1 Be familiar with Workplace Hazardous Materials Information System (WHMIS), which require uniform labelling of Hazardous Workplace Materials and Safety Data Sheets relating to materials covered in

this Specification. Ensure that Employees and Subcontractors representing their firm who work with, or in proximity to, hazardous materials fully understand potential hazards and have been thoroughly trained to deal with any emergencies. Workers to be able to:

- recognize and understand labelling on hazardous materials.
 - understand Material Safety Data Sheets, and are knowledgeable on how to safely use, store, handle and dispose of hazardous materials.
- .2 Ensure Material Safety Data sheets pertinent to completion of this project are on site.
 - .3 Notify the Departmental Representative prior to delivery and starting of any work involving use of hazardous substances. Forward unexpired Material Safety Data Sheets for hazardous materials being brought onto site by Contractors.

1.11 WORKPLACE SAFETY AND PROCEDURES

- .1 In addition to requirements of Section entitled Instructions to Bidders, local governing Occupational Health and Safety Act for Construction Projects, requirements of The Departmental Representative's Occupational Health and Safety Policy, Safety Act and Instructions for Contractors. Health and safety legislation from authorities having jurisdiction are to also apply to this project. Coordinate with the Departmental Representative's occupational health and safety joint policy committee member, and review responsibilities of each party. Be responsible for ensuring that Subcontractors and workers abide by rules and requirements set forth under the Act.
- .2 Be the liaison with Ministry of Labour and to notify the Departmental Representative of and enforce duties of Contractor (Constructor) in accordance with Occupational Health and Safety Act (Ont.).
- .3 Comply with requirements of Occupational Health and Safety Act and other regulations pertaining to health and safety, including worker's compensation/ insurance board and fall protection regulations. When working in confined spaces, comply with requirements of Occupational Health and Safety Act - Ontario Regulation 632, "Confined Spaces" and any other applicable Ministry of Labour requirements.
- .4 Within 10 days of preconstruction meeting, and prior to commencement of Work, submit Contractor's job site rules, including safety policies and procedures, general safety policies and injured worker transportation policies. These job site rules to be consistent with Contractor's duties and obligations under Contract and under Occupational Health and Safety Act. Such job site rules to include provisions making smoking and consumption of alcohol or non-prescription drugs on Project to be subject to discipline proceedings and/or termination of employment.
- .5 Assess potential workplace hazards on an on-going basis, particularly in situations of on-going construction of work, or where multiple trades are present and intermingling, or where workplace environment is not familiar.
- .6 Prior to the start of work, provide to the Departmental Representative written confirmation that Contractor's personnel on site including sub-trades have been trained on safety policy and procedures and are aware of potential workplace hazards.
- .7 Provide adequate levels of safety supervision, including sufficient and competent supervising staff and processes for monitoring compliance of safety requirements and to effectively communicate and inform personnel of any foreseeable risks or hazards prior to work commencing and regularly during progress of work.
- .8 Conduct regular site meetings as work proceeds, to organize work, explain safety aspects of work, remind of important safety aspects of work and to advise of any new

hazards or problematic issues.

1.12 ELECTRICAL SAFETY

- .1 Contractor shall adhere to the requirements and provisions of:
 - .1 CSA Z462 – Workplace Electrical Safety
 - .2 CSA Z460 – Lockout Procedures
 - .3 Electrical Safety Authority

1.13 HOT WORK

- .1 Hot Work includes, but is not limited to, brazing, cuttings, grinding, soldering, pipe thawing, torch applied roofing, and welding operations.
- .2 Prior to commencement of any Hot Work, for any temporary operations involving open flames or projecting sparks, Contractor's policies and procedures to be submitted to the Departmental Representative for review and approval.
- .3 Provide fire and public safety protection materials, screens, smoke eaters, etc. as may be required by type of work and the Departmental Representative.

1.14 FIRST AID

- .1 Be familiar with location of nearest first aid unit (provided by Contractor) prior to commencement of Work. Report incidents to the Departmental Representative immediately and submit a copy of Ministry of Labour report form to the Departmental Representative.

1.15 DESIGNATED MATERIALS

- .1 If at any time during course of existing building work, hazardous materials other than those identified in Documents and pertaining to Project Scope of Work, are encountered or suspected that were not identified as being present and which specific instructions in handling of such materials were not given, cease work in area in question and immediately notify the Departmental Representative. Comply with local governing regulations with regards to working in areas suspected of containing hazardous materials. Do not resume work in affected area without review and approval from the Departmental Representative.

1.16 WORK SCHEDULE

- .1 After receiving written notification of award of contract, coordinate required work schedule with the Departmental Representative. As outlined in Document entitled Instructions to Bidders, after award of contract, submit detailed work program schedule of sequence of work, identifying date for each step of work, methodology of how work is to be performed, when deliveries are to be made and interruption to services requirements. Prepare submitted schedule based on conceptual schedules and requirements in Document entitled Instructions to Bidders. Such schedule to identify a complete breakdown of project activities showing time duration of each activity. Strictly adhere to schedule. Do not start any construction work without the Departmental Representative's review of schedule and coordination.
- .2 Use scheduling program acceptable to the Departmental Representative.
- .3 Contractor's Construction Superintendent to organize and attend regular weekly site meetings with the Departmental Representative to review project work and to report on progress. Contractor's site representative to prepare notes of meeting and issue to participants within 3 working days after meeting. Prepare a Project Status report and issue to The Departmental Representative on every Monday during construction phase unless Monday is a statutory or provincial holiday, then on next working day. Project Status report to summarize activities completed in prior week and forecast activities to be undertaken in current week.

- .4 Include for scheduling, coordination and work phasing to suit project requirements. No extras for premium time will be considered. Shutdowns and planning of operations that may affect the Owner's use of services to be coordinated and approved in writing with the Departmental.
- .5 Be aware that on-going functions of existing building must continue and noise-making tools may be operated only with the permission and review by the Departmental Representative. The Departmental Representative may at any given time request that any construction activity be temporarily ceased due to interference being caused.
- .6 Work being performed within occupied spaces and work affecting surfaces adjacent to occupied spaces may need to be performed after regular business hours. For areas where spaces are used by the Owner on a 24 hours basis or over various hours, co-ordinate hours of work with the Departmental Representative on a regular basis to suit the Owner's schedule. Execute work at times confirmed with and as agreed to by the Departmental Representative, so as not to inconvenience the Owner's occupation or in any way hinder Owner's use of building. Include for required premium time work to meet these requirements.
- .7 The Departmental Representative reserves right to perform additional non-related work in same space, while Contractor is performing their work.
- .8 Review product delivery times with suppliers/manufacturers proposed at time of Bid and reviewed with the Departmental Representative and ensure that products are delivered within time frames to meet work schedule requirements. Failure to order products in time to meet work schedule unless due to named manufacturer's unforeseen circumstances, is not acceptable reason to change from named manufacturer.

1.17 PLANNING AND LAYOUT OF WORK

- .1 Base installation layout, design, terminations, and supply of accessories, on Contract Documents with specific coordination with reviewed shop drawings.
- .2 Plan, coordinate, and establish exact locations and routing of services with the Departmental Representative prior to installation such that services clear each other as well as other obstructions.
- .3 The Departmental Representative and the Contractor are to generally determine final locations of major work within ceiling spaces.
- .4 Install services as high as possible to conserve headroom and/or ceiling space. Notify the Departmental Representative where headroom or ceiling space appears to be inadequate prior to installation of work.
- .5 Do not use Contract Drawing measurements for prefabrication and layout of raceways, conduits, ducts, bus ducts, luminaires, and other such work. Locations and routing are to be generally in accordance with Contract Drawings, however, prepare layout drawings for such work. Use established bench marks for both horizontal and vertical measurements. Accurately layout work and be entirely responsible for work installed in accordance with layout drawings.
- .6 Locate control products, products requiring maintenance, junction boxes, and similar products for easy access for servicing and/or removal.
- .7 Be responsible for making necessary changes, at no additional cost, to accommodate structural and building conditions that were missed due to lack of coordination.

1.18 COORDINATION OF WORK

- .1 Review Contract Documents and coordinate work with work of each trade. Coordination requirements are to include, but not be limited to following:
 - .1 requirements for openings, sleeves, inserts and other hardware necessary for installation of work;
 - .2 concrete work such as housekeeping pads, sumps, bases, etc., required for work, and including required dimensions, operating weight of equipment, location, etc.;
 - .3 wiring work required for equipment and systems but not specified to be done as part of mechanical work, including termination points, wiring type and size, and any other requirements.
- .2 Ensure materials and equipment are delivered to site at proper time and in such assemblies and sizes so as to enter into building and be moved into spaces where they are to be located without difficulty.
- .3 Wherever possible, coordinate equipment deliveries with manufacturers and/or suppliers so equipment is delivered to site when it is required, or so it can be stored within the building subject to available space as confirmed with Departmental Representative and protected from elements.
- .4 Ensure proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Comply with code requirements with regards to access space provision around equipment. In coordination with Departmental Representative, re-locate equipment which does not meet this requirement.

1.19 INTERRUPTIONS TO AND SHUTDOWNS OF SERVICES AND SYSTEMS

- .1 It is understood that this facility is a critical facility that operates continuously. Avoid as much as possible, requirement for power or service shutdowns. Take necessary steps and measures to avoid any need for shut down or service interruptions.
- .2 Coordinate shutdowns and interruptions to existing systems and services fully with and performed at times acceptable to the Departmental Representative.
- .3 Prior to each shut-down or interruption, inform the Departmental Representative in writing minimum 5 working days in advance of proposed shutdown or interruption. Do not shutdown or interrupt any system or service without review and approval by the Departmental Representative. The Departmental Representative retains right to cancel or re-schedule any period of shut down.
- .4 Perform work associated with shutdowns and interruptions as continuous operations to minimize shutdown time and to reinstate systems as soon as possible, and, prior to any shutdown, ensure that required materials and labour required to complete Work for which shutdown is required are available at onsite.
- .5 Coordinate with the Departmental Representative any off-hour work and comply with any instructions given by the Departmental Representative for carrying out this work
- .6 The Departmental Representative retains right to shutdown services or building access for emergency reasons with no advance notification to Contractor. The Departmental Representative to provide Contractor with minimum 5 days advance notice of planned temporary stoppages of services and planned rerouting of building access.

- .7 Existing building is to remain in use and occupancy throughout duration of construction of Work. Provide and maintain continuation of fire protection, fire walls and fire rated assemblies in existing building.
- .8 Maintain existing exits and provide proper and safe means of egress from throughout existing building to open spaces at all times to approval of local governing authorities. Identify and provide exit lights, and illuminate temporary means of egress.
- .9 Maintain access to service and delivery entrances, and for maintenance and inspection services.
- .10 Maintain security and life/safety systems of existing building during Work.

1.20 USING ELEVATORS FOR MOVEMENT OF EQUIPMENT

- .1 When using elevators to transport equipment to installed positions, ship equipment to site in sections to allow for transporting in the Departmental Representative designated building elevators on site. Include for following:
 - .1 prepare and submit proposed schedule of use of elevators to the Departmental Representative for review and approval.
 - .2 equipment to suit weight limit restrictions and dimensions of elevator; factory disassemble equipment as required to meet elevator restrictions; include in shop drawings manufacturer's detailed drawings identifying breakdown sections of equipment.
 - .3 provide protection mats to interior elevator cab surfaces.
 - .4 transport to installation location.
 - .5 where applicable, re-assemble equipment at installation location.
 - .6 equipment disassembly and assembly to be performed by equipment manufacturer's authorized technicians.
 - .7 perform start-up and testing of equipment.

1.21 COMPONENT FINAL LOCATIONS

- .1 Departmental Representative reserve right to relocate electrical components such as receptacles, switches, communication systems, outlets, prior to installation, without additional cost to Owner, if relocation per components do not exceed 3m from original location. No credits will be anticipated where relocation per components of up to and including 3m reduces materials, products and labour.

2 PRODUCTS

2.01 GENERAL

- .1 Order products in a timely manner in order to meet project- scheduling timelines. Failure to order products to allow manufacturers sufficient production/delivery time to meet project-scheduling timelines is an unacceptable reason to request for other suppliers or substitutions.
- .2 Provide Canadian manufactured products wherever possible or required and when quality and performance is obtainable at a competitive price. Products are to be supplied from manufacturer's authorized Canadian representative. Products are to be new.
- .3 Products are to comply with applicable respective Canadian standards, and typically with Canadian Standards Association (CSA) approvals and/or Underwriters Laboratories of Canada (ULC) listings markings.
- .4 Systems and equipment of this Project are to be "Proven State of the Art" and be most recent and up to date series/version of product that is available at time of shop drawing review process. Products that have been stored or "on shelf" for extended period will not be accepted. Software is to be of latest version available and be provided with updates available at time of shop drawing review process. Systems are to be designed such that its software is backwards compatible. Future upgrades are not to require any hardware replacements or additions to utilize latest software.
- .5 Products scheduled and/or specified have been selected to establish a performance and quality standard, and, in some instances, a dimensional standard. In many cases acceptable product manufacturers are specified for products with manufacturer name, series name and/or model number. Bid Price may be based on products supplied by any of manufacturer's base specified or other approved equal.
- .6 Listing of a product as "acceptable" does not imply automatic acceptance by Departmental Representative. It is responsibility of Contractor to ensure that any price quotations received, and submittals made are for products that meet or exceed specifications included herein.
- .7 In addition to manufacturer's products base specified or named as acceptable, other manufacturers of products may be proposed as substitutions to the Departmental Representative for review and consideration for acceptance. However, base Bid Price on products base specified or named as acceptable. Departmental Representative has sole discretion in accepting any proposed substitution of product. Indicate any proposed substitutions in areas provided on Bid Form. Do not order such products until they are approved by the Departmental.
- .8 Any proposed changes to list of manufacturers initiated by Contractor after award of Contract may be considered by Departmental Representative at Departmental Representative's discretion, with any additional costs for such changes if approved by Departmental Representative and costs for review, to be borne by Contractor.
- .9 Whenever use of product other than based specified products or named as acceptable is being supplied, allow sufficient time for processing of product submissions and time for Departmental Representative's review, such that there will not be significant impact on contract time or work schedule.

3 EXECUTION

3.01 SHOP DRAWINGS

- .1 At start-up meeting review with Departmental Representative, products to be included in shop drawing submission. Prepare and submit list of products to Departmental Representative for review.
- .2 Submit electronic copies of shop drawings unless otherwise directed by Departmental Representative. Review exact requirements with Departmental Representative.
- .3 Submit for review, drawings showing in detail design, construction, and performance of equipment and materials as requested in Specification. Submit shop drawings to Departmental Representative for review prior to ordering and delivery of product to site. Include minimally for preparation and submission of following, as applicable:
 - .1 product literature cuts;
 - .2 equipment data sheets;
 - .3 equipment dimension drawings;
 - .4 system block diagrams;
 - .5 sequence of operation;
 - .6 connection wiring schematic diagrams;
 - .7 functionality with integrated systems.
- .4 Each shop drawing or product data sheet is to be properly identified with project name and product drawing or specification reference. Shop drawing or product data sheet dimensions are to match dimension type on drawings.
- .5 Ensure proposed products meet each requirement of Project. Endorse each shop drawing copy "CERTIFIED TO BE IN ACCORDANCE WITH ALL REQUIREMENTS". Include company name, submittal date, and sign each copy. Shop drawings that are received and are not endorsed, dated and signed will be returned to be resubmitted.
- .6 Departmental Representative to review shop drawings and indicate review status by stamping shop drawing copies as follows:
 - .1 "REVIEWED" or "REVIEWED AS NOTED" (appropriately marked) – If Departmental Representative's review of shop drawing is final, Departmental Representative to stamp shop drawing;
 - .2 "REVISE AND RESUBMIT" – If Departmental Representative's review of shop drawing is not final, Departmental Representative to stamp shop drawing as stated above, mark submission with comments, and return submission. Revise shop drawing in accordance with Departmental Representative's notations and resubmit.
- .7 Following is to be read in conjunction with wording on Departmental Representative's shop drawing review stamp applied to each and every shop drawing submitted:

"THIS REVIEW BY DEPARTMENTAL REPRESENTATIVE IS FOR SOLE PURPOSE OF ASCERTAINING CONFORMANCE WITH GENERAL DESIGN CONCEPT. THIS REVIEW DOES NOT MEAN THAT DEPARTMENTAL REPRESENTATIVE APPROVES DETAILED

DESIGN INHERENT IN SHOP DRAWINGS, RESPONSIBILITY FOR WHICH REMAINS WITH CONTRACTOR. DEPARTMENTAL REPRESENTATIVE'S REVIEW DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR ERRORS OR OMISSIONS IN SHOP DRAWINGS OR OF CONTRACTOR'S RESPONSIBILITY FOR MEETING REQUIREMENTS OF CONTRACT DOCUMENTS. BE RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT JOB SITE, FOR INFORMATION THAT PERTAINS SOLELY TO FABRICATION PROCESSES OR TO TECHNIQUES OF CONSTRUCTION AND INSTALLATION, AND FOR CO-ORDINATION OF WORK OF SUB-TRADES."

- .8 Submit each system and each major component as separate shop drawing submissions. Submit together shop drawings for common devices such as devices of each system.
- .9 Obtain shop drawings for submission from product manufacturer's authorized representatives and supplemented with additional items specified herein.
- .10 Do not order product until respective shop drawing review process has been properly reviewed with the Departmental Representative.
- .11 Where extended warranties are specified for equipment items, submit specified extended warranty with shop drawing submittal.
- .12 Refer to specific requirements in other Sections.

3.02 EQUIPMENT LOADS

- .1 Supply equipment loads (self-weight, operating weight, housekeeping pad, inertia pads, etc.) to Departmental Representative, via shop drawing submissions, prior to construction.
- .2 Where given choice of specific equipment, actual weight, location and method of support of equipment may differ from those assumed by Departmental Representative for base design. Back-check equipment loads, location, and supports, and include necessary accommodations.
- .3 Where supporting structure consists of structural steel framing, it is imperative that equipment loads, location, and method of support be confirmed prior to fabrication of structural steel. Review locations of equipment with Departmental Representative prior to construction.

3.03 OPENINGS

- .1 Supply opening sizes and locations to Departmental Representative to allow verification of their effect on design, and for inclusion on structural drawings where appropriate.
- .2 No openings are permitted through structures without written approval from Departmental Representative. Show required openings on a copy of drawings. Identify exact locations, elevations, and size of proposed openings and submit to Departmental Representative for review, well in advance of doing work.

Prior to leaving site at end of each day, walk through areas of work and check for any openings, penetrations, holes, and/or voids created under scope of work of project, and ensure that any openings created under scope of work have been closed off, fire-stopped and smoke-sealed. Do not leave any openings unprotected and unfinished overnight.

3.04 SCAFFOLDING, HOISTING, AND RIGGING

- .1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to approval by Departmental Representative.
- .2 Use scaffolds in such a manner as to interfere as little as possible with Owner operations.
- .3 Do not place major scaffolding/hoisting equipment loads on any portion of structure without approval from Departmental Representative. No supports, clips, brackets or similar devices are to be welded, bolted or otherwise affixed to any finished member or surface without review and approval from Departmental Representative.
- .4 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

3.05 HOARDING AND FENCING

- .1 Provide required hoarding, fencing, safety devices, and safety barriers, and provide required temporary safety rails, and weather tight and/or protective covers, etc., to comply with Occupational Health and Safety Acts and maintain same in a safe condition until total completion of this Contract or until directed by the Departmental Representative, whichever is sooner. Safety rails, weather tight and/or protective covers, etc., to be provided to excavations, concrete floor edges, perimeters of slabs, openings, stairwells, etc. Provide fencing and/or hoarding around construction areas and staging areas in compliance with local governing authority and code requirements. Remove safety barriers at completion of work as coordinated with the Departmental Representative.

3.06 NOISE ABATEMENT

- .1 Provide full co-operation and protective measures in minimizing excessive noise due to construction operations.
- .2 No pneumatic tools and other excessively noisy and disruptive tools, machinery and equipment to be permitted without written approval of the Departmental Representative and review with the Departmental Representative.
- .3 Conduct a daily review of site to ensure that materials and temporary structures are secure. Allow for inspection by the Departmental Representative. Rectify any deficiencies as instructed by the Departmental Representative.
- .4 Prior to issuance of a Certificate of Substantial Performance of the Work, review roof or other areas of site with the Departmental Representative to ensure that temporary construction materials and structures are removed. Submit to the Departmental Representative, final field review report stating that roof or other site areas are cleared of temporary construction materials and structures. Certificate of Substantial Performance of the Work is not to be granted until the Departmental Representative reviews condition of site to be satisfactory.

3.07 CHANGES IN THE WORK

- .1 Whenever the Departmental Representative proposes in writing to make a change or revision to design, arrangement, quantity, or type of any work from that required by

Contract Documents, prepare and submit to Departmental Representative for review, a quotation detailing proposed cost for executing change or revision.

- .2 Quotation to be a detailed and itemized estimate of product, labour, and equipment costs associated with change or revision, plus overhead and profit percentages and applicable taxes and duties.
- .3 Unless otherwise specified in Divisions 00, following additional requirements apply to quotations submitted:
 - .1 when change or revision involves deleted work as well as additional work, cost of deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from cost of additional work before overhead and profit percentages are applied to additional work;
 - .2 costs for journey person and apprentice labour must not exceed prevailing rates at time of execution of Contract and must reflect actual personnel performing work;
 - .3 costs for rental tools and/or equipment are not to exceed local rental costs;
 - .4 overhead percentage will be deemed to cover quotation costs other than actual site labour and materials, and rentals;
 - .5 quotations, including those for deleted work, to include a figure for any required change to Contract time.
- .4 Quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal. Failure to submit a proper quotation to enable Departmental Representative to expeditiously process quotation and issue a Change Order will not be grounds for any additional change to Contract time.
- .5 Make requests for changes or revisions to work in writing to Departmental Representative and, if accepted by Departmental Representative, Notice of Change to be issued.
- .6 Do not execute any change or revision until written authorization for change or revision has been obtained from Departmental Representative and reviewed with Departmental Representative.

3.08 NOTICE FOR REQUIRED FIELD REVIEWS

- .1 Whenever there is a requirement for the Departmental Representative to perform a field review prior to concealment of any work, to inspect/re-inspect work for deficiencies prior to Substantial Performance of the Work, for commissioning demonstrations, and any other such field review, give minimum 7 working days' notice in writing to Departmental Representative.
- .2 If the Departmental Representative is unable to attend a field review when requested, arrange an alternative date and time.
- .3 Do not conceal work until the Departmental Representative advises that it may be concealed.
- .4 When the Departmental Representative is requested to perform a field review and work is not ready to be reviewed, reimburse Departmental Representative for time and travel expenses.

3.09 TEMPORARY SERVICES

- .1 Coordinate with the Departmental Representative any requirements for temporary services including but not limited to temporary electrical power, lighting, heating and exit pathways.

- .2 Maintain fire protection of areas which may include fire watch during temporary shutdowns of existing systems, in accordance with requirements of local governing code and local governing authorities.
- .3 Where existing washroom facilities are not to be used as directed by the Departmental Representative, provide temporary stand-alone facilities.
- .4 Throughout duration of project, water and power may be taken from existing services in building, as reviewed and approved by The Departmental Representative. Confirm power connection points with the Departmental Representative. Only amount of water and power required for normal and proper execution of work may be used. Pay for unusual or unwarranted consumption of water and power.

3.10 STORAGE AND HANDLING OF MATERIALS

- .1 Coordinate storage requirements for project material/equipment in advance, and store material/equipment in accordance with the Departmental Representative's instructions and space restrictions.
- .2 Store materials to be reused, recycled and salvaged in locations as directed by the Departmental Representative.
- .3 Unless specified otherwise, materials for removal and not being reused become Contractor's property and to be properly disposed off-site.
- .4 Protect, stockpile, store and catalogue salvaged items.

3.11 PARKING AND TRAFFIC CONTROL

- .1 Arrange for own parking outside of site. Limited parking may be available onsite, but confirm availability with the Departmental Representative.
- .2 Control traffic to and from Place of the Work to public roads where public pedestrian and vehicular traffic occurs. Conform to local traffic regulations, parking authority and police instructions.
- .3 Where work requires closure of public roads, sidewalks, and/or use of properties/spaces of adjacent buildings/lots, include necessary arrangements and costs to obtain approvals for such use, from respective authorities and/or The Departmental Representatives/Property Managers. Include for required police supervision, where applicable.

3.12 PROTECTION AND SECURITY

- .1 Protect existing services, structures and other items required to remain and newly installed Work during construction with secure and durable coverings, barricades, or guards suitable for various conditions. Perform Work in a manner to avoid damage.
- .2 The Owner's personnel and public will be occupying existing building during execution of Work. Provide for safety of occupants and for security of occupied areas. Provide protection and keep clear areas that are required for access to, and exit from, occupied areas. Maintain clear and safe fire exit routes.
- .3 Protect existing areas above, below and adjacent areas of Work from any debris, noise or interruptions to existing services to satisfaction of The Departmental Representative.

Maintain existing services to these areas in operation to allow the Owner to have continued use of areas. If services that are required to be maintained and run through areas of renovations, provide necessary protection to services or reroute, to the review and approval of The Departmental Representative. Include for required premium time work to meet these requirements.

- .4 Where construction operations are executed or traffic routed over finished floors, lay minimum 6 mm (thick plywood coverings tightly fitted over surface in such areas. Secure plywood to prevent movement in a manner which will not damage finished surfaces.
- .5 Cover openings in equipment, ducts, and pipes until final connections are made.
- .6 Protect exposed live electrical equipment during construction for personal safety.
- .7 Shield and mark live electrical parts with appropriate warnings.
- .8 Wherever practical, barricade and lock finished areas.
- .9 Ensure continuous security of Work and construction equipment.
- .10 Perform special precautions when using ladders. As one worker is on a ladder, position another worker at bottom of ladder to maintain watch and to, secure/support ladder. Erect a safety barrier as required around ladder.
- .11 Provide rigid structural safety barriers in compliance with safety requirements of local governing authority having jurisdiction, around perimeter of excavation work. Provide proper warning signage.
- .12 Properly secure tools and Products at end of each Working Day. The Departmental Representative will not be held responsible for any material/Product losses and/or theft

3.13 WASTE MANAGEMENT

- .1 Audit, separate and dispose of construction waste in whole or in part, in accordance with Ontario Regulations 102 and 103 made under Environmental Protection Act.
- .2 The goal is to recycle or re-use to a 90% level. Review methods to achieve this with the Departmental Representative. Advise where this will not be achievable.
- .3 Develop a Construction Waste Management Plan, outlining what waste materials are expected, and how waste will be diverted away from landfill. Identify in the Plan appropriate unused material handling and disposal protocols, recycling opportunities and manufacturer take-back programs. During regular periods reviewed with The Departmental Representative, submit copies of waste hauling certificates or receipts with documentation of recovery rates for all materials where a portion is recycled and/or reused and a portion is landfilled.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Separate and store materials produced during dismantling of structures in designated areas.
- .6 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
- .7 Fires and burning of rubbish or waste onsite is prohibited.
- .8 Do not bury rubbish or waste materials.

- .9 Do not dispose of waste into waterways, storm, or sanitary sewers.
- .10 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .11 Empty waste containers on a regular basis.

3.14 DUST AND WATER CONTROLS

- .1 Provide protective measures necessary to ensure that existing building and adjacent areas to work of this contract will remain free from entry of dust or water at all times. Existing areas and rooms to be in use during construction period. Conduct work to minimize interferences. Exercise extreme care and caution to protect existing equipment and other components from contamination by dust and debris.
- .2 Include for following work
 - .1 Provide required temporary enclosures and protective measures to protect existing equipment for the entire duration of work in existing areas. Erect and maintain interior enclosures to isolate renovation from other areas and existing equipment.
 - .2 Prior to commencement of Work, protect existing equipment within work area with drop cloths, air barriers, protective panels, and enclosures. Such measures to prevent any debris from falling onto existing equipment, and to prevent dust migration from occurring. Support drop cloths from ceiling or other structure at a minimum 600 mm above existing equipment, or other equipment as designated by The Departmental Representative. Do not allow tools, drop cloths, materials, and construction aids to be placed on or against electrical or mechanical equipment unless such equipment has been properly and safely shutdown for performance of work and coordinated with the Departmental Representative.
 - .3 Thoroughly clean following items prior to bringing into existing areas and rooms:
 - tools, equipment, and other construction aids;
 - materials, parts, and other components to be installed;
 - pipe, ducts and conduit: Remove dirt and scale for inside and outside surfaces;
 - workers apparel.
 - .3 To extent possible, perform cutting, drilling, welding, soldering, sanding, painting, finishing, and other construction operations outside existing areas in locations reviewed and approved by The Departmental Representative.
 - .4 Work performed within existing areas:
 - .1 Continuously operate HEPA vacuum cleaner/ HEPA dust collectors to remove residue when cutting, filing, drilling or other similar work being performed within existing areas. Remove particles with HEPA vacuum cleaner during operation producing residues.
 - .2 Welding, soldering, and other fume producing operations being performed within existing areas: Provide supplemental power ventilation to building exterior. Do not commence fume-producing operations until ventilation apparatus is approved by the Departmental Representative.

- .3 At end of workday remove tools and materials from existing areas or place within room at location designated by the Departmental Representative.
- .4 Maintain work areas free of waste material, debris, and rubbish. Immediately remove debris and rubbish from areas of Work and associated pipe chases, plenums, access floor spaces, and above suspended ceiling.
- .5 Provide temporary dustproofing partitions as required prior to demolition. Treat openings, joints and cracks in enclosures to prevent any dust and moisture from entering existing adjacent areas.
- .6 Where dustproof partitions are relocated for tying in of materials install partition from floor to ceiling and from ceiling to underside of slab without damaging finishes.
- .7 Damp mop surfaces in construction areas continually during demolition and daily during normal construction.
- .8 Seal ventilation ducts to or from construction area.
- .9 Allow the Departmental Representative to review erected partitions before proceeding with any construction and/or demolition work.
- .10 Do not remove dustproof partitions until areas have been reviewed and accepted by the Departmental Representative.
- .11 Carefully remove dustproof partitions and clean surfaces including walls, ceilings, floors, and top of equipment to the Departmental Representative's acceptance.
- .12 Be responsible for ventilation of fumes and odours that may occur during construction. Include for temporary partitions and temporary exhaust fans to ensure that fumes are properly extracted from work area.

3.15 WORKMANSHIP AND MATERIALS

- .1 Materials used in execution of contract to be new and of best quality to do work for which it is intended. No defective, unsound, or used material will be permitted.
- .2 Manufactured articles, material, and equipment to be applied, installed, connected, erected, cleaned, and conditioned in strict accordance with applicable manufacturer's instructions and directions.
- .3 Make no deviations from specifications or drawings without written request to the Departmental Representative and subsequent Departmental Representative's review and response.
- .4 Where evidence exists that defective work has occurred or that work has been carried out incorporating defective materials, or work has been damaged due to unprotected conditions, the Departmental Representative may have tests, inspections, surveys, analytical calculations of equipment performance and like to help determine whether work is to be corrected or replaced. These tests, inspections, etc. are to be made at Contractor's expense, regardless of their results.
- .5 Conduct testing in accordance with requirements of CSA, local governing codes, and local governing authorities, except where this would, in the Departmental Representative's opinion, cause undue delay or give results not representative of rejected material in place. In this case, tests are to be conducted in accordance with standards given by the Departmental Representative and/or Commissioning Authority.

- .6 Materials or work which fails to meet specified requirements may be rejected by the Departmental Representative whenever found at any time prior to final acceptance of work regardless of previous inspections. If rejected, defective materials or work is to be promptly removed and replaced, or repaired to the satisfaction of the Departmental Representative, at no expense to the Owner.

3.16 CONSTRUCTION MACHINERY AND EQUIPMENT

- .1 Unless otherwise specified or directed, supply, erect and operate scaffolding, rigging, hoisting equipment and associated hardware required for work, and subject to the review and approval of the Departmental Representative.
- .2 Comply with codes, by-laws, and regulations governing erection and use of scaffolding and other equipment used for preparation, fabrication, conveying, and erection of Work.
- .3 Submit erection drawings if required by local authority having jurisdiction and the Departmental Representative.
- .4 Submit to the Departmental Representative for review prior to start of work, erection and layout drawings and list of scaffolding, machinery, and equipment intended to be used in equipment rooms.
- .5 Erect scaffolding independent of walls and in a manner to avoid interference with parts of Work in progress. Obtain review and approval from the Departmental Representative.
- .6 Do not place major scaffolding/hoisting equipment loads on any portion of structure without review and approval from the Departmental Representative
- .7 Provide and maintain required shoring and bracing in accordance with Construction Safety Act and other applicable regulations.
- .8 Prevent sprayed materials from contaminating air beyond application area, by providing temporary enclosures.
- .9 Immediately remove from site scaffolding, rigging and hoisting equipment when no longer required.

3.17 PATCHING AND MAKING GOOD

- .1 Patching and making good to be responsibility of Electrical Contractor and be performed by trade specialist in particular material to be treated, and to be made indistinguishable in finished work when viewed from distance of 1500 mm under normal lighting. Unless otherwise approved by the Departmental Representative patch openings and penetrations same day as cutting/drilling of work. Provide fire stopping and smoke seal materials in fire rated construction as specified in another Section.
- .2 Where existing openings are indicated as filled in, new openings cut into existing walls, existing items removed, or any form of alteration to existing surface or material is made, term "Make Good" is deemed to apply whether specifically noted or not.
- .3 Where term "Make Good" is implied or used on drawings or in Specifications to refer to repairing or filling operations performed on existing floors, walls, ceilings or any other exposed surfaces, it is intended that finished surfaces match and line with existing adjoining surfaces.
- .4 Where existing surfaces are damaged by Work and/or where existing devices are removed from wall, ceilings, floors and other surfaces, and such deleted devices are not being

replaced in same locations, patch locations of these removed devices and re-finish. Patching and finishing is to be provided by tradesmen skilled in particular trade or application worked on by trade. Include for:

- .1 preparing existing surfaces to be filled and repainted to be cleaned as required to remove dirt, dust, oil, grease, loose paint, rust and any other foreign matter which would prevent proper bonding of new finish; sand glossy surfaces to uniform dull texture;
- .2 filling in and patching surfaces with same material as existing surfaces; finished surfaces to match and line with existing adjoining surfaces.
- .3 providing fire stopping materials to maintain fire rating of surfaces penetrated.

END OF SECTION

1 GENERAL**1.01 MEETINGS**

- .1 Hold Project and coordination meetings on site or other pre-arranged location, on a weekly basis coordinated and confirmed with The Departmental Representative.
- .2 Organize each meeting and send out appropriate notices to The Departmental Representative, Subcontractors, and any other persons whose presence is required.
- .3 Attendance by Contractors is mandatory.
- .4 Take minutes of meetings and submit copies of minutes to parties present and any other party as necessary.

1.02 START-UP MEETING

- .1 Within 5 working days prior to construction start-up meeting, submit construction schedule for review and approval by the Departmental Representative.
- .2 Schedule and arrange start-up meeting as reviewed and approved by the Departmental Representative for attendance by parties in Contract to discuss and resolve administrative procedures and responsibilities.
- .3 Agenda to include but not be limited to following:
 - .1 appointment of official representative of participants in Work;
 - .2 schedule of Work, progress scheduling;
 - .3 ordering of and delivery schedule of specified equipment;
 - .4 shop drawing submissions;
 - .5 site security, emergencies, protective measures;
 - .6 supplementary instructions, contemplated changes, change orders, procedures, approvals required, mark up percentages permitted, time extension, overtime, administrative requirements;
 - .7 record drawings, maintenance manuals, take over procedures, acceptance, warranties;
 - .8 administrative procedures, holdbacks;
 - .9 insurances, transcripts of policies, Workers' Compensation.

1.03 PROGRESS MEETINGS

- .1 During course of Work, administer and schedule weekly progress meetings and any additional as may be required until project completion.
- .2 Agenda to include but not be limited to following:
 - .1 review, approval of minutes of previous meeting;

- .2 review of work progress since previous meeting;
- .3 field observations, problems, conflicts;
- .4 problems which impede construction schedule;
- .5 corrective measures and procedures to regain projected schedule;
- .6 revisions to construction schedule;
- .7 progress schedule during succeeding work period and effect on occupants;
- .8 review submittal schedules for samples and shop drawings and expedite as required;
- .9 maintenance of quality standards;
- .10 pending changes and substitutions;
- .11 review proposed changes for effect on construction schedule and on completion date;
- .12 other business deemed necessary to project.

1.04 SUBMITTALS

- .1 Submit to the Departmental Representative following:
 - .1 construction schedules;
 - .2 shop drawings;
 - .3 samples;
 - .4 product data;
 - .5 certification and verification of performance;
 - .6 operating and maintenance manuals;
 - .7 as-built record documents;
 - .8 progress and submittals schedules;
 - .9 progress and daily reports;
 - .10 inspection and test reports;
 - .11 warranties;
 - .12 certificates and transcripts;
 - .13 other items requested by the Departmental Representative.
- .2 Submit submittals with reasonable promptness and in an orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default

will be allowed.

- .3 Work affected by submittal is not to proceed until review by the Departmental Representative is complete.
- .4 Review submittals prior to submission to the Departmental Representative. Review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of the Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and will be considered rejected.
- .5 Verify field measurements and coordinate affected adjacent Work.
- .6 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representatives review of submittals.
- .7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representatives review.
- .8 Maintain minimum one reviewed copy of each submission at Place of the Work.

1.05 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract and when reviewed with the Departmental Representative, submit Workplace Safety and Insurance Board/Workers' Compensation Board status, transcription of insurances, and as specified Performance Bond and Labour and Material Payment Bond.

1.06 REQUEST FOR INFORMATION (RFI)

- .1 Review contract documents for information prior to issuance of RFI during performance of Work. Where it is determined, at discretion of the Departmental Representative and Departmental Representative, that information requested in RFI was readily identifiable as part of contract documents, respective trades Contractor to be back-charged against their contract amount for time spent by Departmental Representative and/or Departmental Representative in preparing response to RFI.
- .2 Where information is required during construction period, submit request for information to the Departmental Representative in writing, clearly identifying:
 - .1 Contractor's company name, address and telephone number, and designated contact person;
 - .2 project title and the Departmental Representative's project number;
 - .3 name of the Departmental Representative's contact person;
 - .4 RFI tracking number and date of submission;
 - .5 description of information required with related specification section number, page number and paragraph number referenced; or if drawing related, drawing number with co-ordinates or note number referenced, as applicable.
- .3 RFI process of submission: At start-up meeting review RFI process requirements with The Departmental Representative. Unless otherwise noted by or reviewed with the Departmental Representative, allow the Departmental Representative minimum of 5

working days to respond to RFI, from the Departmental Representative's date of acknowledged receipt, and based upon a regular and reasonable flow of RFIs. If, for any reason, the Departmental Representative requires additional time beyond 5 working days, the Departmental Representative to provide Contractor with notice indicating additional time required. If, at any time, Contractor submits unusually large number of RFIs or RFIs of complex nature, such that the Departmental Representative cannot process these RFIs within 5 working days, the Departmental Representative to advise Contractor of estimate of time necessary for processing.

1.07 OPERATING AND MAINTENANCE MANUALS

- .1 For each item of equipment for which a shop drawing is required (except for simple equipment), supply minimum 3, project specific, indexed copies of equipment manufacturers' operating and maintenance (O&M) instruction data manuals. Confirm exact quantity of manuals with the Departmental Representative. Consolidate each copy of data in an identified hard cover three "D" ring binder. Each binder to include:
 - .1 front cover: project name label; wording to identify respective Division of Work - "Name of Division" Systems Operating and Maintenance Manual"; and date;
 - .2 introduction sheet listing the Departmental Representative, Contractor, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses;
 - .3 equipment manufacturer's authorized contact person name, telephone number and company website;
 - .4 Table of Contents sheet, and corresponding index tab sheets;
 - .5 copy of each "REVIEWED" or clean, updated "REVIEWED AS NOTED" shop drawing or product data sheet, with manufacturer's/supplier's name, telephone and fax numbers, email address, company website address, and email address for local source of parts and service; when shop drawings are returned marked "REVIEWED AS NOTED" with revisions marked on shop drawing copies, they are to be revised by equipment supplier to incorporate comments marked on "reviewed" shop drawings and a clean updated copy is to be included in operating and maintenance manuals;
 - .6 additional general information as follows:
 - description of each system and its controls.
 - wiring and connection diagrams, and control schematics.
 - explanation of operational principles with operational instruction for each system and each component.
 - description of actions to be taken in event of emergencies and/or equipment failure.
 - .7 maintenance data as follows:
 - operation and trouble-shooting instructions for each item of equipment and each system;
 - schedules of tasks, frequency, tools required, and estimated task time;
 - recommended maintenance practices and precautions including warnings of any maintenance practice that will damage or disfigure

equipment/systems;

- complete parts lists with numbers.

.8 performance data as follows:

- equipment and system start-up data sheets;
- equipment performance verification and test results, and final commissioning reports;
- warranties;
- inspection certificates issued by regulatory authorities.

.9 as applicable, additional information for Electrical Divisions of copies of additional and revised panelboard directories.

.2 Generally, binders are not to exceed 75 mm (3") thick and not to be more than 2/3 full.

.3 Operating and maintenance instructions are to relate to job specific equipment supplied under this project and related to the Departmental Representative's building. Language used in manuals is to contain simple practical operating terms and language easy for in-house maintenance staff to understand how to operate and maintain each system.

.4 Before applying for a Certificate of Substantial Performance of the Work, assemble one draft copy of O & M Manual and submit to The Departmental Representative for review prior to assembling remaining copies. Incorporate The Departmental Representative's comments into final submission.

1.08 RECORD AS-BUILT DRAWINGS

.1 As work progresses at site, clearly mark in red in a neat and legible manner on a set of bound white prints of Contract Drawings, changes and deviations from routing of services and locations of equipment shown on Contract Drawings, on a daily basis. Changes and deviations include those made by addenda, change orders, and site instructions. Use notes marked in red as required. Maintain white print red line as-built set at site for exclusive use of recording as-built conditions, keep set up-to-date, and ensure set is available for periodic review. As-built set is also to include following:

- .1 dimensioned location of inaccessible concealed work;
- .2 locations of control devices with identification for each;
- .3 location and identification of devices in concealed locations such as accessible ceiling spaces and raised floors;
- .4 location of concealed services terminated for future extension and work concealed within building in inaccessible locations.
- .5 identify routing and location of concealed conduits/ducts of diameter 50 mm and greater.

.2 Before applying for a Certificate of Substantial Performance of the Work, update a clean copy of Contract Drawing set in accordance with marked up set of "as-built" white prints including deviations from original Contract Drawings, thus forming an "as-built" drawing set. Submit "as-built" site drawing prints to the Departmental Representative for review.

Make necessary revisions to drawings as per the Departmental Representative's comments to the satisfaction of the Departmental Representative.

- .3 Submitted drawings are to be of same quality as original Contract Drawings. CAD drawing files are to be compatible with AutoCAD software release version reviewed with the Departmental Representative.
- .4 Prepare and submit for review with record drawings, a neat, clear, properly identified, "as-built" electrical distribution riser diagram record drawing (in AutoCAD format release version reviewed with The Departmental Representative) of entire electrical distribution system up to and including line side connections to panelboards. Building and room outlines are to reflect "as-built" outlines. Include in diagrams for feeder types and sizes, conduit sizes, breaker, switchboard and distribution panel sizes, etc. Submit sample version to The Departmental Representative for review and comments prior to final manufacturer. Size diagrams same size as issued full Size Drawings.
- .5 Include on single lines, panelboard locations identified by room numbers below panel. When specific identified location is not available, nearest available room number to be used followed by a (Δ) triangle to flag approximate location. Encircle various loads by Building Wings (where applicable) for ease of identification. Group lighting loads on panelboards on top of panel. Identify motor control centres and splitters similar to panelboards. Identify fuse sizing including existing equipment where there is no difficulty in obtaining information. Use these requirements for pricing, and review exact requirements with the Departmental Representative prior to commencing work.
- .6 Replace existing posted single line electrical distribution drawings with revised to reflect renovations and revisions to electrical distribution equipment. Drawings to be of type to match existing as confirmed with the Departmental Representative.

1.09 BOOKS AND RECORDS OF CONTRACTOR

- .1 Maintain proper books and records showing expenditures in connection with construction of Work. Retain onsite, a permanent written record of construction schedule coordinated and accepted by the Departmental Representative of progress of work showing dates of commencement and completion of parts of work. Make this record available for inspection by the Departmental Representative's representative at all times.
- .2 Maintain on site or at some other location reviewed with the Departmental Representative, records relevant to valuation of the Work, including books of account, invoices, and statements. Make records available at all reasonable times for inspection by the Departmental Representative and Federal and Provincial Auditors.
- .3 Assist such inspection for purpose of establishing and determining quantity, quality and cost of materials and equipment purchased and used in the Work.

1.10 PROGRESS AND SUBMITTALS SCHEDULES

- .1 Submit following schedules to The Departmental Representative within 10 working days from date of award of Contract unless otherwise specified herein:
 - .1 Progress schedule:
 - Prepare a progress schedule of the Work consistent with work schedule. Allow time for preparing and reviewing shop drawings, delivery of major

items and equipment, and completion of work of each Subcontractor or special operation required to perform Work. Coordinate Progress Schedule with Schedule of Service shutdowns.

- Maintain progress schedule up to date and advise parties concerned of changes.
- Print and issue copies to parties concerned. Issue revised copies at suitable intervals.

.2 Submittals schedules:

- Prepare and submit schedule listing shop drawings showing anticipated date of submission and date review is required.
- Prepare and submit schedule listing samples showing anticipated date of submission and date review is required.
- Prepare and submit a schedule for delivery of equipment showing anticipated date of arrival.
- Coordinate these schedules with progress schedule.

.3 Cost breakdown and cash flow schedule:

- Prepare cost breakdown for each section of the Work and a monthly cash flow schedule coordinated with progress schedule.
- Submit draft format for review with the Departmental Representative.
- Submit cost breakdown and cash flow schedule 15 working days or more prior to first application for payment.
- Maintain cash flow schedule up to date with progress schedule and advise the Departmental Representative of changes.
- Issue revised copies to the Departmental Representative at time of each change.

1.11 PROGRESS AND DAILY REPORTS

.1 Progress reports:

- .1 Submit to The Departmental Representative monthly progress reports with each progress payment claim consisting of a concise description and marked-up schedule showing physical percentage complete by item and in total.

.2 Daily reports:

- .1 Maintain in field office at Place of the Work a written daily record of progress of parts of the Work available for review with the Departmental Representative. Show dates of commencement and completion of parts of the Work, daily high and low temperatures and other weather particulars, number of people engaged on the Work (including sub-trades) broken down in groups for each part of the Work.

1.12 PROJECT INSPECTION, TESTING, START-UP AND VERIFICATION WORK

- .1 Perform complete inspection, testing, adjusting, start-up, and verification of

systems and equipment. Prepare and submit copies of completed testing reports to the Departmental Representative.

- .2 Expedite and complete deficiencies and defects identified by the Departmental Representative.
- .3 Prior to application for Certificate of Substantial Performance of the Work carefully inspect Work and ensure it is complete, that major and minor construction deficiencies are complete and/or corrected and building is clean and in condition for occupancy. Notify the Departmental Representative in writing, of Satisfactory Completion of the Work and request an inspection. Arrange for a final inspection tour with the Departmental Representative.
- .4 Submit to the Departmental Representative, written request for final inspection of systems. Include written certification that:
 - .1 deficiencies noted during job inspections have been completed;
 - .2 field quality control procedures have been completed, maintenance and operating data have been completed and submitted to, and reviewed with the Departmental Representative;
 - .3 tags and nameplates are in place and equipment identification have been completed;
 - .4 cleaning up is complete;
 - .5 spare parts and replacement parts specified have been provided and acknowledged by the Departmental Representative;
 - .6 as-built and record drawings have been completed and submitted to, reviewed and accepted by The Departmental Representative;
 - .7 The Departmental Representative's staff has been instructed in operation and maintenance of systems;
 - .8 commissioning procedures have been completed to satisfaction of the Departmental Representative.
 - .9 nameplates, signage and operating and maintenance manuals are to satisfaction of the Departmental Representative;
 - .10 systems have been tested and verified, and are ready for operation;
- .5 After the Departmental Representatives inspections, correct list of deficiencies and defects prepared by the Departmental Representative.
- .6 When the Departmental Representative considers deficiencies and defects have been properly corrected and it appears requirements of Contract have been performed, make application for Certificate of Substantial Performance.

1.13 EQUIPMENT AND SYSTEM MANUFACTURER'S CERTIFICATION

- .1 When equipment/system installation is complete, but prior to start-up procedures, arrange and pay for equipment/system manufacturer's authorized representative to visit site to examine installation, and after any required corrective measures have been made, to certify in writing to the Departmental Representative that equipment/system installation is complete and in accordance with equipment/system manufacturer's instructions.

1.14 EQUIPMENT AND SYSTEM START-UP

- .1 When installation of equipment/systems is complete but prior to commissioning, perform start-up for equipment/systems as specified in respective work Sections in accordance with following requirements:
 - .1 submit a copy of each equipment/system manufacturer's start-up report sheet to the Departmental Representative for review, and incorporate any comments made by the Departmental Representative;
 - .2 under direct on-site supervision and involvement of equipment/system manufacturer's representative, start-up equipment/systems, make any required adjustments, document procedures, leave equipment/systems in proper operating condition, and submit to The Departmental Representative complete set of start-up documentation sheets signed by manufacturer/supplier and Contractor.

1.15 CONTRACT CLOSE-OUT

- .1 Collect reviewed submittals, and assemble documents executed by Subcontractors, suppliers and manufacturers. Also include (as applicable):
 - .1 documentation in respect to requirements of the Construction Lien Act;
 - .2 Statutory Declarations;
 - .3 Indemnification Forms;
 - .4 Warranties;
 - .5 Certificates of Approval or Acceptance from Regulatory Authorities;
 - .6 certificate of good standing from Workplace Safety and Insurance Board/Workers' Compensation Board for Prime Contractor and Subcontractors;
 - .7 Final Statutory Declaration from Contractor and Sub-Trades;
 - .8 confirmation that federal, provincial, and/or municipal authorities have given their formal approval on the Work;
 - .9 reference records as specified;
 - .10 certificate of inspection from the Departmental Representatives, as applicable;
 - .11 certification that systems have been tested and are ready for operation;
 - .12 certification that adjusting of systems is completed;
 - .13 certification that the Owner's operating personnel have been instructed in proper operation of systems and equipment and have received operating and maintenance manuals and other pertinent records and schedules;
- .2 Submit material prior to final application for payment. For equipment put into use with the Departmental Representative's permission during construction, submit within 10 working days after start-up. For items of Work delayed materially beyond date of Substantial Completion, provide updated submittal within 10 working days after acceptance, listing date of acceptance as start of warranty period.

- .3 Review maintenance manual contents (operating, maintenance instructions, record "as-built" drawings, spare parts, materials) for completeness.
- .4 Review cash allowances in relation to Contract Price, change orders, holdbacks and other Contract Price of Adjustments.
- .5 Attend "end-of-work" testing and break-in or start-up demonstrations.
- .6 Review inspection and testing reports to verify conformance to intent of documents and that changes, repairs or replacements have been completed.
- .7 Review condition of equipment which have been used in course of the work to ensure turning over at completion in "as new condition" with warranties, dated, and certified from time of Substantial Performance of the Work.
- .8 Arrange and coordinate instruction of the Departmental Representative's staff in care, maintenance, and operation of systems by suppliers or Subcontractors.
- .9 Coordinate building accessibility, traffic, and Contractor's and Subcontractor's cleaning-up and completion activities with the Owner's moving-in of staff, furnishings, and equipment, all to suit the Owners's work schedule and not disrupt Owner's productivity.
- .10 Provide on-going review, inspection and attendance to building call-back, maintenance and repair problems during the warranty period.
- .11 Provide warranties fully executed
- .12 Submit a final statement of accounting giving total adjusted Contract Sum, previous payments and monies remaining due
- .13 The Departmental Representative will issue a final change order reflecting approved adjustments to Contract Sum not previously made.

1.16 FINAL INSPECTION

- .1 Submit to Departmental Representative, written request for final inspection of systems. Include written certification that:
 - .1 deficiencies noted during job inspections have been completed
 - .2 field quality control procedures have been completed
 - .3 maintenance and operating data have been completed and submitted to, reviewed with Departmental Representative and accepted by Departmental Representative;
 - .4 tags and nameplates are in place and equipment identifications have been completed;
 - .5 clean-up is complete;
 - .6 spare parts and replacement parts specified have been provided, as confirmed by Departmental Representative and reviewed with Departmental Representative;
 - .7 as-built and record drawings have been completed and submitted to and reviewed with Departmental Representative and accepted by Departmental Representative;

- .8 Departmental Representative's staff has been instructed in operation and maintenance of systems;
- .9 commissioning procedures have been completed;
- .10 fire alarm verification has been 100% completed and Verification Certificate has been submitted to and accepted by Departmental Representative.

1.17 INSTRUCTIONS TO THE DEPARTMENTAL REPRESENTATIVE

- .1 Instruct the Departmental Representative's designated representatives in aspects of operation and maintenance of systems and equipment listed in trade Sections governed by this Section. Obtain in writing from the Departmental Representative a list of the Departmental Representative's representatives to receive instructions.
- .2 Include services of qualified service technicians and other manufacturer's representatives required for instruction of specialized portions of installation.
- .3 For each item of equipment and for each system for which training is specified, prepare training modules as specified below. Operating and Maintenance Manuals are to be used during training sessions, and training modules to include:
 - .1 Operational Requirements and Criteria: to include but not be limited to equipment function, stopping and starting, safeties, operating standards, operating characteristics, performance curves, and limitations.
 - .2 Troubleshooting: to include but not be limited to diagnostic instructions, test and inspection procedures.
 - .3 Documentation: to include but not be limited to equipment/system warranties, and manufacturer's/supplier's parts and service facilities, telephone numbers, email addresses, and like.
 - .4 Maintenance requirements: to include but not be limited to inspection instructions, types of cleaning agents to be used as well as cleaning methods, preventive maintenance procedures, and use of any special tools.
 - .5 Repair requirements: to include but not be limited to diagnostic instructions, disassembly, component removal and repair instructions, instructions for identifying parts and components, and review of any spare parts inventory.
- .4 Assemble training modules into a training manual and submit a copy to the Departmental Representative for review prior to scheduling training. Ensure that each participant in each training session has required training material.
- .5 Schedule demonstrations and training at mutually agreed to times with minimum of 10 working days' notice given to The Departmental Representative and The Departmental Representative.
- .6 Demonstration and Training Confirmation: Obtain a list of personnel to receive demonstration and training from the Departmental Representative, and after training session is completed, have each participant sign list to confirm their attendance and that person understood demonstration and training session.
- .7 Obtain signatures of the Departmental Representative to verify that they have received operating and maintenance instruction manuals and "As-built" record drawings.
- .8 Make requested submissions and additionally submit to the Departmental

Representative prior to application for a Certificate of Substantial Performance of the Work, a complete list of systems for which instructions were given, stating for each system:

- .1 date instructions were given to the Departmental Representative's staff;
- .2 duration of instruction;
- .3 names of persons instructed;
- .4 other parties present (manufacturer's representative, The Departmental Representatives, etc.).

END OF SECTION

1 GENERAL

1.01 BUILDING USE

- .1 Building to remain in use in areas not immediately affected by the work. Ensure that normal operations and maintenance may be carried out without disruption, except as otherwise noted herein or stated in Bid.
- .2 Work shall be allowed only from **7 a.m. to 7 p.m., Monday to Friday**. Work shall be performed according to the start date and duration given in Bid Document.
- .3 Seventy-two (72) hours written notice to the Departmental Representative and The Departmental Representative is required for work to be performed outside the designated times (if permitted).
- .4 Maintain existing processes in operation during the full construction period. Co-operate with the Departmental Representative's representatives in the building in order to minimize disruptions to building operation and services. Advise the Departmental Representative well in advance of proposed shutdowns of any services, so that the Owner may be consulted regarding the effects of the shutdown.

1.02 ACCESS AND EGRESS

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

1.03 USE OF SITE AND FACILITIES

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

1.04 SECURITY

- .1 Where security has been reduced by Work of Contract, advise the Departmental Representative and provide temporary means to maintain security.
- .2 Security escort:
 - .1 Personnel employed on this project must be escorted when executing work in ***non-public areas***. Personnel must be escorted in all areas after normal working hours.

1.05 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not permitted within the work area or in any area of the building.

1.06 EXISTING SERVICES

- .1 Notify the Departmental Representative of intended interruption of services and obtain required permission.
- .2 When breaking into or connecting to existing services or utilities, give the Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Execute Work at times directed by the Departmental Representative with minimum of disturbance to Work, ***and pedestrian, vehicular traffic, and/or building occupants***
- .4 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of any capped service.

END OF SECTION

1.01 GENERAL

- .1 Perform all work in accordance with current Code requirements and local and municipal by-laws and property standards.
- .2 Building Code: Perform Work in accordance with the [National Building Code of Canada (NBC)] [2020] - including amendments up to the time of bid closing and other codes of provincial or local application.
- .3 Electrical Code: Perform Work in accordance with the Canadian Electrical Code (CEC) - including amendments up to the time of bid closing and other codes of provincial or local application. Contractor shall also comply with provisions set out in the Ontario Electrical Safety Code (OESC) and any direction by the Electrical Safety Authority (ESA).
- .4 All Standards referred to shall be the current editions as amended at the date of issue of Contract Documents.
- .5 If there is a conflict or discrepancy between codes, the most stringent requirements shall apply.
- .6 Specific design and performance requirements listed in Specifications and indicated on Drawings may exceed minimum requirements established by referenced Codes; these requirements will govern over the minimum requirements listed in the referenced Codes.
- .7 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - Regulatory requirements and fees in force at the time of bid closing, and
 - A change in regulatory requirements or fees scheduled to become effective after the time of bid closing and of which public notice has been given before the time of bid closing.
- .8 Notifying the proper municipal inspector in advance (as specified by the inspector) to complete review of any project component the local municipal authority requires. Ensuring that correct municipal reviews are completed shall be solely the Contractor's responsibility. Additional work to expose or re-do uninspected work shall be completed by the Contractor at their expense.

1.02 HAZARDOUS MATERIAL DISCOVERY

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

END OF SECTION

1 GENERAL

1.01 WORK CREW

- .1 Provide qualified site superintendent/foreman who will oversee all work carried out at the site. Site superintendent/Foreman to be capable of communicating effectively in English, familiar with the requirements of the specifications, and present at all times that work is being carried out, including Subcontractor activities.
- .2 Use only thoroughly trained and experienced operators and workers.
- .3 Monitor compliance with the contract schedule on an ongoing basis.
- .4 At no time shall the size of the work crew be decreased from the size indicated on the project schedule.

1.02 SUBCONTRACTORS

- .1 Be responsible that all subcontractors examine the Drawings and Specifications covering their work and the work of all other Subcontractors, which may affect their work.
- .2 Ensure that all work is carried out in compliance with the Contract Documents and to accept responsibility for delays or costs arising from the failure to inspect or adequately co-ordinate a subcontractor's work.
- .3 Commencement of the Work implies acceptance of surfaces and conditions. No claim for damages or resulting extra work will be accepted except where such conditions cannot be determined prior to construction and brought to the Departmental Representative's attention prior to disturbances of conditions.

1.03 INSPECTION

- .1 Allow the Departmental Representative access to Work. Provide reasonably facilities for such access.
- .2 Notify the Departmental Representative, inspection and testing agents not less than 48 hours prior to each part of work being ready for review or testing. Work which requires review or testing shall not be performed on weekends or holidays unless previously agreed to.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work
- .4 Be responsible for payment of costs if the work is not ready when stated and if the Departmental Representative and inspection and testing agency are not given sufficient notice of such delay.
- .5 The Departmental Representative reserves the right to deduct from the Contractor amounts for extra inspection and testing by the Departmental Representative as required for certification of payment of work done to repair a deficiency.
- .6 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Departmental Representative at no cost to the Owner. Pay costs for retesting and reinspection.

1.04 PROCEDURES

- .1 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .2 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.

1.05 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by The Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Correct defects and deficiencies when they are revealed during inspection or testing as advised by the Departmental Representative at no change to Contract Price or Contract Time. Pay costs for retesting and re-inspection. Appointed agency will request additional inspections or tests to ensure full degree of defects or deficiencies are revealed and corrected.
- .3 If in opinion of the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, The Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.06 REPORTS

- .1 Submit copies of inspection and test reports to the Departmental Representative.
- .2 Submit reports for inspection and testing required by Contract Documents or by AHJ and performed by Contractor-retained inspection and testing agencies within ten days after inspection or test is completed.
- .3 Quality control testing and inspection reports to include the following:
 - .1 Project name and number
 - .2 Testing/Inspection agency's name, address, telephone number, and website
 - .3 Date of issuing report
 - .4 Dates and locations of tests, inspections, or samples
 - .5 Description of the Work and test and inspection method
 - .6 Numbers and titles of associated specification Sections
 - .7 Test and inspection data and interpretation of test results (e.g., pass or fail)
 - .8 Ambient conditions at time of test, inspection, or sampling
 - .9 Recommendations on re-testing and re-inspecting, if applicable

END OF SECTION

1 GENERAL

1.01 REFERENCE

- .1 Division 00 and Division 01 apply to and are a part of each Electrical Division Section.

1.02 APPLICATION

- .1 This Section specifies products, criteria and characteristics, and methods and execution that are common to one or more Sections of Electrical Divisions. It is intended as a supplement to each Section of Electrical Divisions and is to be read accordingly.
- .2 Be responsible for advising product vendors of the requirements of this Section.

1.03 SUBMITTALS

- .1 Submit shop drawings for products of this Section.
- .2 Additionally, as part of shop drawing submission process, submit following to the Departmental Representative for review:
 - .1 dimensioned location drawings indicating locations of cutting or drilling required for Electrical Divisions work
 - .2 samples of materials and any other items as specified in succeeding Sections of Electrical Divisions
 - .3 weight loads of selected equipment (upon request)
 - .4 equipment nameplate and warning sign proposed nomenclature, print type, symbols, sizing and colours;
 - .5 fire stopping installation drawings with ULC certifications
 - .6 copies of prior to start of construction approvals from local governing authorities having jurisdiction.
- .3 Prior to application for Substantial Performance of the Work, submit following to the Departmental Representative for review (note: funds will be withheld until each of following items have been completed and documented to satisfaction of Departmental Representative:
 - .1 final distribution system testing documented to satisfaction of the Departmental Representative

2 PRODUCTS

2.01 CONDUITS

- .1 EMT, galvanized electrical metallic tubing to CSA C22.2 No. 83, complete with factory made bends and joints and terminations made with steel couplers and steel set screw type connectors with insulated throats. Provide raintight type fittings where EMT is exposed to water spray of activated sprinklers.
- .2 Hot dipped zinc galvanized steel core, flexible liquid tight metallic conduit to CSA C22.2 No. 56, with flame retardant PVC jacket, complete with terminations consisting of ULC listed, suitable for wet locations, gasketed, steel or iron construction, liquid-tight flexible conduit connectors at terminations.

2.02 PULLBOXES AND JUNCTION BOXES

- .1 Galvanized or prime coat plated steel, suitable for application and complete with hinged covers as required, and connectors suitable for connected conduit.
- .2 Suitable for sprinklered area.
- .3 Physical size of pullboxes to be as required by local electrical code to suit number and size of conduits and conductors.
- .4 Each box to be complete with suitable securing lugs, connectors suitable for connected conduit, knockouts, covers and any other required accessory.

2.03 EMERGENCY SERVICE RECEPTACLES

- .1 Receptacles
 - .1 Hospital specification grade and have the following features.
 - Flush, Nylon, Red face
 - Single outlet
 - Configuration 5-20R
 - 125VAC
 - .2 Hubbell Extra Heavy Duty HBL8310R or approved equal.
- .2 Receptacle Box
 - .1 Receptacle to be mounted in cast malleable iron box "FS" type
 - Single top entry
 - Complete with EMT to NPT threaded waterproof connector.
- .3 Box Cover
 - .1 Cast (or stamped metal) to fit FS box above
 - One hole to fit receptacle above
 - Complete with gasket
 - Weatherproof hinged cover

- .4 Lamacoid label
 - .1 Mechanically fastened with stainless screws.
 - .2 Red with white lettering
 - .3 Circuit designation "EM13-XX"

2.04 FIRESTOPPING AND SMOKE SEAL MATERIALS

- .1 Asbestos-free, elastomeric materials and intumescent materials, tested, listed and labelled by ULC in accordance with CAN/ULC S115, and CAN/ULC S101 for installation in ULC designated firestopping, and smoke seal systems to provide a positive fire, water and smoke seal and a fire resistance rating no less than fire rating for surrounding construction.
- .2 Materials are to be compatible with abutting dissimilar materials and finishes and complete with primers, damming and back-up materials, supports, and anchoring devices in accordance with firestopping manufacturer's recommendations and ULC tested assembly. Coordinate material requirements with trades supplying abutting areas of materials.
- .3 Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.
- .4 For typical standard indoor applications for conduit and cable installations to seal openings up to 25 mm (1"): Hilti "Cable Disc CFS-D 1", pre-formed firestopping solution with features as follows:
 - .1 Approximate Density 1.6 g/cm³;
 - .2 Mold and mildew resistant;
 - .3 Surface burning characteristics (UL 723 (ASTM E84): Flame spread: 0 and Smoke development: 5;
 - .4 Application temperature 0 to 40°C (32-104°F);
 - .5 Percent Fill: up to 100% per tested system;
 - .6 Sound Transmission classification (ASTM E 90): 62 (Relates to specific construction).

2.05 FASTENING AND SECURING HARDWARE

- .1 Concrete inserts - Crane Canada Ltd., No. 4-M for concrete work for single or double conduit, cable tray, etc., runs and equipment. Unistrut Ltd. multiple type inserts for runs of three (3) or more conduits etc., or where a grid support system is required.
- .2 Concrete fasteners – "WEJ-IT" anchors, lead cinch anchors and/or "STAR" or "PHILLIPS" self-drilling anchors.
- .3 Masonry inserts – "WEJ-IT" expansion shields and machine bolts or, for light loads, fibre or lead plugs and screws.
- .4 Structural steel - Crane Canada Ltd., beam clamps.
- .5 Anchors, fasteners and other securing hardware to be of capacity and type to suit application and for which materials to which hardware are being installed.

- .6 Metal framing U-channels – typical 40 mm (1-5/8") width but increased where required to suit application, galvanized steel channels complete with required fittings and ancillary hardware. Acceptable manufacturers of framing channels are:
 - .1 Unistrut;
 - .2 Other approved equal

- .7 Acceptable manufacturers of fastening and securing hardware:
 - .1 Hilti;
 - .2 Or approved equal.

2.06 IDENTIFICATION NAMEPLATES

- .1 Laminated plastic (Lamacoid) black-white-black with beveled edges, stainless steel screws, and proper identification engraving. Each nameplate to be sized to suit equipment for which it is provided and required wording. Various colour configurations to be used to differentiate systems. Confirm exact nomenclature, sizing, print type and colour scheme with Departmental Representative.

2.07 SPRINKLER PROTECTION

- .1 Provide drip shields for protection of surface mounted equipment enclosures from water spray and dripping of liquids. Features of shields include:
 - .1 factory constructed by respective equipment manufacturers;
 - .2 constructed from non-combustible materials (sheet steel);
 - .3 enamel painted to match equipment;
 - .4 surfaces and edges filled/sanded smooth prior to painting;
 - .5 supported from equipment with structural steel rods/metal framing or other method reviewed with the Departmental Representative;
- .2 Include with equipment shop drawings, detailed dimensions of drip shields and methods of supporting.
- .3 Equipment with top cable/conduit entries to include waterproof connectors or additional sealing of entries with gasketing and/or waterproof sealant to prevent water from entering enclosure. Avoid top entry where possible unless approved by the Departmental Representative.
- .4 Design ventilation louvers such that live components are not exposed to water spray and dripping liquids.
- .5 Above requirements are additional minimum "sprinkler protection" standards for equipment specified as NEMA / (EEMAC) 1, 2 or 12.

3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- .1 Install conduit concealed in finished areas, and concealed to degree made possible by finishes in partially finished and unfinished areas. Conduit may be exposed in unfinished areas such as Electrical and Mechanical Rooms, unless otherwise noted on drawings or specified herein. Documents do not identify exact routing.
- .2 Where shown, routing is diagrammatic, identifying general requirements of routing and locations. Include for necessary offsets, fittings, transformations and similar items required as a result of obstructions and other architectural or structural details not shown.
- .3 Where conduits are exposed, arrange them to avoid interference with other work, parallel to building lines and install as high as possible. Do not install conduits within 150 mm of "hot" pipes or equipment unless conduits are associated with equipment. Independently run conduit to be supported from wall/ceiling structure, not from ceiling hangers, ductwork, piping, cable trays, formed steel decking, etc.
- .4 Conduits are sized on drawings, but in absence of type and sizing, type and size to suit intended application in accordance with applicable local governing electrical code requirements. Sizes identified on drawings are minimum sizes and are not to be decreased unless reviewed and approved by the Departmental Representative.
- .5 Mounting heights of devices may be typically identified on drawings, but such dimensions are for general pricing only. Review exact mounting heights with the Departmental Representative prior to roughing –in.

3.02 INSTALLATION OF CONDUIT

- .1 Provide conduit as follows:
 - .1 for conductors except as noted above or elsewhere in this Specification – EMT.
 - .2 for short branch circuit connectors to motorized equipment and distribution transformers (minimum length 450 mm, maximum length 600 mm with 180° loop where possible) – galvanized steel flexible liquid-tight conduit;
 - .3 at points, where conductors cross building expansion joints – galvanized steel flexible conduit with no less than 600 mm of extra curve;
- .2 Support and secure surface mounted and suspended single or double runs of metal conduit at support spacing in accordance with local governing electrical code requirements by means of galvanized pipe straps, conduit clips, ringbolt type hangers, or by other proper manufactured devices.
- .3 Support multiple mixed size metal conduit runs with U- channel conduit racks spaced to suit spacing requirements of smallest conduit in group.
- .4 Unless otherwise noted, provide conduit fittings constructed of same materials as conduit and which are suitable in respects for application.
- .5 Cut square and properly ream site cut conduit ends.
- .6 Provide conduit as sized on drawings. Size conduit not sized on drawings in accordance with local governing electrical code with consideration that sizes of branch circuit

conductors indicated are minimum sizes and must be increased as required to suit length of run and voltage drop, Conduit to be of minimum size 16 mm diameter.

- .7 Site made bends for conduit to maintain full conduit diameter with no kinking, and conduit finishes are not to flake or crack when conduit is bent.
- .8 Plug ends of roughed-in conduits which are exposed during construction with approved plugs.

3.03 INSTALLATION OF PULLBOXES AND JUNCTION BOXES

- .1 Provide pullboxes in conduit systems wherever shown on drawings, and/or wherever necessary to facilitate conductor installations. Generally, conduit runs exceeding 30 m in length, or with more than two - 90° bends, are to be equipped with a pullbox installed at a convenient and suitable intermediate accessible location.
- .2 Size boxes to accommodate supplied system and for bending radii of installed cables. Confirm requirements with respective system vendors.
- .3 Provide junction boxes wherever required and/or indicated on drawings and as required by local governing electrical code.
- .4 Boxes in EMT inside building to be stamped galvanized or prime coated steel.
- .5 Pullboxes and junction boxes to be accessible after work is completed.
- .6 Terminal box for signals to the BAS system will include terminal blocks with labelled terminals using manufacturers labelling method. No twist-on connectors will be allowed. Terminal boxes shall be industrial grade EEMAC 3R with hinged cover and removable white backplate.
- .7 Clearly identify main pull or junction boxes by painting the outside of covers. Spray painting is not permitted. Paint colours to be in accordance with following schedule:
 - .1 normal power-blue;
 - .2 essential power-orange;
 - .3 miscellaneous signals-brown.
- .8 In addition to painting miscellaneous signal boxes, clearly identify the specific system in which the box is installed.

3.04 INSTALLATION OF FIRESTOPPING AND SMOKE SEAL MATERIALS

- .1 Where work penetrates or punctures fire rated construction, provide ULC certified, listed and labelled firestopping and smoke sealing packing material systems to seal openings and voids around and within raceway and to ensure that continuity and integrity of fire separation is maintained.
- .2 Ensure that continuity and integrity of fire separation is maintained and conform to requirements of latest edition of ULC publication "List of Equipment and Materials, Volume II, Building Construction".
- .3 Comply with following requirements:
 - .1 Manufacturer's installation instructions for each specific application.

- .2 Clean areas and surfaces before materials are installed.
 - .3 Examine substrates, openings, voids, adjoining construction and conditions under which firestop and smoke seal system is to be installed. Confirm compatibility of surfaces.
 - .4 Verify penetrating items are securely fixed and properly located with proper space allowance between penetrations and surfaces of openings.
 - .5 Report any unsuitable or unsatisfactory conditions to Departmental Representative in writing, prior to commencement of work. Commencement of work will mean acceptance of conditions and surfaces.
 - .6 Mask where necessary to avoid spillage and overcoating onto adjoining surfaces. Remove stains on adjacent surfaces.
 - .7 Prime substrates in accordance with product manufacturer's written instructions.
 - .8 Provide temporary forming as required and remove only after materials have gained sufficient strength and after initial curing.
 - .9 Tool or trowel exposed surfaces to a neat, smooth, and consistent finish.
 - .10 Remove excess compound promptly as work progresses and upon completion.
- .4 Notify Departmental Representative when work is complete and ready for inspection, and prior to concealing or enclosing firestopping and smoke seal materials and service penetration assemblies. Arrange for final inspection of work by local governing authority inspector prior to concealing or enclosing work. Make any corrections required.
 - .5 Where work requires removal of existing firestopping materials and replacement of firestopping materials after cabling changes have been made, ensure that replacement material is same material and manufacturer of new installation.

3.05 INSTALLATION OF FASTENING AND SECURING HARDWARE

- .1 Provide fasteners, anchors and similar hardware required for conduit, duct, raceway, conductors, etc. and for equipment hanger and/or support material unless otherwise noted.
- .2 Accurately and properly set concrete inserts in concrete framework. Where multiple type inserts are used, space same to suit requirements of smallest conduit, etc., in group.
- .3 Fasten hanger and support provisions to masonry with expansion shields and machine bolts.
- .4 Provide beam clamps for attaching hanging and/or support provisions to structural steel, or where reviewed and approved by Departmental Representative.
- .5 Install devices in accordance with manufacturer's instructions to suit each respective application.
- .6 Explosive powder actuated fasteners are not permitted unless specific approval for their use and type has been obtained from the Departmental Representative.

3.06 INSTALLATION OF IDENTIFICATION NAMEPLATES

- .1 For each piece of electrical distribution equipment from electrical source of supply up to and including panelboards, for special control panels and cabinets, and for each other piece of electrical equipment, provide engraved Lamacoid identification nameplates secured to apparatus with stainless steel screws. Nameplates to indicate source of electrical supply and include the Departmental Representative's equipment identification number. Identify whether equipment is on "NORMAL POWER SYSTEM" or "EMERGENCY POWER SYSTEM", where applicable.
- .2 Panelboard nameplates to identify panelboard number as designated on drawings, unless otherwise instructed. Nameplates for disconnect switches, control panels, and cabinets to outline their service and source of supply.
- .3 Nameplates to be mechanically secured Lamacoid and be colour coded as follows:
 - .1 Normal Power White with black letters;
 - .2 Emergency Power Red with white letters;
 - .3 UPS Essential Power Orange with white letters.
- .4 Above identification nameplate and nomenclature requirements are for typical requirements for pricing only.
- .5 In pull boxes, junction boxes and at terminations, identify feeders by use of plastic plates indicating system voltage and circuit designations. Plates to be 25 mm (1") in diameter and have letter stamped 9 mm (5/8") high. Colour coding to be:
 - .1 Phase A – red;
 - .2 Phase B – black;
 - .3 Phase C – blue;
 - .4 Neutral – white;
 - .5 Ground - green.
- .6 Review print size type and size, colours, sizing and nomenclature of nameplates with the Departmental Representative prior to ordering. Submit sample board.

3.10 BRANCH CIRCUIT BALANCING

- .1 Connect branch lighting and power circuits to panelboards so as to balance actual loads (wattage) within 5%. If required, transpose branch circuits when work is complete to meet this requirement.
- .2 Perform necessary tests to show compliance with above requirement. Make such tests after building is occupied and document into testing report.

3.11 DISCONNECTION, REMOVAL AND RELOCATION WORK

- .1 Prior to start of any disconnection, removal or relocation work in any areas of building, prepare schedule of work and notify the Departmental Representative to obtain approval of work to proceed.
- .2 Where indicated on drawings or where required to perform Work of this Project, disconnect and remove items of existing obsolete electrical work.

- .3 Where switches, receptacles, and other devices and equipment are removed, disconnect at point of electrical supply, remove obsolete wiring and conduit up to source, unless otherwise noted, and make system safe to the Departmental Representative's satisfaction.
- .4 Remove obsolete conduit/raceways in accessible ceiling spaces, exposed locations, etc. Where existing obsolete conduit and similar raceway material cannot be removed, such as embedded in concrete, cut back and cap obsolete conduit and raceways.
- .5 Contractor must not compromise systems and equipment that will remain. If in doubt, notify the Departmental Representative. Any system or equipment that is compromised through the actions of the Contractor will be restored to normal service at the Contractor's expense.
- .6 When respective work is deleted, such deletions are to in no way affect operation of any existing interconnected mechanical or electrical components that remain. When existing circuits are being disconnected, maintain supervision of area to ensure that such circuits do not affect essential existing circuits being retained.
- .7 Except where directed by the Departmental Representative, remove from site and properly dispose obsolete materials which are removed and are not relocated or reused.
- .8 Where existing services pass through or are in an area to serve items which are to remain, or pass through areas that are to be deleted, maintain services, but re-route as required. Confirm with the Departmental Representative services which are to be kept in service and operational.
- .9 Revise panelboard directories, accordingly, if affected by any renovation, disconnection, or removal of work. Provide new or revised typed directory cards. Use the Owner's actual room names/numbers. Ensure service to all equipment being demolished, removed, or relocated has been de-energized prior to disconnecting. Label all breakers no longer being used as "spare" on panelboard directories. Revise all other labels for breakers being reused to suit new loads.
- .10 Protect existing devices being relocated or deleted to ensure that they are not damaged. Report devices not working or with damage to the Departmental Representative prior to initiating any work. It will be assumed that devices are in proper working order and good condition if not reported.
- .11 Provide junction boxes, outlet boxes, wiring, plates, etc., as necessary for complete relocation of devices. Report defects or damages to the Departmental Representative. Do not splice conductors unless approved by the Departmental Representative. Utilize junction boxes and terminal devices for proper extension of circuits where approved.
- .12 Provide blank cover plates on existing obsolete boxes which are to remain in position, as designated by the Departmental Representative.
- .13 Electrical services (including auxiliary services, telephone, fire alarm, P.A. System, etc.) to operating parts of building are not to be hampered under any conditions and to that effect, necessary work may have to be carried out on an overtime basis, at no additional cost to this project. Do not interrupt any services without prior written approval by the Departmental
- .14 Be present when new openings are being cut into existing walls and ceilings. Should any damage occur to the electrical system, restore all systems to a safe and sound condition.

- .15 Be responsible for disconnecting power supply to branch circuits controlling lighting, receptacles, panels, mechanical equipment, etc., for safe removal of equipment, conduit, wiring, boxes, etc., affected by demolition.
- .16 Close openings in boxes, panels, etc., that result from removal of equipment, conduit, wiring, fixtures, etc. Close openings in a proper manner and properly terminate and insulate cables to restore systems to a safe operating condition to the Departmental Representative's satisfaction.
- .17 Be present and supervise removal of electrical equipment,
- .18 Where existing surfaces are damaged by Electrical Divisions work and/or where existing devices are removed from wall, ceilings, floors and other surfaces, and such deleted devices are not being replaced in same locations, patch locations of these removed devices and re-finish.
- .19 If at any time during course of building work, asbestos containing materials are encountered or suspected, cease work in area in question and immediately notify the Departmental Representative. Comply with local governing authority regulations. Do not resume work in affected area without approval from Departmental Representative.

3.12 INTERRUPTIONS TO AND SHUT-DOWNS OF SERVICES AND SYSTEMS

- .1 Shutdowns and interruptions to existing systems and services are to be coordinated fully with and performed at times acceptable to Departmental Representative.
- .2 Generally, shutdown may be performed only between hours of 12:00 midnight Sunday until 6:00 a.m. Monday morning. Include for costs of premium time to perform work during nights, weekends or other times outside of normal working hours, which may be necessary to comply with stipulations specified herein in this Article. Services for the operation of existing non-renovated areas of building are to be maintained.
- .3 Work associated with shut-downs and interruptions are to be carried out as continuous operations to minimize shut-down time and to reinstate systems as soon as possible. Prior to any shut-down, ensure that materials and labour required to complete work for which shut-down is required are available at site.
- .4 Confirm any methods of procedures with Departmental Representative prior to start of work.
- .5 Review with Departmental Representative if any feeder (conductor) is designated for special considerations and if designated as such and is to be interrupted, ensure that at least following preparations are met:
 - .1 provide a schedule of proposed feeders to be interrupted; propose one feeder at a time to be worked on per scheduled shutdown.
 - .2 provide a method of procedure for work.
 - .3 prepare above documentation and submit for review and approval by the Departmental Representative at least 10 working days prior to date of each proposed work.
 - .4 on day/night of proposed feeder work, advise the Departmental Representative of which feeder is to be worked on; review with the Departmental Representative requirements for witnessing work.

- .5 Where working in close proximity to "live parts" or inside energized panels or energized cubicles of switchboards/substations, provide protection "boots" over bussing and insulating mats to cover areas of exposed live parts.

3.13 EQUIPMENT BASES AND SUPPORTS

- .1 Provide equipment bases and supports as depicted on drawings or as required for proper equipment installation.
- .2 Secure floor mounted equipment in place on minimum 100 mm high concrete housekeeping pads, minimum 100 mm wider and longer than equipment base dimensions.
- .3 Supply dimensioned drawings, templates, and anchor bolts for proper setting of equipment on bases and pads. Be responsible for required levelling, alignment, and grouting of equipment.
- .4 Submit to Departmental Representative, dimensioned shop drawings of structurally designed bases for support of large, heavy equipment. Indicate on shop drawings total weight of base, reinforcement, and equipment for which it is required.
- .5 Unless otherwise noted, support equipment suspended above floor level with suitable welded or bolted prime coat painted structural steel angles or channels bracketed to wall or secured by hanger rods.

3.14 FINISH PAINTING OF ELECTRICAL WORK

- .1 Provide identification painting for electrical distribution equipment. Review exact finish colours with Departmental Representative. Equipment requiring special colour identification painting to include but not be limited to following:
 - .1 pull boxes and junction boxes.
- .2 Spray painting is not permitted unless approved in writing by Departmental Representative.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

- .1 Submit shop drawings for products and accessories.
- .2 Submit samples of conductors, where requested in Contract Documents or when requested by Departmental Representative.

2 PRODUCTS

2.01 GENERAL POWER CABLES

- .1 CSA approved, ULC labelled and certified. Unless otherwise noted, conductors to be copper and be suitable for applications as noted in local electrical code.
- .2 "T90 Nylon", CSA certified, single copper conductor to CSA C22.2 No. 75, 600 volts, maximum 90°C (194°F) dry conductor temperature, -10°C (-14°F) minimum installation temperature, PVC insulated, nylon covered.
- .3 "R90 or RW90", CSA certified, single copper conductor to CSA C22.2 No. 75, 600 volts, maximum 90°C (194°F) dry conductor temperature, -10°C (-14°F) minimum installation temperature, XLPE insulated, PVC covered.

2.02 ELECTRICAL CONNECTORS

- .1 General:
 - .1 CSA approved and/or ULC listed and labelled as required by local governing authorities and codes;
 - .2 certification: CSA C22.2 No. 65;
 - .3 connectors marked with certification, manufacturer, manufacturer catalogue number and approval for conductor size and type.
- .2 Connectors for conductors connecting to devices in accordance with local governing electrical requirements, equal to Ideal Industries No. 451, No. 452 and No. 453, "Wing-Nut", CSA certified, 600 volts rated, contoured wing design, fire retardant shell, twist on pressure type connectors.
- .3 For conductors sized 1/0 and greater, provide long barrel double crimp, 2-hole compression type lug connectors, unless otherwise noted.

2.03 STANDARD CONTROL AND COMMUNICATIONS CABLES

- .1 BAS Communication Cable
 - .1 22 AWG solid tinned copper conductors,
 - .2 polypropylene insulation,
 - .3 twisted pair,
 - .4 Overall shield (100% coverage),
 - .5 22 AWG solid TC drain wire,

.6 PVC jacket..

2.04 CONDUCTOR PULLING LUBRICANT

.1 IDI Electric, "Ideal Yellow 77" or approved equal.

3 EXECUTION

3.01 PROJECT CONDITIONS

- .1 If identified in documents, verify that field measurements and conditions are as identified.
- .2 Unless specifically noted, cable routing on drawings is schematic and approximate and not reflective of elevations. Route cable as required to meet project conditions. Determine exact routing and lengths on site.
- .3 Confirm fire protection ratings of construction to ensure that rooms and paths of conductors are fire rated in accordance with local governing codes requirements. Include fire rated conductors as required to meet local governing codes requirements.

3.02 CO-ORDINATION

- .1 Co-ordinate work with work provided under other electrical work and work of other trades.
- .2 Determine required separation between cable and other work.
- .3 Determine cable routing to avoid interference with other work.
- .4 Submit any alternative cable routing to the Departmental Representative for review prior to proceeding with work.

3.03 INSTALLATION OF CONDUCTORS

- .1 Provide required conductors. Provide fire rated conductors for applications as required by local governing codes and standards.
- .2 In applications where, multiple conductors in conduit are being run, provide trapeze configuration of U type metal channels and threaded rod hangers to support conduit from ceiling slab. Wall mounted conduit brackets and hangers may be permitted in applications reviewed and approved by the Departmental Representative. Provide required cable support system accessories which are not specified herein or shown on drawings but are required for proper installation.
- .3 Conductors, unless otherwise noted, to be as follows:
 - .1 for climate-controlled areas wiring except as noted above or specified elsewhere in Specification or as noted on drawings - "T90 Nylon" or "RW90".
- .4 Install compression connectors with proper dies and compression tool as per connector manufacturer's instructions.
- .5 Install control wiring as required and as indicated. Confirm exact type of control wiring with manufacturers of equipment/systems being interconnected, and as required by local governing electrical code.

- .6 Coordinate responsibility for provision of control wiring for BAS equipment, with the Departmental Representative.
- .7 Generally, conductor sizes are indicated on drawings. Such sizes are minimum requirements and must be increased, where required, to suit length of run and voltage drop in accordance with applicable conductor voltage drop schedule on drawings or obtained from the Departmental Representative. Conductors not sized or specified of type, to be sized and of type in accordance with requirements of local governing electrical code.
- .8 Do not use conductors smaller than No. 12 AWG in systems over 30 volts, unless otherwise noted.
- .9 Colour code conductors throughout to identify phases, neutrals, and ground by means of self-laminating coloured tape, coloured conductor insulation, or properly secured coloured plastic discs. Colours, unless otherwise noted, to be as follows:
 - .1 Phase A - red;
 - .2 Phase B - black;
 - .3 Phase C - blue;
 - .4 Ground - green;
 - .5 Neutral - white;
 - .6 Control - orange.
- .10 When pulling wires into conduit use lubricant and ensure that wires are kept straight and are not twisted or abraded.
- .11 Ensure manufacturer's bending radii and pulling tensions are not exceeded.
- .12 Control conductors to be numbered with approved slip on printed markers.
- .13 Install low voltage conductors in conduits, unless otherwise noted within Documents.

END OF SECTION

1 GENERAL**1.01 SUBMITTALS**

- .1 Submit shop drawings for products and accessories.

2 PRODUCTS**2.01 BASIC MATERIALS**

- .1 General:
 - .1 Materials: CSA approved and/or ULC listed and labelled as required by local governing authorities and codes.
 - .2 Certification: CSA C22.2 No. 41.
 - .3 connectors marked with certification, manufacturer, manufacturer catalogue number and approval for conductor size and type.
- .2 Ground Conductors: Solid copper, insulated and bare to suit application and code requirements; and bond conductors.
- .3 Ground Connections:
 - .1 Above grade: Compression type copper connectors of type to suit intended applications.
 - .2 When making ground and bonding connections, apply corrosion inhibitor appropriate for protecting connection between metals contact surfaces.
- .4 Miscellaneous ancillary components to complete grounding and bonding work to requirements of local electrical authority and codes.
- .5 Acceptable Manufacturers:
 - .1 Burndy
 - .2 Thomas & Betts
 - .3 Other approved equal.

3 EXECUTION**3.01 GENERAL GROUNDING AND BONDING REQUIREMENTS**

- .1 Provide required grounding and bonding work in accordance with drawings and local electrical authority.
- .2 Ground and bond other equipment such as transformers, switchboards, panelboards, and similar metal work to building ground..
- .3 Make required grounding connections to electrical devices and apparatus. Ground conductors to be insulated copper wire connected with approved fittings in accordance with local governing electrical code.
- .4 Connect to smaller motors or equipment by fastening terminal to a connection box.
- .5 Connect junction boxes to equipment grounding system with grounding clips mounted

directly on box or with machine screws. Completely remove paint, dirt, or other surface coverings at grounding conductor connection points so good metal-to-metal contact is made.

- .6 Make exposed ground connections using compression connectors and other grounding fittings suitable for applications. Install in accordance with manufacturer instructions.

END OF SECTION

1 GENERAL**1.01 SUBMITTALS**

- .1 Submit as part of shop drawing submission, copies of:
 - .1 system and equipment testing reports
 - .2 copies of certificates of approval from local governing inspection authorities.
- .2 Submit proposed shop drawings of major electrical distribution equipment. Allow in shop drawing process, sufficient time for Departmental Representative to review and make comments and for Contractor and equipment vendors to incorporate the Departmental Representative comments, necessary revisions and results of reports into equipment shop drawings.
- .3 Do not order equipment until shop drawings have been reviewed by the Departmental Representative and the Departmental Representative's comments have been addressed. Time for this shop drawing review process will be at Departmental Representative's discretion, but typically allow for 15 working days for initial review submission with additional 10 working days added to accommodate each resubmission.
- .4 Submit after completion of factory testing, copies of completed product testing reports.
- .5 Submit after installation and testing, copies of:
 - .1 completed testing reports with completed test results sheets
 - .2 certificates of approval from local governing authorities, manufacturers of systems and equipment and testing companies.
- .6 Review form of submittals (submission procedures, number of hard copies and requirements for electronic copies) with Departmental Representative at project start-up. For pricing assume minimum 3 hard coloured copies bound and electronic PDF copy.

2 PRODUCTS**2.01 GENERAL SCOPE OF WORK**

- .1 Include for but not be limited to following:
 - .1 product manufacturers providing equipment inspection, testing, start-up, adjustments and verification.
 - .2 electricians/trades people on site to handle equipment, make temporary connections, operate equipment and make repairs and adjustments and assist manufacturer's / testing organization's personnel during on-site inspection, testing, calibration, start-up, verification work and where supplementary commissioning.
 - .3 coordination of work with equipment/system manufacturer's authorized technician in performing adjustments and start-up procedures to equipment/systems.
 - .4 preparing testing reports and documentation for submission to the Departmental Representative.

3 EXECUTION**3.01 GENERAL ELECTRICAL WORK TESTING**

- .1 In addition to tests required by local governing authorities having jurisdiction, local codes and regulations, perform following:
 - .1 after receptacles, motors, signals, etc., are installed, whether same are installed as part of this Division, test work to ensure that there are no leaks, grounds or crosses
 - .2 establish and ensure proper motor rotation - measure full load running currents. Report to Departmental Representative any discrepancies which are found; existing motors which have been worked on (disconnected and reconnected) must be checked with rotation meter to ensure proper rotation; be responsible for any damage caused by reverse rotation
 - .3 ensure that devices are commissioned and operable.
- .2 Rectify deficiencies to satisfaction of the Departmental Representative.
- .3 Document results into distribution system testing report. Report must state that testing was successful, and Work complies with project documents, applicable CSA standards, and other applicable governing codes and requirements.

3.02 SYSTEMS INSPECTION, TESTING, START-UP AND VERIFICATION

- .1 When each system and each major piece of equipment installation is complete and ready for acceptance, include for system and equipment manufacturer or manufacturer's authorized representative to visit site to provide system inspection, testing, start-up, and verification. Perform following:
 - .1 check component connections and overall installation.
 - .2 test and adjust system and ascertain that components are as specified and ensure that products operate as designed.
 - .3 provide start-up procedures for systems and equipment
 - .4 verify and certify system component operations
 - .5 prepare, document and evaluate test results
 - .6 authenticate test results with signature of authorized testing Engineer/Technician
 - .7 check and verify nameplates
 - .8 provide maintenance and operating instructions to Departmental Representative's personnel.
- .2 Perform work properly documented, and in accordance with manufacturer's instructions and recommendations.
- .3 Perform work under the presence of the Departmental Representative at times required by the Departmental.
- .4 Include for manufacturers authorized technicians of equipment/systems integrated to equipment/systems being tested to be onsite during full integration testing. Coordinate with each manufacturer.

- .5 Rectify deficiencies to satisfaction of the Departmental Representative.
- .6 When system inspection, testing, start-up and verification specified above is complete, obtain from supplier/manufacturer a test report with test sheets, and covering verification letter signed by authorized testing technician, stating that system or equipment has been inspected and tested, performs as specified and is ready for acceptance. Include date and time of testing, testing technician's name and specification section number test fulfilled.
- .7 Bind documents under cover and submit copies to the Departmental Representative.

3.03 ELECTRICAL DISTRIBUTION SYSTEM TESTING AND VERIFICATION

- .1 Perform work to standards of applicable local governing authorities, local electrical inspection authority and CSA Standards.
- .2 Services to be performed by an approved independent testing company and be initially conducted prior to system/equipment being energized and further testing when energized, and include following items, where applicable:
 - .1 testing, cleaning when necessary, and calibrating relays and circuit breaker trip devices (calibration of protective devices to conform to requirements of approved coordination curves)
 - .2 function test of associated control devices.
 - .3 replacement of fuses destroyed during testing.
 - .4 acceptance test in presence of the Departmental Representative.
 - .5 presence, for length of time required, of qualified and competent equipment manufacturer's service representative during start-up.
 - .6 carry out insulation resistance testing of feeders with respect to ground.
 - .7 inspection and testing of cables, power panels, transformers, power receptacles and switches.
 - .8 inspection and testing of electrical system auxiliary systems and devices such as UPS, transfer switches, battery systems.
 - .9 verification and certification work of equipment and systems
- .3 Perform services procedures properly documented, and in accordance with manufacturer's instructions and recommendations.
- .4 Provide visual inspection of ground system and verify that it is following issued documents and local electrical code requirements.
- .5 Any work that failed testing that was responsibility of Contractor to be rectified by Contractor and be re-tested and verified, until successful testing, and be at no additional cost to and to the satisfaction of the Departmental Representative.

END OF SECTION

1 GENERAL**1.01 SUBMITTALS**

- .1 Submit shop drawings for products specified in this Section.

1.02 SERIES RATED COMBINATIONS

- .1 Series rated combinations of over-current protective devices are not permitted.

1.03 PROTECTIVE COORDINATION AND EQUIPMENT WITHSTAND RATINGS

- .1 Obtain Departmental Representative comments and incorporate into shop drawings of electrical distribution equipment. Do not order equipment until shop drawings submission process has been completed and reviewed with the Departmental Representative.
- .2 Provide ratings for electrical equipment, circuit protective devices, bussing, and switches to interrupt and withstand short circuit faults greater than available fault current at its source of supply.

1.04 BREAKERS

- .1 Breakers to be NEMA rated types, and for switchboards and distribution panelboards, breakers when frame sized greater than 225 amperes, or where scheduled or where noted on drawings, to be provided with solid state adjustable trip units with long time, short time and instantaneous time (LSI) functions and time delays. Set trip units at ratings as required for proper selective coordination.
- .2 Size breakers as per drawings and/or schedules, but in absence of direction, size breakers to suit intended application, to suit coordination study requirements and in

accordance with local governing electrical code.

2 PRODUCTS**2.01 DISCONNECT SWITCHES**

- .1 Heavy duty, CSA approved, disconnect switches. Features include:
- .1 front operated handle operating mechanism actuates switch;;
 - .2 handle and door interlocked to keep door closed when switch is ON and hold handle OFF when door is open;
 - .3 triple padlocking – 2 on door and up to 3 locks in centre OFF position;
 - .4 100% load break / make rated;
 - .5 non-fusible units;
 - .6 fusible units with fuse clips suitable for HRC fuses;

- .7 ampere rating, number of poles and fuse requirements as indicated on drawings;
- .8 factory primed and painted switch enclosures.
- .2 Enclosures for disconnects mounted in interior climate-controlled areas and standard non-climate controlled areas to be NEMA 3R.
- .3 Acceptable manufacturers are:
 - .1 Eaton;
 - .2 Siemens Electric Ltd.;
 - .3 Schneider Electric (Square D).
 - .4 Other approved equal

3 EXECUTION

3.01 INSTALLATION OF DISCONNECT SWITCHES

- .1 Provide disconnects switches and install into locations and connect complete. Ensure adequate clearance is provided as per local code requirements and as required for access for operation and maintenance. Install as follows:
 - .1 wherever shown on drawings and/or specified herein;
 - .2 wherever required by MCC/VFD/starter schedule drawings;
 - .3 for motorized equipment which cannot be seen from motor starter location or is more than 9 m (30') from starter location (in accordance with local governing electrical code requirements);
 - .4 for "packaged" equipment fed from a motor starter panel.
- .2 Where double throw switches are required, connect to provide operations as noted.
- .3 Ensure enclosure ratings are suitable for intended applications.
- .4 Provide engraved Lamacoid nameplate with nomenclature reviewed with the Departmental Representative.

3.02 PROVISIONS FOR BUILDING AUTOMATION SYSTEM

- .1 Provide alarm/communications circuits as required. Include for provision of conduits, boxes and control/signal wiring for interconnection to BAS. Coordinate with Departmental Representative and BAS Contractor on location of BAS panel to be used for monitoring points and extend wiring in conduit from electrical equipment to this location. Terminate in terminal box leaving 3 m of slack length of wiring (exact length to be coordinated between Mechanical and Electrical trades), for extending and termination to BAS panel by Mechanical Division BAS Contractor. Properly identify terminal blocks/wiring in junction box.

1 GENERAL

1.01 SUBMITTALS

- .1 Submit shop drawings for products specified in this Section.

2 PRODUCTS

2.01 DRY TYPE TRANSFORMERS – GENERAL REQUIREMENTS

- .1 Types, capacities and ratings: as noted or scheduled on drawings.
- .2 CSA approved and/or ULC listed and labelled, constructed and factory tested in accordance with applicable requirements of following:
 - .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-C22.2 No.47, Air-Cooled Transformers (Dry Type).
 - .2 CAN/CSA-C802.2, Minimum Efficiency Values for Dry Type Transformers.
 - .3 CSA C9, Dry-Type Transformers.
 - .2 Institute of Electrical and Electronics Engineers (IEEE)
 - .1 IEEE C57.110, IEEE Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents.

2.02 DRY TYPE DISTRIBUTION TRANSFORMERS

- .1 Hammond Power Solutions, "Sentinel G" series dry type transformers or approved equal as noted on drawings. Transformers must be CSA approved and/or ULC listed and labelled. Transformers to be constructed and factory tested in accordance with applicable requirements of above codes and standards, and other local governing authority codes and standards.
- .2 Transformers to be complete with:
 - .1 copper windings;
 - .2 Class "H", 220°C class, coil insulation, such that winding temperature rise to not exceed 150C°(270F°) and enclosure temperature rise not exceed 65C°(117F°) under full load in a 40°C (104°F) ambient temperature;
 - .3 core construction consisting of stacked laminations of high permeability silicone steel;
 - .4 vacuum impregnated polyester or epoxy resin
 - .5 lugs or pressure type terminals to suit primary and secondary conductors
 - .6 four - 2-1/2% full capacity taps; two (2) above normal and two (2) below normal; taps located on primary winding
 - .7 an integral vibration dampening system with anti-vibration pads used between coil and core and enclosure

- .8 basic impulse level to meet CSA C9 standards;
 - .9 unless otherwise noted, average sound level to meet NEMA ST-20 and CSA C9 standards;
 - .10 efficiency meeting or exceeding latest efficiency levels of listed above standards;
 - .11 unless otherwise noted, factory painted with an ANSI grey enamel.
 - .12 aluminum nameplate indicating impedance rating, weight, connection diagram, style and serial number, riveted to front of enclosure.
- .3 Acceptable manufacturers are:
- .1 Hammond Power Solutions
 - .2 Other approved equal

2.03 ENCLOSURES AND DRIP SHIELDS

- .1 Include following:
- .1 for standard indoor applications: minimum ventilated, drip proof enclosure with rigid end frame, removable plates, terminal compartment;
 - .2 top mounted factory painted drip shield.
 - .3 factory painted with an ANSI grey enamel.

3 EXECUTION

3.01 INSTALLATION OF DISTRIBUTION TRANSFORMERS

- .1 Locate transformers into position. Ensure adequate clearance is provided as per code requirements and as required for access for operation and maintenance. Ensure that there is adequate ventilation for transformers to operate as specified and that there is no transfer of heat to adjacent surfaces or equipment. Comply with manufacturer's instructions and recommendations.
- .2 Secure transformers 75 KVA and larger to a concrete housekeeping pad on vibration isolation pads.
- .3 Ensure that transformers are equipped with lugs or connections suitable for primary and secondary connections. Isolate primary and secondary connections from transformer enclosures by means of 300 mm - 450 mm of liquid-tight flexible conduit.
- .4 Ground and bond equipment to ground electrode grids as per local governing electrical code and inspection authority requirements. Refer also requirements of Section entitled – Grounding and Bonding.
- .5 Provide engraved Lamacoid nameplates and warning signs with nomenclature reviewed with the Departmental Representative.
- .6 When installation is complete, test and check secondary voltages. Make all required adjustments and submit to the Departmental Representative a test report indicating secondary voltage readings and any adjustments made to achieve proper voltages. Furthermore, when building is in normal use, re-check voltages and make any required

adjustments.

- .7 Refer to testing, coordination and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

END OF SECTION

1 GENERAL**1.01 SUBMITTALS**

- .1 Submit shop drawings for products specified in this Section.

1.02 BREAKERS

- .1 Refer to Section 26 20 00 - Part 1, for general requirements for breakers.

2 PRODUCTS**2.01 BRANCH CIRCUIT PANELBOARDS**

- .1 Factory assembled dead front panelboards as per schedules, manufactured to CSA Standard C22.2 No. 29 and local governing electrical code, and designed for sequence phase connection of branch circuit breakers.
 - .1 Breakers to be bolt-on type.
 - .2 Panelboards to be equipped with one (1) continuous bus bar per phase. Each bus bar to have sequentially phased branch circuit connectors limited to bolt-on branch circuit breakers. Bussing to be fully rated and of plated copper construction.
 - .3 Panelboards are to be complete with:
 - .1 EEMAC 3R box, constructed of code gauge galvanized steel with removable box ends, wiring gutter space on sides; conduit entries sealed water-tight; drip shield for surface mounted panelboards;
 - .2 dead-front construction to shield user from energized parts
 - .3 enclosure constructed of code gauge, hot zinc dipped galvanized steel constructed in accordance with UL 50 requirements; trim for flush or surface wall mounting as shown; front panel to not be removable with the door locked
 - .4 hinged door with concealed fasteners, concealed hinge, chrome plated door latch and keyed alike lock with key
 - .5 steel frame holder and circuit directory card protected by clear acetate and secured to back of door, and Mylar circuit breaker identification strips
 - .6 copper neutral bars
 - .7 200% sized neutrals for panels equipped with SPD units and for panels as scheduled
 - .8 solidly bonded equipment copper ground bar
 - .9 high strength, set screw type, anti-turning wire connectors
 - .10 current-carrying parts be insulated from ground and phase-to-phase by high dielectric strength thermoplastic
 - .11 filler plates covering unused mounting space

- .2 Panels, doors and trim are to be factory painted with ANSI grey enamel finish.
- .3 Equip breakers of frame size 225 amperes and greater, with solid state adjustable LSIG trip units.
- .4 Equip circuit breakers connected to dedicated equipment or devices with handle locks.
- .5 Panelboards as scheduled to be complete with integral surge protective devices (SPDs). Unit to be factory installed and connected onto bussing through integral disconnect/breaker as recommended by manufacturer. Unit to include diagnostic package with status indicators on each phase, audible alarm and Form C alarm contacts. Unit to be maintenance free.
- .6 Refer to Section 26 43 00 for additional SPD requirements for branch circuit panelboards.
- .7 Include spare breakers as sized on schedules and future breaker provisions as noted on schedules. Future breaker provisions to include space for breakers, bussing for full panel size and where future breaker sizes are scheduled, required breaker connector kits.
- .8 Acceptable manufacturers are:
 - .1 Eaton;
 - .2 Schneider Electric (Square D);
 - .3 Siemens Electric Ltd.
 - .4 Other approved equal.

3 EXECUTION

3.01 INSTALLATION OF PANELBOARDS

- .1 Provide factory assembled branch circuit panelboards and install into locations and connect complete. Install panelboards with adequate clearance as per code requirements and as required for access for operation and maintenance. Load panels with breakers as scheduled.
- .2 Support cabinets and enclosures independent of connecting conduit, and accurately install with reference to wall finishes.
- .3 Equip panelboards with suitable lugs or provisions to accommodate main and branch conductors scheduled.
- .4 Coordinate with the Departmental Representative to determine extra mechanical loads and BAS panels requiring use of specified additional 15A circuits and connect complete.
- .5 Ground and bond equipment as per local governing electrical code and inspection authority requirements. Refer also requirements of Section entitled – Grounding and Bonding.
- .6 Turn over to the Departmental Representative, prior to application for a Certificate of Substantial Performance of Work, minimum quantity of two panelboard cabinet or enclosure keys per panelboard.

- .7 Identify panelboard breakers in a permanent manner, and complete typed panelboard circuit directories identifying circuit number and type and location of loads supplied from each breaker with nomenclature approved by the Departmental Representative.
- .8 Include spaces for future breakers, spare breakers and additional breakers for miscellaneous mechanical loads are included as per schedules and as specified.
- .9 Install and connect SPD in accordance with manufacturer's instructions and with a dedicated breaker. Test SPD as per manufacturer's instructions.
- .10 Ground and bond panel as per local electrical code requirements. Refer also to requirements of grounding and bonding article.
- .11 Additionally, refer to testing, coordination and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements. Document test results and submit copy to the Departmental Representative.

END OF SECTION

1 GENERAL**1.01 SUBMITTALS**

- .1 Submit shop drawings for products specified in this Section.

2 PRODUCTS**2.01 UNINTERRUPTIBLE POWER SUPPLY (UPS) UNITS**

- .1 CSA approved and ULC listed, B240US series continuous duty, on-line uninterruptible power supplies, as specified in following paragraphs and as noted on drawings.
- .2 General Features:
 - .1 Modular construction, with draw-out assemblies that can be quickly serviced or replaced as necessary.
 - .2 Double conversion topology.
 - .3 Scalable configurations on larger capacity units, of up to 4 identical modules paralleled allowing additional capacity to total rated kVA of unit or for redundancy, as noted.
 - .4 Each paralleled unit operates with its own battery string.
 - .5 Monitoring and control components provides self-diagnosis and self-correction where upon sensing a problem, automatically transfers unit to bypass and when alarm condition clears, automatically reverts back to normal power.
 - .6 Microprocessor controlled logic.
 - .7 EMI suppression; surge, spike and continuous brownout protection.
 - .8 Internal maintenance bypass.
 - .9 External maintenance bypass.
 - .10 Internal battery pack to provide specified battery time at full capacity load.
 - .11 Battery monitoring of lifetime conditions, runtime remaining and battery temperature.
 - .12 Battery circuit testing.
 - .13 Communication interfaces.
 - .14 Cabinet enclosures.
 - .15 100% front accessible.
 - .16 Required ancillary devices.
- .3 Applicable Standards:
 - .1 UPS unit to meet requirements of latest editions of applicable Standards including:

- .1 CSA C22.2 107.1 Uninterruptible Power System;
 - .2 ULC 1778 and 924;
 - .3 IEEE 587/ANSI C62.41 Standards;
- .4 Performance Ratings:
- .1 Output Power Capacity: 100kVA capacity as noted on drawings.
 - .2 Input and Output Voltage Ratings: As noted on drawings.
 - .3 Minimum 97% efficiency full load at unity power factor.
 - .4 Input Power Factor: 0.99 min.
 - .5 Input Voltage Range: +10% to -15%.
 - .6 Input FREQUENCY RANGE: 40 to 70 Hz.
 - .7 Input Current Distortion: Less than 3% without input filter.
 - .8 Output Voltage Regulation: +/-1% from nominal output voltage for any steady state operating condition.
 - .9 Output voltage THD: Less than 2.0% maximum typical non-linear load.
 - .10 Overload current capability (with nominal line and fully charged battery, non-paralleled systems):
 - .1 Double Conversion Mode: maintains voltage regulation for 102% to <110% of resistive/inductive load for 10 minutes, 111% to <125% for 60 seconds, and 126% to 150% for 10 seconds, >151% for 300 ms.
 - .2 Stored Energy Mode (typically on battery): maintains voltage regulation for 102% to <110% of resistive/inductive load for 10 minutes, 111% to <125% for 60 seconds, and >126% for 300 ms.
 - .3 On Bypass (single UPS systems): Continuous = 125%; Transient = 1000% peak current for 10 ms.
 - .11 Common mode noise attenuation:
 - .1 -65 dB up to 20 kHz, -40 db up to 100 kHz.
 - .2 > 100 dB with isolation transformer.
 - .12 EMI Suppression: meets FCC rules and regulation 47, part 15, for Class A devices, CISPR22, and IEC62040-2 C2 and C3.
 - .13 Electrostatic Discharge: meets IEC61000-4-2 level 3; 4 kV contact/8 kV air discharge.

- .14 Operating Temperature: -10°C to +40°C (+14°F to +104°F) without derating.
- .15 Storage Temperature: -20°C to 60°C (-4°F to 140°F).
- .16 Relative Humidity: 0 to 95% max, non-condensing
- .17 Altitude: 1500 m (4,291') without derating.
- .18 Audible noise: Less than 65 dBA (at 1 m [3']) from any operator surface.
- .5 UPS Module Modes of Operation: UPS Modules operate as on-line, fully automatic system in following modes:
 - .1 Normal Mode: The ac mains supply shall be rectified by high frequency IGBT rectifier into regulated dc voltage for powering the dc/ac inverter while charging the batteries. The dc/ac inverter shall be PWM 3 levels IGBT and the output voltage shall have a true sinusoid waveform.
 - .2 Mains Failure Mode: In event of a mains voltage deviation outside the specified input parameters of the UPS, in zero transfer time, the batteries shall provide power to the loads, without any disruption. The batteries supply voltage to the dc/ac inverters located in each of the ACPMs.
 - .3 Battery Power Mode: In the event of a mains power failure, the UPS shall support the load on battery power. When the ac mains return to normal, the UPS shall resume normal mode and shall continue to provide quality output to the load without disturbance, while simultaneously recharging the battery.
 - .4 Recharge Mode: When the ac mains power is restored, the UPS shall automatically resume recharging the batteries after a short, user programmable, power walk-in period. This charging shall cause no interference or disruption to the critical load.
 - .5 Bypass Mode: The UPS system will automatically transfer to bypass in the event of an internal failure or extended overload that results in the UPS not being able to support the connected loads. Bypass mode can also be manually initiated from the system controller.
 - .6 Generator Mode: When the ac mains power supply is replaced by a generator, the UPS shall automatically resume working in normal mode. The system enables you to select optional battery charging and/or frequency tracking (free-running mode) when in generator mode. Frequency range in free running mode is 40-70Hz.
 - .7 Self-Loading Mode: The self-loading feature shall enable the system to test itself for both reactive and resistant simulated loads eliminating the need for external load banks.
 - .8 ECO Mode: The system shall run at up to 99% efficiency with the inverters on standby. In case of anomalies in the mains, the system shall automatically transfer the load to the inverter to back up and ensure its continuous regulated ac power.
- .6 Universal Power Modules: Each module contains:
 - .1 Rectifier/Charger:

- .1 Converts incoming AC power to regulated DC output for supplying inverter and for charging battery.
 - .2 High-frequency pulse-width-modulation (PWM) design, using Insulated Gate Bipolar Transistors (IGBTs).
 - .3 Modular design for easy replacement.
 - .4 Rectifier capable of drawing power from utility with a power factor of 0.99 under nominal conditions.
 - .5 Rectifier protection circuitry prevents IGBTs from sourcing current in excess of their published ratings.
- .2 Inverter:
- .1 Inverter is IGBT PWM design with high speed switching.
 - .2 Provides specified quality output power while operating from any DC source voltage (rectifier or battery) within specified DC operating range.
 - .3 Protection circuitry that prevents IGBTs from sourcing current in excess of their published ratings.
- .7 Static Bypass:
- .1 Alternative source of power for critical load when abnormal condition prevents operation in normal mode.
 - .2 Fully rated, continuous duty, naturally commutated static switch for high-speed transfers.
 - .3 Transfers to bypass (for stand alone, and parallel capacity systems) automatically initiated for following conditions:
 - .1 output overload period expired;
 - .2 critical bus voltage out of limits;
 - .3 internal over temperature period expired;
 - .4 total battery discharge;
 - .5 UPS failure.
 - .4 Uninterrupted automatic re-transfer occurs whenever inverter(s) can assume critical load.
 - .5 Uninterrupted automatic re-transfers are inhibited for following conditions:
 - .1 when transfer to bypass is activated manually or remotely;
 - .2 in event of multiple transfers/re-transfer operations control circuitry limits "cycling" to three operations in any ten-minute period; third transfer locks critical load on bypass source, for 60 minutes;

- .3 UPS failure.
- .6 Uninterrupted manual transfers are initiated from control panel, and transfers to bypass and from bypass is possible with inverter logic. During manual transfers to bypass mode, inverter must verify proper bypass operations before transferring critical load to bypass.
- .7 Transfers to bypass are inhibited for following conditions:
 - .1 bypass voltage out of limits (+10%, to -10% of nominal);
 - .2 bypass frequency out of limits (+/- 4 Hz, adjustable, factory set);
 - .3 bypass out of synchronization;
 - .4 bypass phase rotation / installation error.
- .8 Static transfer time: No break, complete in less than 4 ms.
- .9 Bypass manually energized using control panel or remotely through building alarm input.
- .8 Monitoring and Control Components:
 - .1 Control panel provides fully automatic operation through microprocessor controlled digital signal processing. Start-up and transfers are automatic functions, and do not require operator intervention.
 - .2 System software to provide control, monitoring and communication requirements of UPS unit and batteries. System software to be compatible for use by wide range of operating systems.
 - .3 178 mm touch sensitive, backlit LCD front panel display that includes LED indicators for basic UPS status. Colour coded LED vertical bars show UPS status (green, amber, red).
 - .4 LCD Displays:
 - .1 UPS status (home screen): shows UPS status output voltage and battery time remaining, load level, average efficiency, power consumption in kWh, system mimic diagram, operating mode, and active events.
 - .2 Controls Tab: touch sensitive button controls, for turning UPS on and off, transfer to/from bypass, enabling or disabling battery charger, initiating battery test, and enabling or disabling Energy Saver System.
 - .3 Metering Tab: screen shows voltages currents, temperatures, kW, kVA, and power factor (as applicable) for UPS input, output, bypass source, and battery; colour coded (green, amber, red) bar graph indicators accompany power and temperature measurements.
 - .4 Logs Tab: alarm/event queue, active alarms and alarm history, events, status changes and commands, all timed to 1/1000th second for tracking and analysis;
 - .5 Statistics Tab: Numerically and graphically displays estimated savings afforded by energy saver operation over time.
 - .6 Settings Tab: Button access to user adjustable settings such as, but not limited to: date/time, building alarm designations, communications parameter setup,

UPS name, user passwords, and display language.

- .5 Control Panel Lamp Indicators:
 - .1 NORMAL: Green LED indicates that commercial AC utility or generator source is supplying power to rectifier and inverter is supporting critical load.
 - .2 BYPASS: Amber LED indicates that UPS has transferred load to bypass circuit.
 - .3 BATTERY: Amber LED indicates that commercial AC utility or generator source has failed and battery is supplying power to inverter, which is supporting load.
 - .4 ALARM: Red LED and accompanying audible alarm horn, indicates that UPS detects an alarm condition, outlined in detail in Logs tab from home screen and in operator's manual.
- .6 Interface Panel: Provides following signals and communication features:
 - .1 Alarm Contact: Dry contact for annunciating summary alarm for user use.
 - .2 USB communications interface.
 - .3 Building Alarms: Five Inputs for monitoring status of external dry contacts.
 - .4 External REPO Contacts: To connect an external remote emergency power off switch to shut down UPS and de-energize critical load.
 - .5 Battery Control Contacts: To connect battery shunt trip and auxiliary contact signals from battery breaker or battery disconnect switch.
 - .6 External Bypass Indicator Connection: To acknowledge that external maintenance bypass has been closed around UPS, placing critical load on utility power.
- .7 Communications: UPS to be equipped with field configurable communications to allow for remote monitoring functions via plug-in devices. Include for:
 - .1 Remote Monitoring:
 - .1 Communications devices capable of communicating via various industry standard protocols such as RS232, SNMP, BACnet and ModBus.
 - .2 Monitoring of UPS status through isolated dry contact Form C relays; include minimum 2 NC and 2 NO contacts for auxiliary functions.
 - .3 Relay Card: Serial dry contact card providing 4 isolated dry output contacts, 1 isolated input; relays are programmable.
 - .4 Integrate into any industry Siemens Building Automation System (BAS); exact protocol requirements to be compatible with BAS serving building and confirmed with Mechanical Division BAS vendor.
- .9 UPS Module Protection:
 - .1 Rectifier/Charger and Bypass protection provided through individual fusing of each phase.
 - .2 kAIC Rating: 100 kAIC for greater than 40 kW frames.

- .3 Battery protection provided by thermal-magnetic molded-case circuit breakers in each battery cabinet.
 - .4 Electronic current limiting circuitry and fuses in inverter circuit provides output protection.
- .10 UPS Integral Battery Management System:
- .1 Provides battery time remaining while operating in normal mode and battery mode. Battery time available information displayed real-time, even under changing load conditions. Upon commissioning, battery runtime information available.
 - .2 Automatically tests battery system to ensure that battery can provide greater than 80% of its rated capacity. Testing batteries to not jeopardize operation of critical load. Upon detection of battery string not capable of providing 80%, UPS system to alarm that battery needs attention/replacement. Battery test to detect following:
 - .1 open battery string;
 - .2 shorted battery string (current limit);
 - .3 battery capacity (runtime) less than 80% of "new" battery capacity.
- .11 Transformers:
- .1 Where transformers are required to transform voltages to required levels, ensure that dimensions of entire assembly can be accommodated in available spaces of installation location. Review with Departmental Representative prior to ordering.
 - .2 Transformers are to be isolated distribution type. Autotransformers are not acceptable unless approved in writing by the Departmental Representative.
- .12 Valve Regulated Lead Acid (VRLA) Batteries:
- .1 Valve regulated, high-rate discharge, lead-acid batteries which provide energy to support critical load during momentary loss of input power to rectifier; batteries are flame retardant in accordance with UL 94-V2 requirements.
 - .2 Battery Pack: Factory preassembled and prewired, sealed, maintenance-free, lead acid type batteries to provide power for at least 10 minutes at full load rating capacity of UPS.
 - .3 Depending on UPS capacity and battery run time requirements, batteries are internally housed in UPS cabinet or an external matching cabinet. Refer to additional cabinet requirements later in this Section.
 - .4 Each battery tray shall be removable from the front of cabinet.
 - .5 Circuit breaker in each cabinet includes A/B auxiliary switch. UPS module provides monitoring and alarming an open battery cabinet circuit breaker condition.
 - .6 Circuit breaker in each cabinet includes 48 VDC shunt trip device. Shunt trip operates to trip battery breaker(s) for an emergency power off command or battery disable command.
 - .7 Expected Battery Life: minimum 200 complete full load discharge cycles when operated and maintained within manufacturer's specifications.

- .8 External battery cabinet to match depth, height and appearance of UPS cabinet. Power and control wiring between cabinets to be factory provided.
- .13 Enclosures/Cabinets:
 - .1 Entire UPS system including accessories, transformer, maintenance bypass, and battery packs to be provided in matching dead front, free standing, and enameled painted steel enclosures. Enclosures include safety shields behind doors and equipped with casters and leveling feet. Front doors include locks to prevent unauthorized entry.
 - .2 Enclosures to be suitably forced air fan ventilated and NEMA 1 rated with sprinkler-proof provisions including drip shield. Drip shield to be constructed of steel and finished to match UPS. Drip shield to be manufactured by UPS manufacturer. Ventilation louvres to be designed to prevent penetration of water spray from activated sprinklers onto live parts, and doors and component openings to be gasketed.
 - .3 No back or side clearance or access is required for the system. Serviceable subassemblies to be modular and capable of being replaced from front of UPS. Back and side enclosure covers to be capable of being located directly adjacent to a wall.
 - .4 Cable entries provisions provided to suit specific project installation requirements.
- .14 Additional Requirements:
 - .1 Output Breakers: As shown on drawings and as required.
 - .2 Spare Parts: Manufacturer's recommended spare parts kit including one modular logic board of each type of replaceable logic board.
 - .3 Integrate Cabinets with following:
 - .1 external maintenance bypass
 - .2 isolation transformers
- .15 Warranty:
 - .1 UPS System:
 - .1 UPS manufacturer to warrant UPS system against defects in materials and workmanship for 24 months from date of substantial completion. Warranty to include all labour and materials with no deductible amounts.
 - .2 Batteries:
 - .1 System manufacturer to provide full comprehensive warranty on batteries against defects in materials and workmanship as follows:
 - .1 VRLA batteries to be designed for minimum 5 years of service life
 - .2 batteries to be complete with 24 months full exchange and 60 months prorated warranty, from date of substantial completion
 - .3 after 60 months, battery manufacturer's standard warranty to be passed through to Owner
 - .4 batteries to be supplied by UPS manufacturer or UPS manufacturer

authorized dealer.

- .16 Testing, Start-up, Verification and Training:
 - .1 Manufacturer to provide standard factory testing and submit copy of detailed reports to Departmental Representative for review.
 - .2 Manufacturer's authorized technician to:
 - .1 provide onsite service of inspecting installation, perform start-up, testing and verification of equipment
 - .2 to assist installing Contractor in installation and testing of equipment; coordination of work with Contractor
 - .3 preparation and signing certification report letter that states system has passed manufacturer's testing and performs to manufacturer's requirements for application
 - .4 be present to assist during third party testing
 - .5 provide instructions on system operating and maintenance.
 - .3 Perform testing and verification work at times acceptable to Departmental Representative and reviewed with Departmental Representative.
 - .4 Refer to Part 3 for additional requirements.
- .17 Acceptable Manufacturers are:
 - .1 Riello Sentryum UPS
 - .2 Riello Master HP UL UPS
 - .3 Mitsubishi 1100 UPS
 - .4 Toshiba G9000 UPS
 - .5 Other approved equal.

3 EXECUTION

3.01 INSTALLATION OF UPS UNITS

- .1 Obtain required training from manufacturer's representative on any special installation procedures. Install units in accordance with manufacturer's instructions to suit specific installation requirements.
- .2 Provide specified UPS units for equipment applications as detailed and as sized in specifications and/or on drawings. Place units on concrete housekeeping pads, level and secure in position.
- .3 Connect units in accordance with applicable Codes of authorities having jurisdiction and in accordance with manufacturer's instructions. Ensure adequate clearance is provided as per local governing code requirements and as required for access for operation and maintenance.
- .4 Coordinate feed entries and exits to suit site conditions and equipment locations. Confirm suitability of conduit entries and exits with the Departmental Representative. Avoid conduit entries and exits from the

top of the UPS System enclosures.

- .5 Provide separate circuit to feed external maintenance bypass, as required.
- .6 Provide EPO operator in wall box in locations as reviewed with Departmental Representative. Provide wiring in conduit and connect to UPS unit. Provide engraved nameplate identifying operator.
- .7 Materials and parts comprising UPS units to be new, of current manufacture, of a high grade and free from defects and imperfections and must have been in prior service, except as required during factory testing.
- .8 Provide transparent plastic covers of suitable gauge during installation of large UPS unit to protect entire UPS equipment from dust and dirt during Project Work.
- .9 Wiring and bolted connections of bus bars, lugs, and cables to be made in accordance with requirements of system manufacturer and applicable governing codes and standards. Electrical power connections to be torqued to required value and marked.
- .10 Protect wire runs in a manner which separates power and control wiring. Input and output wiring must be separate. Make provisions in cabinets to permit installation of input and output cabling, using conduit.
- .11 Provide drip shield for UPS units located in sprinklered equipment rooms or other unfinished areas.
- .12 Ground and bond equipment as per local electrical code requirements, to suit specific project requirements.
- .13 Provide adequate ventilation to ensure that components are operated within their environmental ratings.
- .14 Nameplates:
 - .1 Provide engraved Lamacoid nameplates for equipment and components.
 - .2 Prior to manufacture of nameplates, review nomenclature with the Departmental Representative in writing.

3.02 INSPECTION, TESTING, START-UP, COMMISSIONING AND VERIFICATION WORK

- .1 Include for onsite inspection, testing, start-up, commissioning and verification by manufacturer's field service personnel. Arrange for testing and commissioning to be performed by equipment supplier and witnessed by Departmental Representative at a time approved by Departmental.
- .2 Under direction of Departmental Representative, carry out complete performance acceptance tests and associated work at site on installed UPS units. Include for provision of full capacity load banks for testing. Manufacturer to provide monitoring equipment required to demonstrate successful operation.
- .3 Tests to be conducted without disturbing user wiring and completed prior to connection of site critical loads.
- .4 Perform visual inspection, mechanical inspection, electrical inspection, start-up and verification, including but not limited to:
 - .1 inspect equipment for damage and for proper installation

- .2 perform start-up procedure as per manufacturer's instructions and recommendations
- .3 test entire UPS system for automatic operation; testing must show successful uninterrupted full load transfer upon hydro failure to UPS and uninterrupted transfer from UPS to bypass
- .4 perform load testing, battery system testing, bypass test, and integrated testing with transfer switches and breakers feeding UPS unit and external bypass.
- .5 inspect and test batteries for charge and charging capability
- .6 Inspect batteries for correct connections
- .7 test for low battery shut down
- .8 test battery monitoring system
- .9 test external maintenance bypass switch
- .10 load test for connected building load, and automatic operation of normal power failure; simulate power failure and power retransfer; simulate power failure of emergency generators and reconnection
- .11 testing to include use of artificial load bank with tests as follows:
 - .1 continuous test for 4 hours at full load
 - .2 discharge batteries at full load for 15 minutes
 - .3 recharge batteries for 60 minutes
 - .4 supply full load.
- .12 testing after installation to ensure IEEE 519 Harmonic levels are maintained at 100% and 50% load input and output
- .13 testing and demonstrating successful operation of EPO system
- .14 test system options and features to ensure proper operation.
- .5 Onsite testing to include but not be limited to following detailed parameters:
 - .1 recording functional alarms and voltage levels at which alarm occurs, on UPS system
 - .2 recording critical load alarms and voltage levels at which alarm occurs, on UPS system
 - .3 recording minimum and maximum adjustment of voltage potentiometer on system
 - .4 recording levels and checking functionality of battery equalize feature
 - .5 recording load testing data with 0%, 50% and 100% load for function of input VAC/IAC/THD%, VDC/IDC (charging), output VAC/ Φ - Φ V average/IAC, output kW/kVA/Hz and output voltage THD%
 - .6 determine voltage regulation from 0-100% full load
 - .7 determine voltage unbalance of system at 0%, 50% and 100% kW load

- .8 record transient response of system under load steps of 0-50%, 50-0%, 50-100%, 100-50%, 100% (UPS to bypass), 100% (bypass to UPS) and 100% simulated fuse failure; load percentages; Refer to kW rating of unit; record 3-phases of output voltage, 1-phase of output current and one phase of input voltage; attach printouts with report
- .9 perform battery discharge test; record battery details, specifications and operating data; load system to 100% kW load and record DCV and DCA at one-minute intervals from 0 to 20 minutes, record 3-phases of output voltage, one phase of output current and one phase of input voltage; attach printouts with report;
- .10 record voltage levels and times at which Battery Discharge/Low Battery Warning/Low Battery Shutdown occur during discharge test
- .11 during battery charge (no load), record battery current limit (ADC, 10%) and reduced battery current limit (ADC, 1%)
- .12 after battery recharge current has reached 0 A following battery capacity test, perform 125% overload test and verify/record overload alarm, input current limit (115%), reduced input current limit (100%), overload transfer alarm, auto-retransfer primed alarm and auto-retransfer successful (no alarm).
- .6 Rectify deficiencies to satisfaction of the Departmental Representative.
- .7 Document, sign, and date test results. Submit minimum one bound hard copy and electronic copy to Departmental Representative for review.

3.03 TRAINING

- .1 Manufacturer's trained technician to perform onsite training of each user (including provision of user guides) prior to project completion to ensure that users are properly trained in the operation and maintenance of system.

END OF SECTION

1 GENERAL

1.01 SUBMITTALS

- .1 Submit shop drawings for products specified in this Section.

2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES

- .1 Branch circuit panelboards as scheduled to be complete with integral surge protective device (SPDs). Unit to be factory installed and connected onto bussing through integral breaker as recommended by manufacturer. SPD features include:
 - .1 in accordance with ANSI/UL 1449 3rd Edition, IEEE C62.41, C62.45, UL 1283, and CSA Standards
 - .2 Type 1
 - .3 maximum voltage protection rating to not exceed 700 V (120/208 V): L-N, L-G, N-G;
 - .4 minimum nominal discharge current rating of 10 kA
 - .5 minimum short circuit current rating of 100 kA
 - .6 peak surge current 150 KA per phase
 - .7 indicator LED on units to identify protection integrity status of metal-oxide varistors; indicator to be visible on front of panelboard.
 - .8 high-performance EMI/RFI noise rejection filter
 - .9 indicator LED on units to identify protection integrity status of MOVs; indicator to be visible on front of SPD device.
 - .10 diagnostic package with status indicators on each phase
 - .11 audible alarm
 - .12 Form C alarm contacts (for connection to BAS)
 - .13 maintenance free and not require any user intervention throughout its life.
 - .14 standard manufacturer's minimum 5 years parts and labour warranty.

2.02 ACCEPTABLE MANUFACTURERS

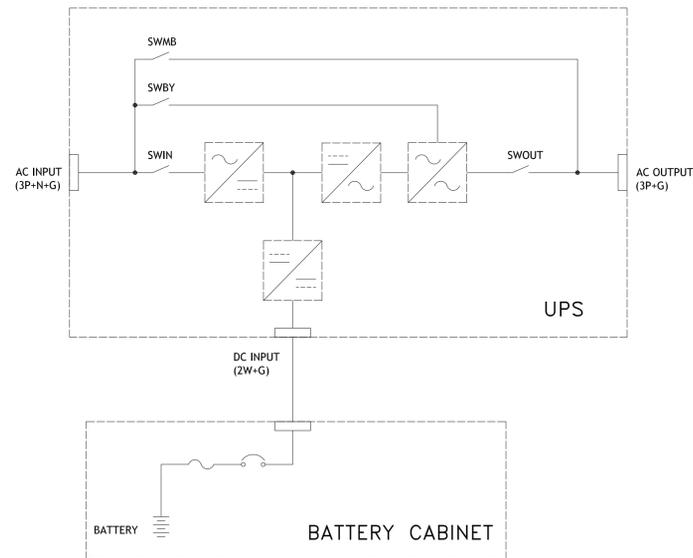
- .1 Acceptable manufacturers are:
 - .1 As supplied by Panelboard Manufacturer.

3 EXECUTION

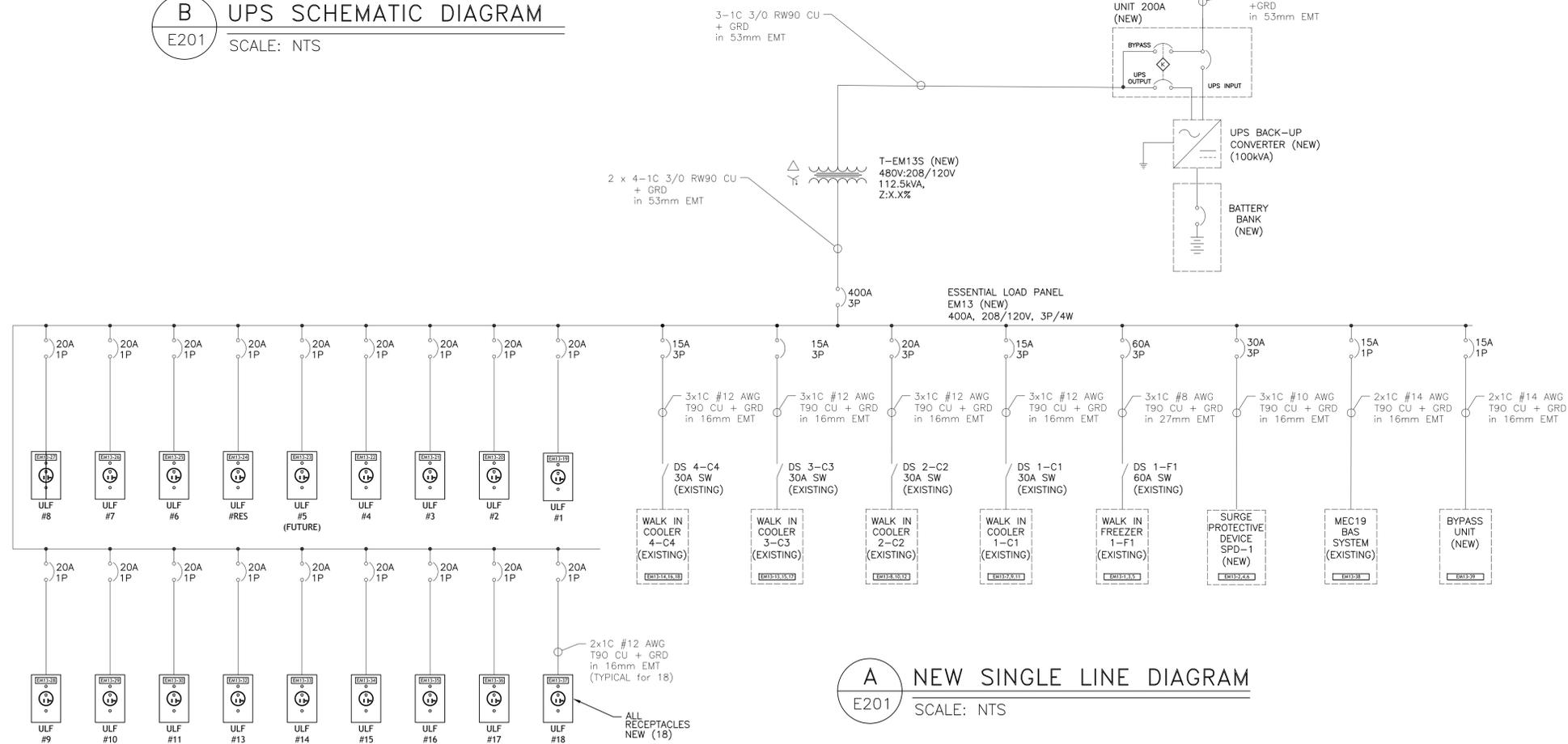
3.01 INSTALLATION OF SPD UNITS

- .1 Obtain required training from manufacturer's representative on any special installation procedures. Units are to be factory installed in accordance with manufacturer's instructions to suit specific installation requirements.
- .2 Ensure that MOV condition LED indicator is visible from front of device.
- .3 Ground and bond components as per local electrical code requirements. Refer also to requirements of grounding and bonding article.
- .4 Provide alarm/communications circuits as required. Include for provision of conduits, boxes and control/signal wiring for interconnection to BAS.
- .5 Perform testing at times reviewed with the Departmental Representative.
- .6 Provide instructions on system operating and maintenance.
- .7 Additionally, refer to testing, coordination and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

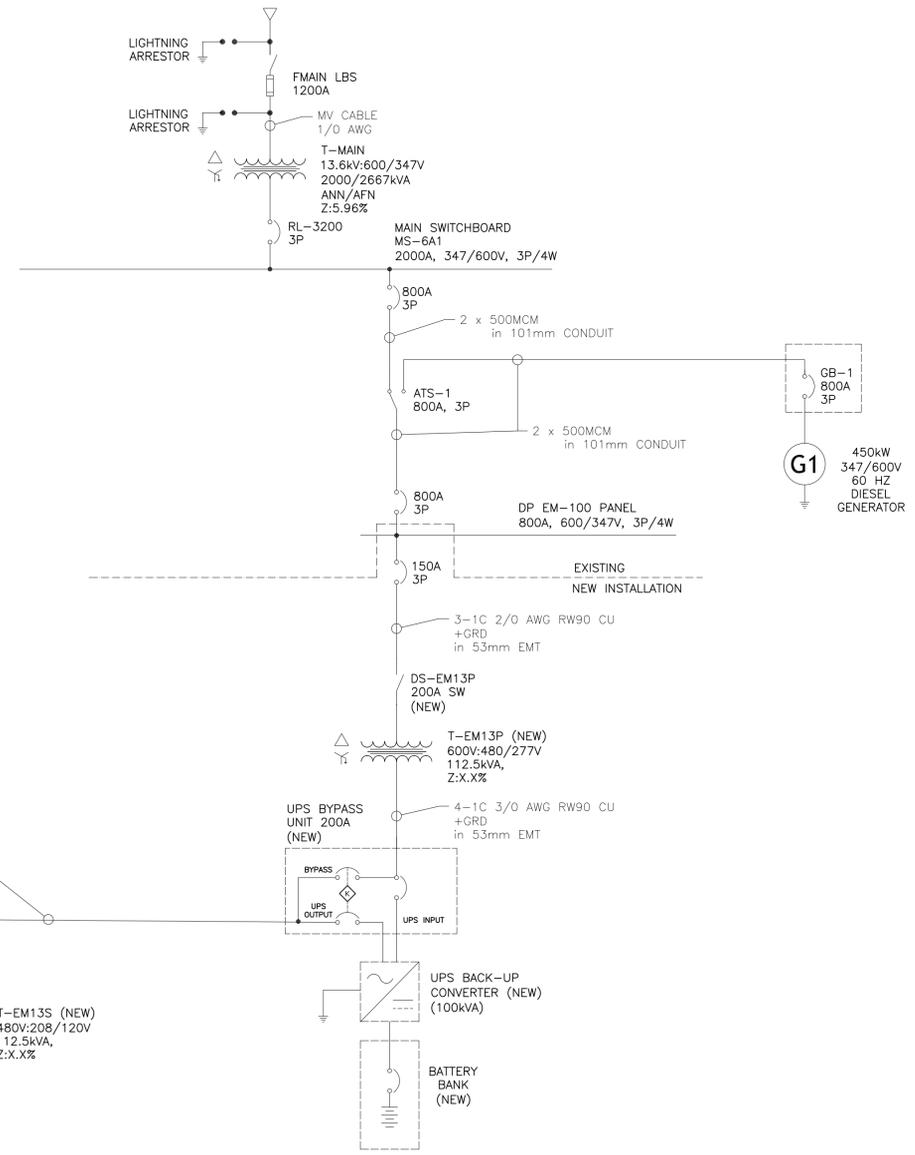
END OF SECTION



B UPS SCHEMATIC DIAGRAM
E201 SCALE: NTS



A NEW SINGLE LINE DIAGRAM
E201 SCALE: NTS



GENERAL NOTES

CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING FIELD CONDITIONS ON THE PROJECT AND TO REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
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NOTE: DRAWINGS ARE NOT TO BE SCALED.

ENGINEERS SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

E		
D		
C		
B	DW ISSUED FOR TENDER	23-09-20
A	DW PRELIMINARY REVIEW	23-09-07
No.	BY REVISION / ISSUE	DATE



15 Wildwood Place
Waterloo, ON N2L 4B2
mobile: (519) 572-7500
email: dwindley@powerdigm.ca

PROJECT NAME
A AFC
GRDC UPS BASEMENT GUELPH
95 STONE ROAD
GUELPH, ONTARIO

DRAWING TITLE
UPS BASEMENT GUELPH
SINGLE LINE DIAGRAM

PROJECT No.	SCALE		
476-01-01	NTS		
DATE	DRAWING No.	DRAWN BY	APPROVED
2023/07/20	07-E201	D.W.	D.W.



GENERAL NOTES

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NOTE: DRAWINGS ARE NOT TO BE SCALED.

ENGINEER'S SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET, RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

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A	DW	PRELIMINARY REVIEW 23-09-07
No.	BY	REVISION / ISSUE DATE

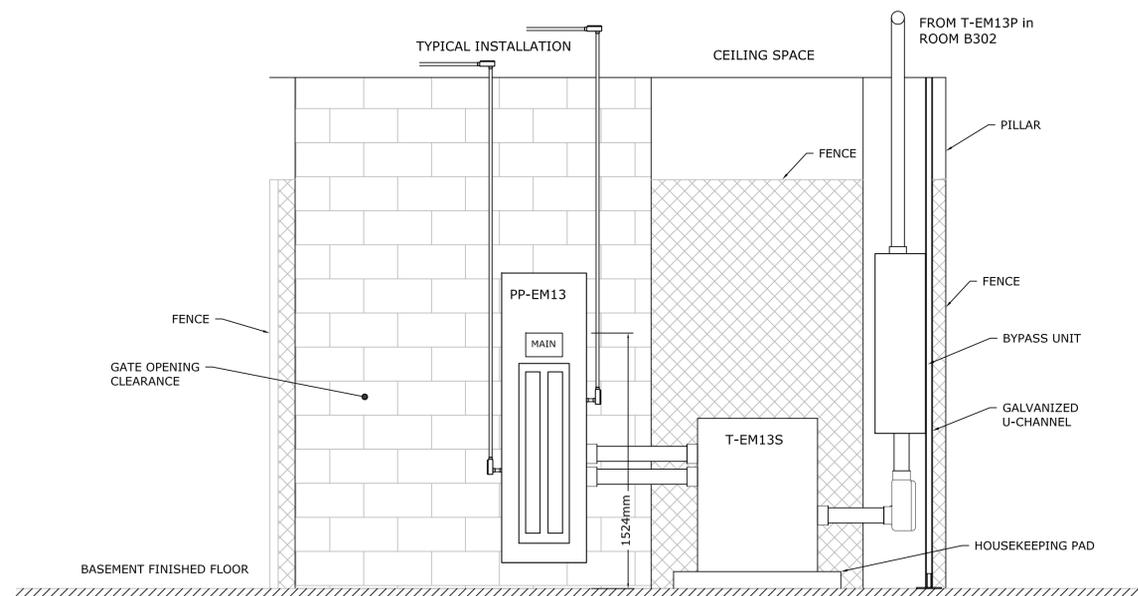


15 Wildwood Place
 Waterloo, ON N2L 4B2
 mobile: (519) 572-7500
 email: dwindley@powerdigm.ca

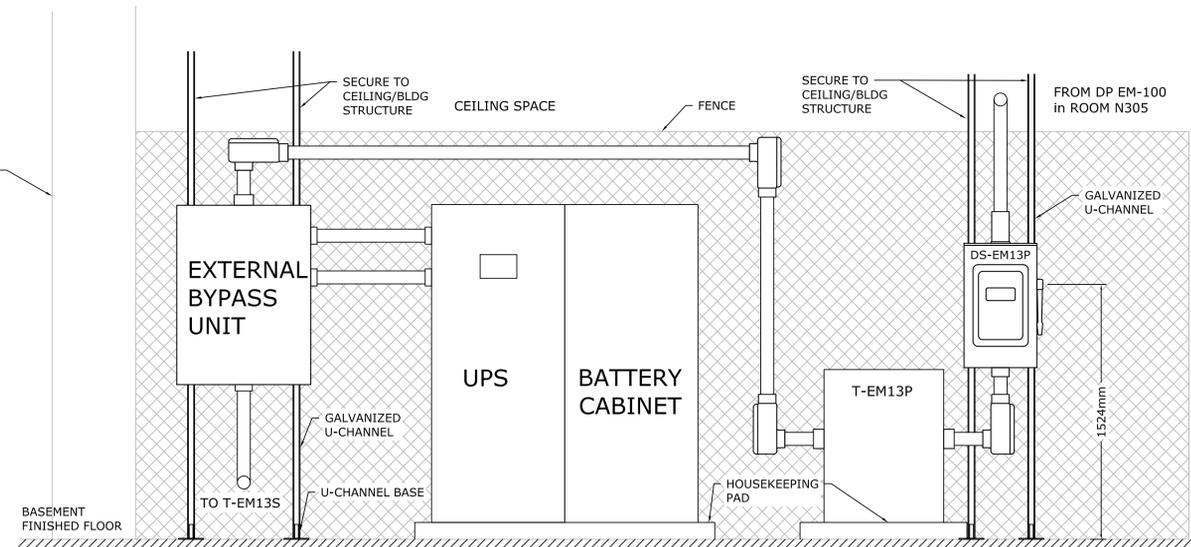
PROJECT NAME
 AAFC
 GRDC UPS BASEMENT GUELPH
 95 STONE ROAD
 GUELPH, ONTARIO

DRAWING TITLE
 UPS BASEMENT GUELPH
 PLAN LAYOUT - UPS PRIMARY

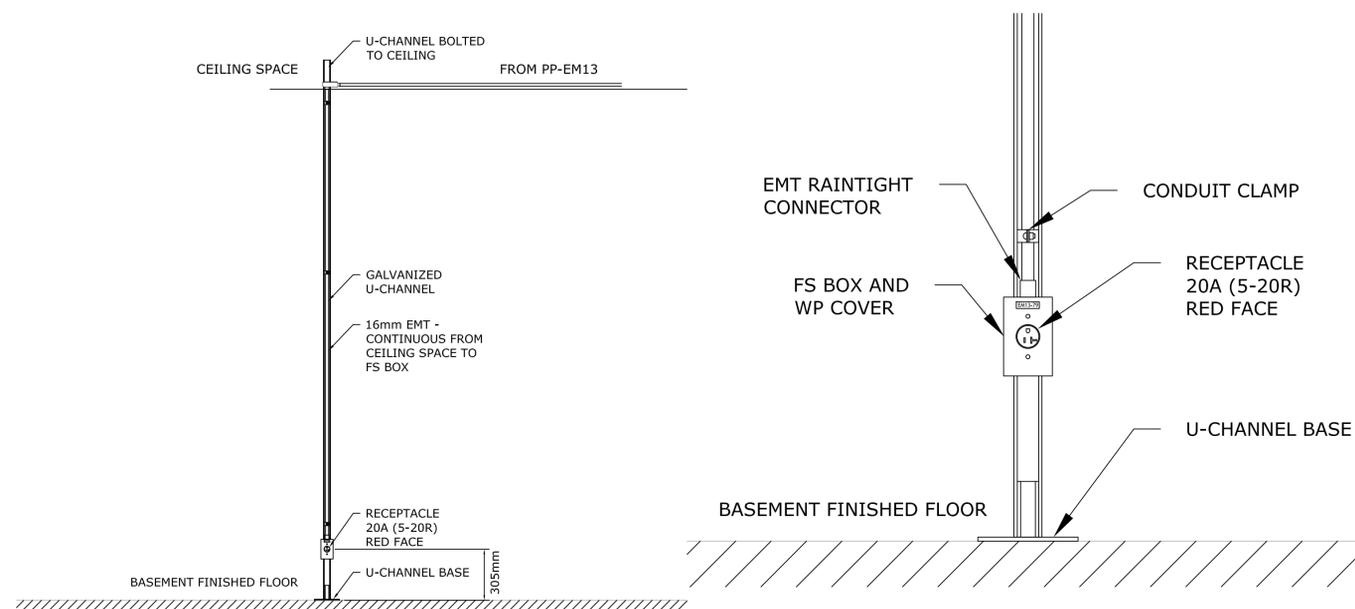
PROJECT No.	SCALE		
476-01-01	NTS		
DATE	DRAWING No.	BROWN BY	APPROVED
2023/07/31	07-E202	D.W.	D.W.



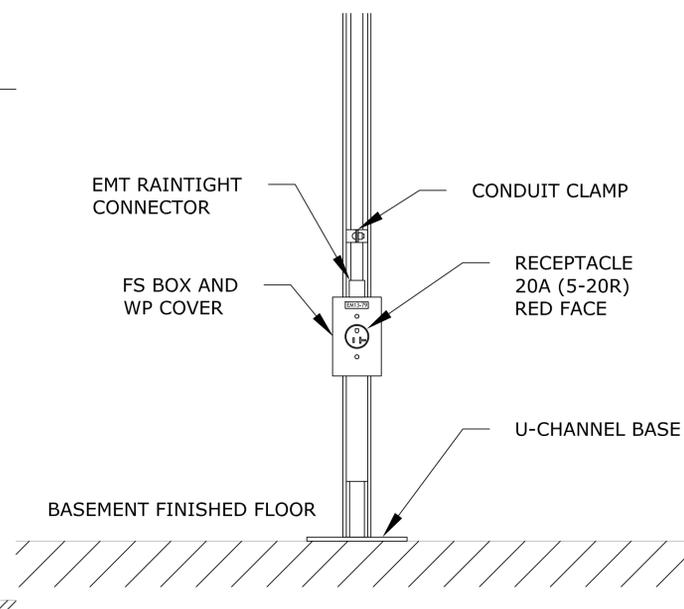
A PP-EM13 WALL ELEVATION - ROOM B102
E203 SCALE: 1:20



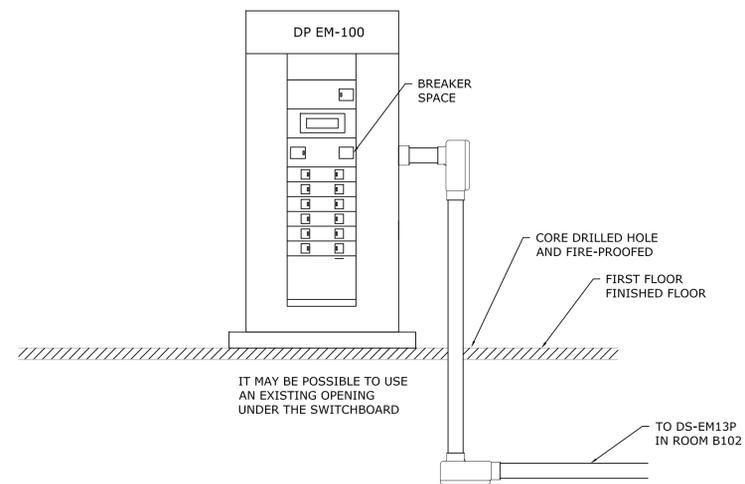
C UPS WALL ELEVATION - ROOM B102
E203 SCALE: 1:20



B RECEPTACLE INSTALLATION
E203 SCALE: 1:20



E RECEPTACLE DETAIL
E203 SCALE: 1:5



E DP EM-100 ELEVATION - ROOM N305
E203 SCALE: 1:20

GENERAL NOTES

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NOTE: DRAWINGS ARE NOT TO BE SCALED.

ENGINEER'S SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET, RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

E		
D		
C		
B	DW ISSUED FOR TENDER	23-09-20
A	DW PRELIMINARY REVIEW	23-09-07
No.	BY REVISION / ISSUE	DATE

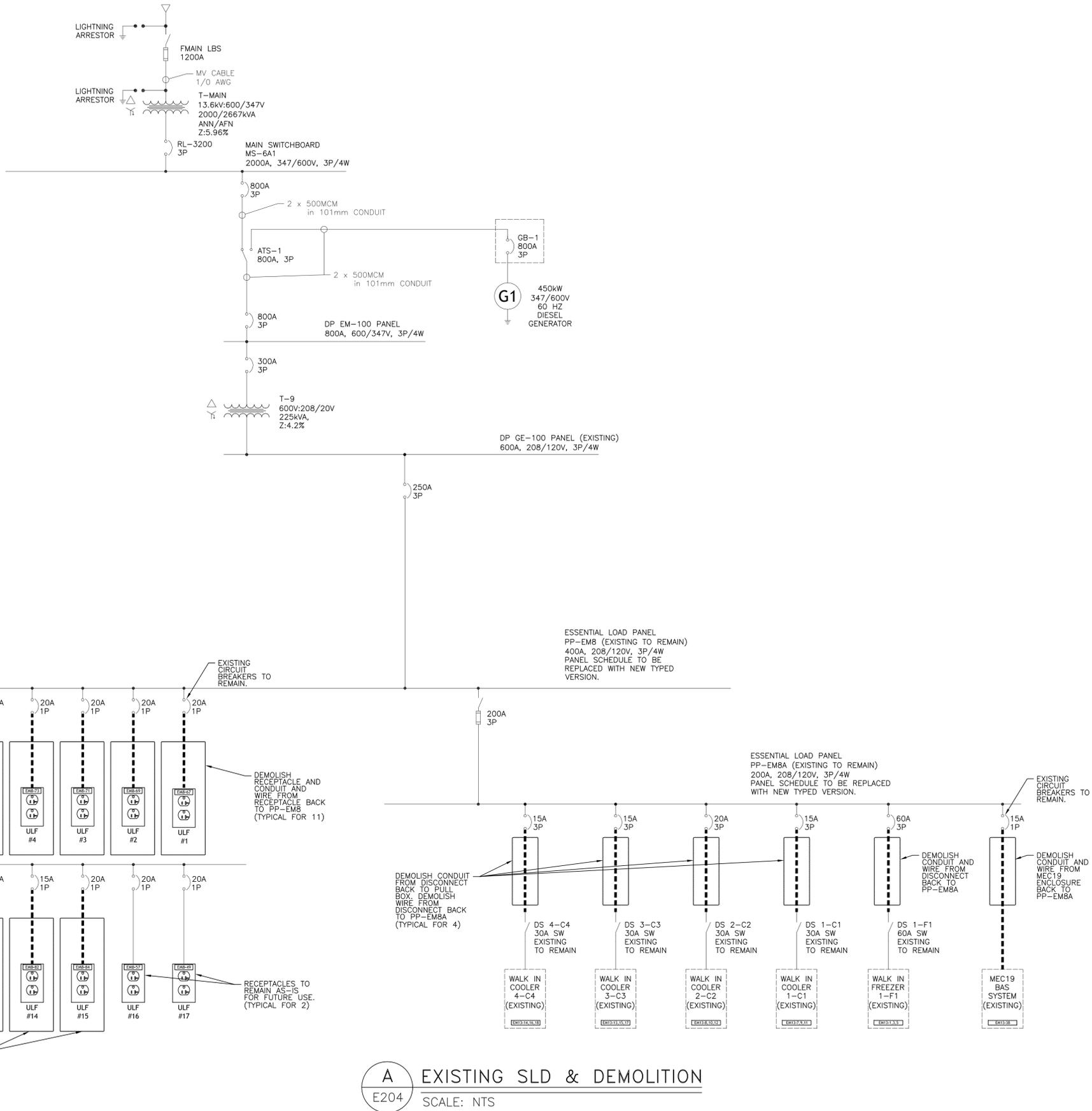


15 Wildwood Place
Waterloo, ON N2L 4B2
mobile: (519) 572-7500
email: dwindley@powerdigm.ca

PROJECT NAME
AAFC
GRDC UPS BASEMENT GUELPH
95 STONE ROAD
GUELPH, ONTARIO

DRAWING TITLE
UPS BASEMENT GUELPH
DETAILS

PROJECT No.	SCALE		
476-01-01	NTS		
DATE	DRAWING No.	DRAWN BY	APPROVED
2023/07/31	07-E203	D.W.	D.W.



A EXISTING SLD & DEMOLITION
E204 SCALE: NTS

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ENGINEERS SEAL



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	CIRCUIT DESIGNATION
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No. BY	REVISION / ISSUE	DATE

POWERDIGM Rx Inc.
Power & Process Optimization

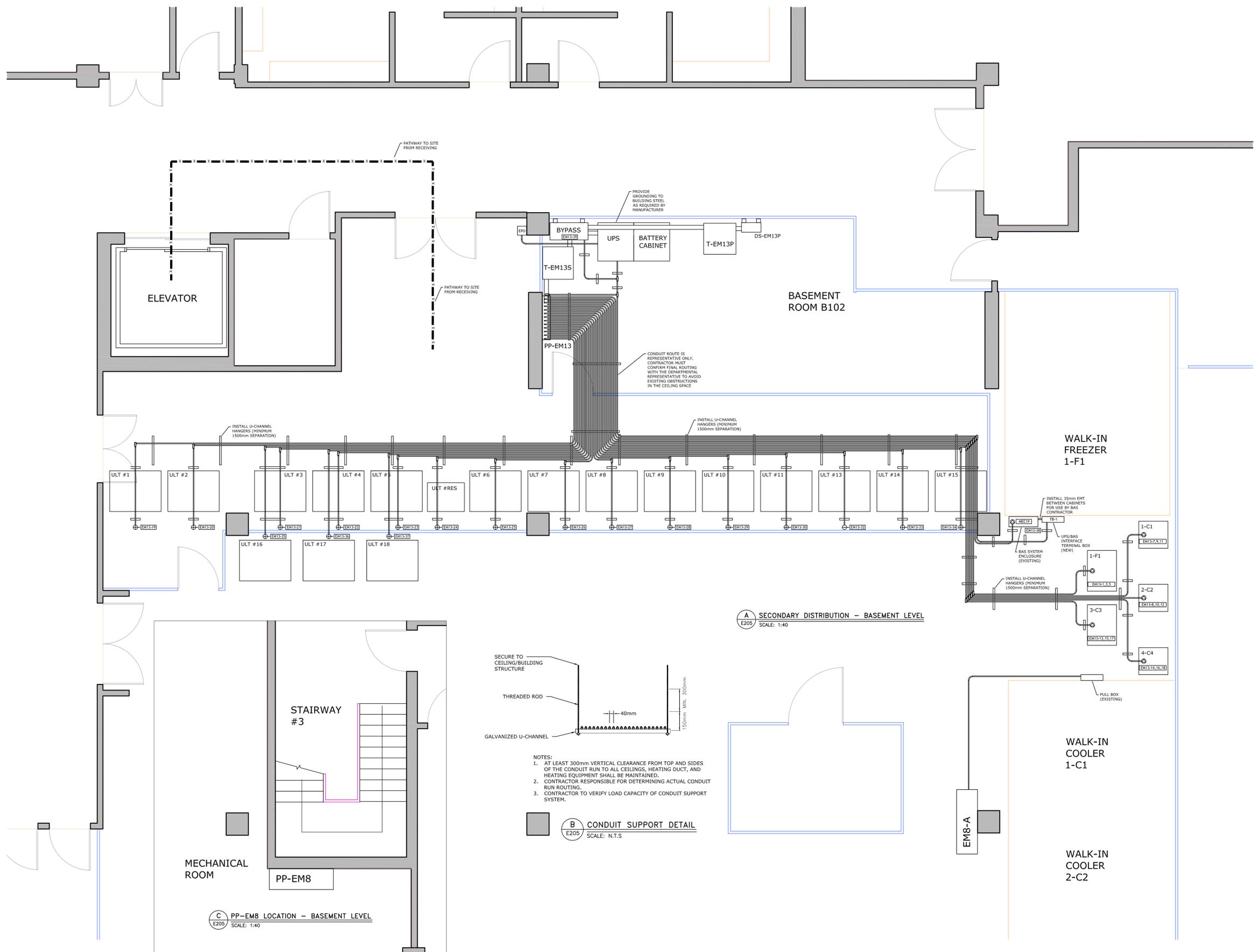
15 Wildwood Place
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mobile: (519) 572-7500
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PROJECT NAME
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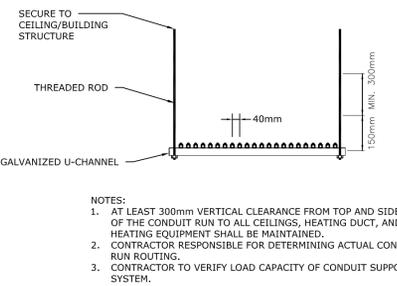
95 STONE ROAD
GUELPH, ONTARIO

DRAWING TITLE
UPS BASEMENT GUELPH
SINGLE LINE DIAGRAM
DEMOLITION DETAILS

PROJECT No. 476-01-01	SCALE NTS
DATE 2023/08/21	DRAWING No. 07-E204
DRAWN BY D.W.	APPROVED D.W.



A SECONDARY DISTRIBUTION - BASEMENT LEVEL
SCALE: 1:40



C PP-EM8 LOCATION - BASEMENT LEVEL
SCALE: 1:40

- NOTES:
- AT LEAST 300mm VERTICAL CLEARANCE FROM TOP AND SIDES OF THE CONDUIT RUN TO ALL CEILINGS, HEATING DUCT, AND HEATING EQUIPMENT SHALL BE MAINTAINED.
 - CONTRACTOR RESPONSIBLE FOR DETERMINING ACTUAL CONDUIT RUN ROUTING.
 - CONTRACTOR TO VERIFY LOAD CAPACITY OF CONDUIT SUPPORT SYSTEM.

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ENGINEERS SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

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No.	BY REVISION / ISSUE	DATE



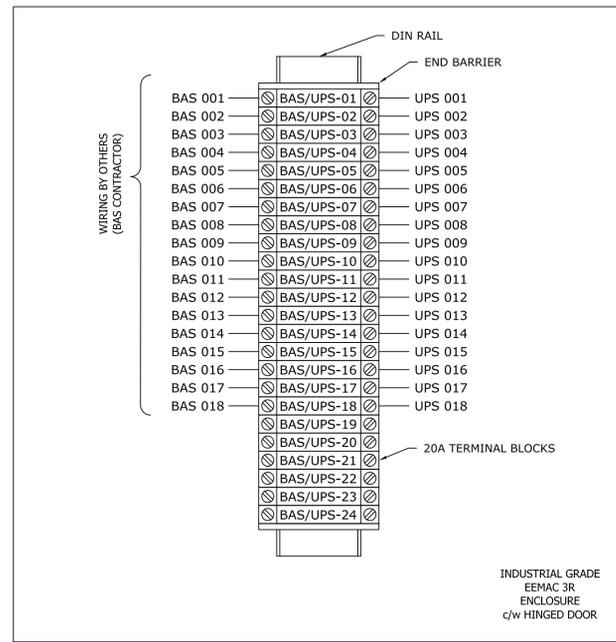
15 Wildwood Place
Waterloo, ON N2L 4B2
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PROJECT NAME
AAFC
GRDC UPS BASEMENT GUELPH

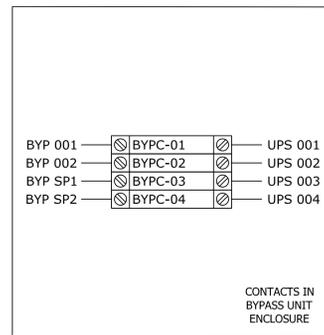
95 STONE ROAD
GUELPH, ONTARIO

DRAWING TITLE
UPS BASEMENT GUELPH
PLAN LAYOUT - UPS SECONDARY
BASEMENT LEVEL

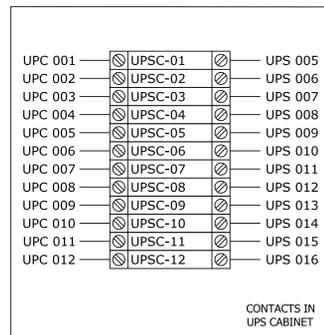
PROJECT No. 476-01-01	SCALE NTS
DATE 2023/07/31	DRAWING No. 07-E205
D.W.	APPROVED D.W.



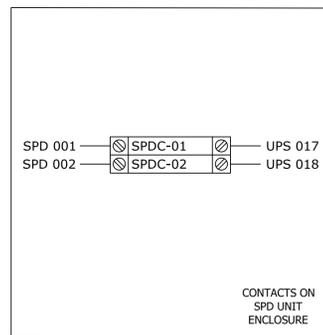
B BAS/UPS INTERFACE TERMINAL BOX TB-1
E206 SCALE: NTS



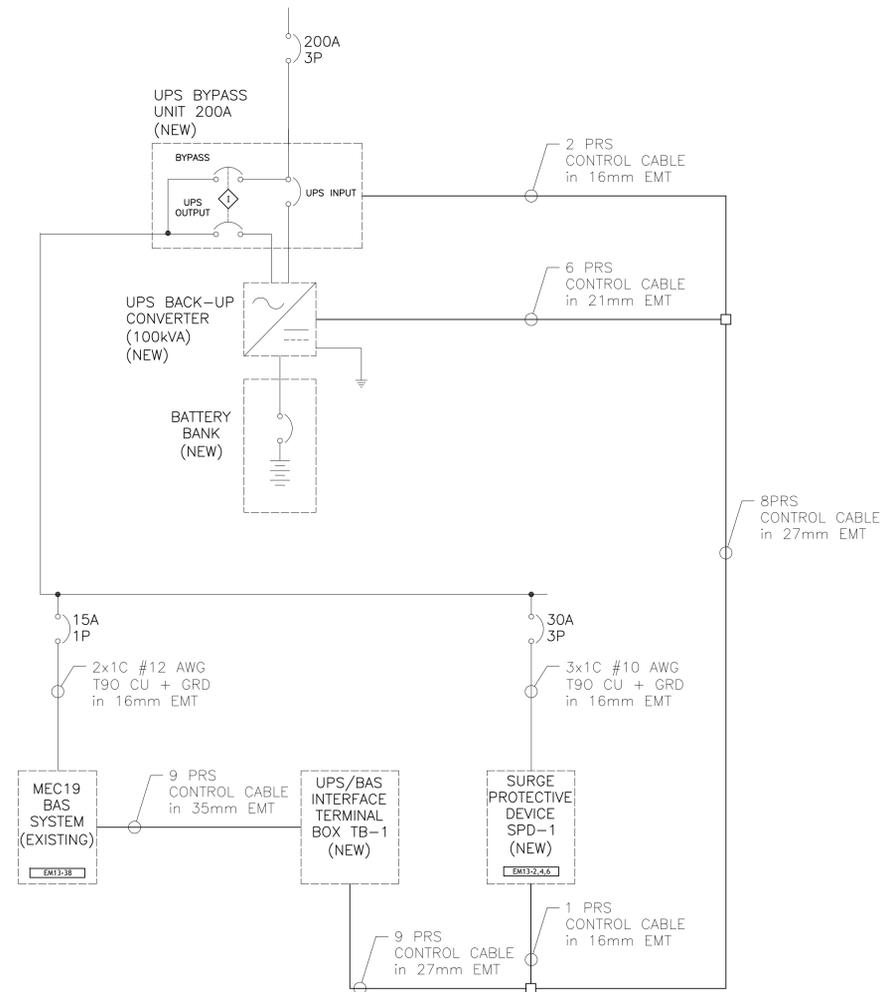
C BYPASS UNIT INTERFACE TERMINALS
E206 SCALE: NTS



D UPS CABINET INTERFACE TERMINALS
E206 SCALE: NTS



E SPD INTERFACE TERMINALS
E206 SCALE: NTS



A BAS SYSTEM CONNECTIONS TO UPS SYSTEM
E206 SCALE: NTS

GENERAL NOTES

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ENGINEER'S SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET, RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

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email: dwindley@powerdigm.ca

PROJECT NAME
AAFC
GRDC UPS BASEMENT GUELPH

95 STONE ROAD
GUELPH, ONTARIO

DRAWING TITLE
UPS BASEMENT GUELPH
BAS SYSTEM INTERFACE

PROJECT No.	SCALE		
476-01-01	NTS		
DATE	DRAWING No.	DRAWN BY	APPROVED
2023/09/06	07-E206	D.W.	D.W.

MAIN AMP RATING: 400A
 MAIN CIRCUIT BREAKER: 400A
 MAIN FEEDER SIZE: 2 x 3/0 AWG CU + #6 GRD
 VOLTAGE/PHASE: 120/208VAC, 3Ø/4W

ESSENTIAL LOADS PANEL - PP-EM13

IC.=10KA
54 CCTS

DESCRIPTION	DEVICES	CB SIZE	LOAD	CCT	PHASE	CCT	LOAD	CB SIZE	DEVICES	DESCRIPTION
WALK-IN FREEZER - 1-F1	1	60	-	1	A	2	-	30	1	SURGE PROTECTIVE DEVICE
WALK-IN COOLER - 1-C1	1	15	-	7	A	8	-	15	1	WALK-IN COOLER - 2-C2
WALK-IN COOLER - 3-C3	1	20	-	13	A	14	-	15	1	WALK-IN COOLER - 4-C4
FREEZER - ULF #1	1	20	-	19	A	20	-	20	1	FREEZER - ULF #2
FREEZER - ULF #3	1	20	-	21	B	22	-	20	1	FREEZER - ULF #4
FREEZER - ULF #5	1	20	-	23	C	24	-	20	1	FREEZER - ULF #RES
FREEZER - ULF #6	1	20	-	25	A	26	-	20	1	FREEZER - ULF #7
FREEZER - ULF #8	1	20	-	27	B	28	-	20	1	FREEZER - ULF #9
FREEZER - ULF #10	1	20	-	29	C	30	-	20	1	FREEZER - ULF #11
SPARE	-	20	-	31	A	32	-	20	1	FREEZER - ULF #13
FREEZER - ULF #14	1	20	-	33	B	34	-	20	1	FREEZER - ULF #15
FREEZER - ULF #16	1	20	-	35	C	36	-	20	1	FREEZER - ULF #17
FREEZER - ULF #18	1	20	-	37	A	38	-	15	1	SIEMENS BAS SYSTEM (MEC19)
MANUAL BYPASS UNIT	1	15	-	39	B	40	-	20	-	SPARE
SPACE	-	-	-	41	C	42	-	-	-	SPACE
SPACE	-	-	-	43	A	44	-	-	-	SPACE
SPACE	-	-	-	45	B	46	-	-	-	SPACE
SPACE	-	-	-	47	C	48	-	-	-	SPACE
SPACE	-	-	-	49	A	50	-	-	-	SPACE
SPACE	-	-	-	51	B	52	-	-	-	SPACE
SPACE	-	-	-	53	C	54	-	-	-	SPACE

ELECTRICAL DRAWING LIST

E201	SINGLE LINE DIAGRAM
E202	PLAN LAYOUT - UPS PRIMARY DISTRIBUTION
E203	ELEVATIONS AND DETAILS
E204	DEMOLITION DETAILS
E205	PLAN LAYOUT - UPS SECONDARY DISTRIBUTION
E206	BAS SYSTEM INTERFACE
E207	SCHEDULES

INSTALLATION SCHEDULE

- PRELIMINARY WORK**
 - CLEAR AND CLEAN PROJECT AREA OF EQUIPMENT AND STORAGE MATERIALS.
 - OBTAIN DIMENSIONS OF ALL EQUIPMENT AND LAY OUT RELATIVE POSITIONS IN THE PROJECT AREA. REVIEW WITH DEPARTMENTAL REPRESENTATIVE. TAPE OFF THE PROPOSED EQUIPMENT LOCATIONS. ENSURE PROPER CLEARANCES ARE MAINTAINED.
 - POUR HOUSEKEEPING PADS AS REQUIRED. INSTALL U-CHANNEL SUPPORTS FOR EQUIPMENT.
 - INSTALL BASE EQUIPMENT AND GROUND AS NECESSARY.
 - CONSTRUCT PRIMARY CONDUITS PER THE SINGLE LINE DRAWING AND PLANS. ADVISE DEPARTMENTAL REPRESENTATIVE OF ANY CONFLICTS.
 - INSTALL WIRE AND CABLE BETWEEN THE EQUIPMENT PER THE SINGLE LINE DIAGRAM.
 - REVIEW WITH THE DEPARTMENTAL REPRESENTATIVE PRIOR TO PENETRATING ANY WALL OR CEILINGS.
- SECONDARY INSTALLATION**
 - FOR THIS STAGE, THE LOAD EQUIPMENT WILL NOT BE AFFECTED. DO NOT DISCONNECT ANY EQUIPMENT AT THIS STAGE.
 - REVIEW EXACT RECEPTACLE LOCATIONS WITH THE DEPARTMENTAL REPRESENTATIVE. MARK AGREED LOCATIONS CLEARLY.
 - REVIEW SECONDARY CONDUIT ROUTES WITH DEPARTMENTAL REPRESENTATIVE.
 - INSTALL U-CHANNEL RECEPTACLE SUPPORTS AT AGREED LOCATIONS.
 - INSTALL CONDUIT HANGERS TO SUPPORT SECONDARY CONDUIT RUNS.
 - RUN CONDUIT AND WIRE TO RECEPTACLE LOCATIONS FROM PP-EM13.
 - VERIFY CONNECTIONS AND PERFORM TESTING FOR RECEPTACLE CIRCUITS.
- WALK-IN FREEZERS, COOLERS, AND AUXILIARY EQUIPMENT**
 - AS ABOVE. REVIEW EQUIPMENT CONNECTION LOCATIONS AND CONDUIT ROUTING WITH THE DEPARTMENTAL REPRESENTATIVE.
 - DO NOT DISCONNECT ANY FREEZER OR COOLER EQUIPMENT AT THIS STAGE.
 - RUN CONDUIT AND WIRE TO THE VICINITY OF THE EQUIPMENT DISCONNECT CONNECTIONS. LEAVE SUFFICIENT WIRE CURLED UP TO MAKE THE FINAL CONNECTION
- PRIMARY CONNECTION**
 - INSTALL NEW CONDUIT AND FEEDER CABLE FROM THE DISCONNECT DS-EM13P BACK TO POWER PANEL DP EM-100. LEAVE SUFFICIENT CABLE TO MAKE A CONNECTION TO THE NEW CIRCUIT BREAKER.
 - INSTALL PENETRATIONS IN WALLS AND CEILING AS REQUIRED TO COMPLETE THE INSTALLATION. VERIFY ALL PENETRATIONS PRIOR TO INSTALLING THEM WITH THE DEPARTMENTAL REPRESENTATIVE.
 - VERIFY THAT THE NEW FEEDER BREAKER IS COMPATIBLE WITH DP EM-100 AND THAT IS AVAILABLE FOR THE POWER TIE-IN.
 - ENSURE ALL DOWNSTREAM EQUIPMENT HAS BEEN VERIFIED AND TESTED AND IS SUITABLE FOR POWER. THIS WILL INCLUDE PP-EM13.
 - ALL DOWNSTREAM EQUIPMENT WILL BE OFF-LINE DURING THE TIE-IN AND WILL BE PROGRESSIVELY POWERED UP ONCE THE POWER TIE-IN HAS BEEN MADE.
 - POWER WILL NOT BE APPLIED TO THE UPS UNTIL THE MANUFACTURER HAS TESTED AND VERIFIED THE EQUIPMENT.
- POWER TIE-IN**
 - ARRANGE WITH THE DEPARTMENTAL REPRESENTATIVE AN APPROPRIATE TIME TO PERFORM THE POWER TIE-IN.
 - ENSURE ALL MATERIALS AND TOOLS ARE AVAILABLE.
 - DE-ENERGIZE POWER PANEL DP EM-100 AND ISOLATE FROM POWER SYSTEM AND BACK-UP GENERATOR.
 - INSTALL NEW FEEDER BREAKER AND INSTALL CABLE CONNECTION TO UPS SYSTEM.
 - MANUFACTURER TO TEST AND COMMISSION THE UPS SYSTEM. ALL DOWNSTREAM EQUIPMENT TO REMAIN DE-ENERGIZED FOR THIS STAGE.
- SECONDARY CONNECTIONS**
 - ONCE THE UPS AND EQUIPMENT HAS BEEN COMMISSIONED, ALL DOWNSTREAM EQUIPMENT CAN BE PROGRESSIVELY POWERED UP AND TESTED.
 - EACH FREEZER MAY BE REMOVED FROM THE OLD SYSTEM AND PLUGGED INTO THE NEW SYSTEM ONE AT A TIME ON A SCHEDULE DETERMINED BY THE DEPARTMENTAL REPRESENTATIVE. VERIFY THAT THE FREEZER IS FUNCTIONING CORRECTLY AS IT IS RE-CONNECTED.
 - THE HARD CONNECTION FOR EACH WALK-IN COOLER AND FREEZER MAY BE REMOVED FROM ITS DISCONNECT ONE AT A TIME ON A SCHEDULE DETERMINED BY THE DEPARTMENTAL REPRESENTATIVE. RE-CONNECT THE NEW FEEDER FROM PP-EM13 AND VERIFY THAT THE COOLER OR FREEZER IS FUNCTIONING CORRECTLY AS IT IS RE-CONNECTED.
 - AUXILIARY LOADS TO BE CONNECTED AT AN APPROPRIATE TIME TO ALLOW NORMAL OPERATION.
- DEMOLITION**
 - THIS CAN BE PERFORMED WITH CARE ONCE THE UPS SYSTEM HAS BEEN TESTED, VERIFIED, AND ACCEPTED BY THE DEPARTMENTAL REPRESENTATIVE.
 - ADVISE THE DEPARTMENTAL REPRESENTATIVE IF POWER OUTAGES ARE REQUIRED AND COORDINATE THESE WITH THE OPERATION OF THE FACILITY.

ESSENTIAL LOADS PANEL PP-EM13 LOAD SCHEDULE

ITEM NO.	EQUIPMENT DESCRIPTION	LOAD DETAILS				CONNECTION DETAILS				REMARKS					
		AMPERES (RLA)	AMPERES (LRA)	KW	KVA	VOLTAGE	PHASE	DIRECT	RECEPTACLE		PANELBOARD	CIRCUIT NUMBER	BREAKER SIZE	FEEDER SIZE	MOVING HT (AFT)
1	1-F1 WALK-IN FREEZER	24	156		1	208	3	X		PP-EM13	1,3,5	15A	#12	-	RE-CONNECTION TO EXISTING DISCONNECT
2	1-C1 WALK-IN COOLER	7.5	51		1	208	3	X		PP-EM13	7,9,11	15A	#12	-	RE-CONNECTION TO EXISTING DISCONNECT
3	2-C2 WALK-IN COOLER	7.5	51		2.25	208	3	X		PP-EM13	8,10,12	20A	#12	-	RE-CONNECTION TO EXISTING DISCONNECT
4	3-C3 WALK-IN COOLER	9.1	55		1	208	3	X		PP-EM13	13,15,17	15A	#12	-	RE-CONNECTION TO EXISTING DISCONNECT
5	4-C4 WALK-IN COOLER	7.5	51		5	208	3	X		PP-EM13	14,16,18	60A	#8	-	RE-CONNECTION TO EXISTING DISCONNECT
6	ULF FREEZER #1	8.5				115	1	X		PP-EM13	19	20A	#12	305mm	-
7	ULF FREEZER #2	16				115	1	X		PP-EM13	20	20A	#12	305mm	-
8	ULF FREEZER #3	16				115	1	X		PP-EM13	21	20A	#12	305mm	-
9	ULF FREEZER #4	8.5				115	1	X		PP-EM13	22	20A	#12	305mm	-
10	ULF FREEZER #5 (FUTURE)	16*				115*	1	X		PP-EM13	23	20A	#12	305mm	-
11	ULF FREEZER RES	8.5*				115*	1	X		PP-EM13	24	20A	#12	305mm	-
12	ULF FREEZER #6	18				115	1	X		PP-EM13	25	20A	#12	305mm	-
13	ULF FREEZER #7	18				115	1	X		PP-EM13	26	20A	#12	305mm	-
14	ULF FREEZER #8	16				115	1	X		PP-EM13	27	20A	#12	305mm	-
15	ULF FREEZER #9	16				115	1	X		PP-EM13	28	20A	#12	305mm	-
16	ULF FREEZER #10	16				115	1	X		PP-EM13	29	20A	#12	305mm	-
17	ULF FREEZER #11	16				115	1	X		PP-EM13	30	20A	#12	305mm	-
18	ULF FREEZER #13	16				120	1	X		PP-EM13	32	20A	#12	305mm	-
19	ULF FREEZER #14	16				120	1	X		PP-EM13	33	20A	#12	305mm	-
20	ULF FREEZER #15	16				115	1	X		PP-EM13	34	20A	#12	305mm	-
21	ULF FREEZER #16	18				115	1	X		PP-EM13	35	20A	#12	305mm	-
22	ULF FREEZER #17	16				120	1	X		PP-EM13	36	20A	#12	305mm	-
23	ULF FREEZER #18	18*				120*	1	X		PP-EM13	37	20A	#12	305mm	-

* ESTIMATED

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ENGINEERS SEAL



ELECTRICAL LEGEND

	SURFACE ELECTRICAL POWER PANEL
	RECEPTACLE - ONE GANG, SINGLE OUTLET, RED FACE, 5-20R CONFIGURATION
	CIRCUIT DESIGNATION
	HARD WIRE CONNECTION
	WIRING TO BE REMOVED
	CHAIN LINK FENCING
	WALK-IN FREEZER & COOLERS
	KIRK KEY INTERLOCK

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B	ISSUED FOR TENDER	23-09-20
A	PRELIMINARY REVIEW	23-09-07
No.	BY	REVISION / ISSUE
		DATE



15 Wildwood Place
 Waterloo, ON N2L 4B2
 mobile: (519) 572-7500
 email: dwindley@powerdigm.ca

PROJECT NAME
 A AFC
 GRDC UPS BASEMENT GUELPH

95 STONE ROAD
 GUELPH, ONTARIO

DRAWING TITLE
 UPS BASEMENT GUELPH
 SCHEDULES

PROJECT No.	SCALE		
476-01-01	NTS		
DATE	DRAWING No.	DRAWN BY	APPROVED
2023/09/06	07-E207	D.W.	D.W.

**APPENDIX 2 - LISTING OF SUBCONTRACTORS AND SUPPLIERS**

The Bidder must submit the list of Subcontractors and Suppliers for any division of the Work as listed in the table below. If "own forces" of the General Contractor are planned to be used to execute certain division(s) of work it must also be indicated in the table below.

	Subcontractor and Suppliers	Division
1		
2		
3		
4		



ANNEX B - CERTIFICATE OF INSURANCE
(Not required at solicitation closing)

CERTIFICATE OF INSURANCE



Description and Location of Work	Contract No.
	Project No.

Name of Insurer, Broker or Agent	Address (No., Street)	City	Province	Postal Code
Name of Insured (Contractor)	Address (No., Street)	City	Province	Postal Code
Additional Insured				
<i>His Majesty the King in right of Canada as represented by the Minister of Public Works and Government Services</i>				

Type of Insurance	Insurer Name and Policy Number	Inception Date D / M / Y	Expiry Date D / M / Y	Limits of Liability		
				Per Occurrence	Annual General Aggregate	Completed Operations Aggregate
Commercial General Liability				\$	\$	\$
Umbrella/Excess Liability				\$	\$	\$

I certify that the above policies were issued by insurers in the course of their Insurance business in Canada, are currently in force and include the applicable insurance coverage's stated on page 2 of this Certificate of Insurance, including advance notice of cancellation / reduction in coverage.

Name of person authorized to sign on behalf of Insurer(s) (Officer, Agent, Broker)

Telephone number

Signature

Date D / M / Y



General

The insurance policies required on page 1 of the Certificate of Insurance must be in force and must include the insurance coverage listed under the corresponding type of insurance on this page.

The policies must insure the Contractor and must include His Majesty the King in right of Canada as represented by the Minister of Public Works and Government Services as an additional Insured.

The Policy shall be endorsed to provide the Owner with not less than 30 days' notice in writing in advance of any cancellation or change or amendment restricting coverage.

Without increasing the limit of liability, the policies must protect all insured parties to the full extent of coverage provided. Further, the policies must apply to each Insured in the same manner and to the same extent as if a separate policy had been issued to each.

Commercial General Liability

The insurance coverage provided must not be substantially less than that provided by the latest edition of IBC Form 2100.

The policy must either include or be endorsed to include coverage for the following exposures or hazards if the Work is subject thereto:

- (a) Blasting.
- (b) Pile driving and caisson work.
- (c) Underpinning.
- (d) Removal or weakening of support of any structure or land whether such support be natural or otherwise if the work is performed by the insured contractor.
- (e) Damage to existing structure

The policy must have the following minimum limits:

- (a) **\$5,000,000** Each Occurrence Limit;
- (b) **\$10,000,000** General Aggregate Limit per policy year if the policy contains a General Aggregate; and
- (c) **\$5,000,000** Products/Completed Operations Aggregate Limit.

Umbrella or excess liability insurance may be used to achieve the required limits.