

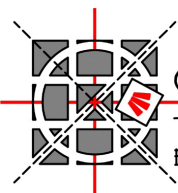
BID DOCUMENTS & SPECIFICATIONS

Issued for Permit, Tender and Construction

Loyalist Ambulance Base

**for the
County of Lennox & Addington**

Date: 2026-06-30
Project N° 24073



COLBOURNE & KEMBEL , ARCHITECTS INC.

739D ARLINGTON PARK PLACE KINGSTON ONTARIO K7M 8M8
E-MAIL info@ckai.ca

TEL 613-384-2240

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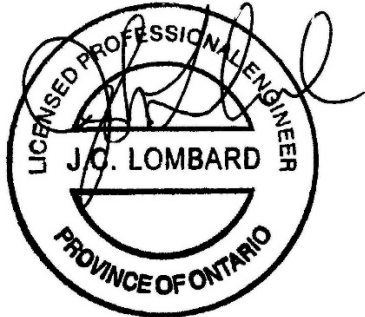
Appendix A

Geotechnical Investigation Report Proposed Ambulance Base Jack Davey Drive, Loyalist Township ON
Prepared for: Jewell Engineering Inc. March 3, 2025

END OF SECTION

CKA #24073

Consultant Identification / Identification Expert-Conseil:

 Architect/Architecte	 Engineer/Ingénieur	 Engineer/Ingénieur
 Engineer/Ingénieur	Engineer/Ingénieur	Engineer/Ingénieur
Engineer/Ingénieur	Engineer/Ingénieur	Engineer/Ingénieur

PROJECT

LOYALIST AMBULANCE BASE

OWNER

COUNTY OF LENNOX & ADDINGTON
97 THOMAS STREET EAST,
NAPANEE, ON K7R 4B9

CONSULTANTS:

PRIME CONSULTANT & CIVIL ENGINEERS

JEWELL ENGINEERING LIMITED
208-4 Cataraqui Street,
Kingston, ON K8N 4Z5

ARCHITECT

COLBOURNE & KEMBEL, ARCHITECTS INC.
739D Arlington Park Place
Kingston, ON K7M 8M8

MECHANICAL & ELECTRICAL ENGINEERS

MORRIS ENGINEERING LIMITED
10 Slade Road
Mallorytown, ON K0E 1R0

STRUCTURAL ENGINEERS

LOMBARD ENGINEERING LIMITED
176 Amy Lynn Drive,
Amherstview, ON K7N 2A3

END OF SECTION

1 General**1.1 CONTRACT FORM**

- .1 The form of contract between the Owner and the Contractor will be CCDC2-2020, as amended by the Supplementary Conditions described in Section 00 30 00.

1.2 BID FORM

- .1 The form of bid between the Owner and the Contractor will be as follows in Section 00 20 00.
- .2 Submit Stipulated Price Bid, as requested in Section 00 20 00. Bids shall be addressed to:

Chris Wagar
Director of Infrastructure Services
County of Lennox and Addington

Tender No.: 24073

- .3 Bids will be received up to

2:00:00 p.m., local time, Friday, July 31, 2026

1.3 ELECTRONIC SUBMISSION

- .1 Electronic Bid Submissions Only shall be received by the bidding system, no later than 2:00:00 pm. Local time, **Friday, July 31, 2026**. The closing date and time shall be determined by the County's Bidding System Web clock.

All tenders shall be submitted online through the County's Bidding System website.
<https://lennox-addington.bidsandtenders.ca>

All bidders shall have an active vendor account in the Bidding System and must be registered as a plan taker for this bid opportunity. The registered Bidder will then be enabled to download the bid call document, receive addenda notifications, download Addenda and be able to submit their bid electronically through the bidding system.

The onus is on the Bidder to create a Bidding System Vendor account and register as a plan taker for the bid opportunity at <https://www.bidsandtenders.ca>

Bidders are cautioned that the timing of their bid submission is based on when the Bid is received by the Bidding System, not when a Bid is submitted by a Bidder, as Bid transmission can be delayed in an "Internet Bottleneck" due to file transfer size, transmission speed, etc.

For the above reasons, the County recommends that Bidder allow sufficient time to upload their Bid Submission and attachment(s) (if applicable) and to resolve any issues that may arise well before the Bid Closing date/time.

The Bidding System will send a confirmation email to the Bidder advising that their bid was submitted successfully. If you do not receive a confirmation email, contact Bids and

Tenders Support at support@bidsandtenders.ca or 1-800-594-4798 (8am to 6pm EST) immediately.

Late bids shall not be accepted by the County's bidding system.
Ensure your Bid submission document(s) conforms to the following:

Documents shall be in PDF format. Document shall not be provided in any other format.

Documents should not have a security password, as the County and Township may not be able to open the file. It is the Bidder's sole responsibility to ensure that their uploaded document(s) are not defective, corrupted or blank and that the documents can be opened and viewed by the County and Township.

The County may reject any Bid, in its sole, absolute and unfettered discretion, where any document(s) cannot be opened and viewed by the County.

If a Bidder needs to upload more than one (1) document, the Bidder should combine the documents into one Zipped file, as per instructions stated below.

To compress (or zip) a file or folder, follow these steps:

- Locate the file or folder to compress
- Right-click the file or folder, point to 'Send to', and then click Compressed (zipped) folder.
- A new compressed folder is created in the same location. To rename it, right-click the folder, click Rename, and then type the new name.

Please note: If uploading a zipped file containing more than one (1) document, please ensure each document is named, in relation to the submission format item responding to, for example, if responding to the Previous Experience Category save the document as "Previous Experience".

1.4 DRAWINGS AND SPECIFICATIONS

- .1 Any questions pertaining to this document or process must be received no later than 2:00:00 p.m. local time, on July 27 and must be submitted by clicking on the "Submit a Question" button on the County's Bids and Tenders web page. All responses to questions on the specific project will be responded to via Addenda
- .2 All bidders shall make themselves familiar and be responsible for the requirements set out in Division 00, Project Bidding and Contract Information; and Division 01, General Requirements.

- .3 The Bidder is to review the Bid Set upon receipt and verify that all drawings, specifications and schedules are included. Inform Architect immediately of any missing information.

1.5 COPYRIGHT

- .1 Notwithstanding GC 1.1.9 of the contract, for the purposes of the bidding stage only, the related sections of the specifications and drawings may be copied for issue to sub-trades for this project. Each such subdivision shall be accompanied by Divisions 00 and 01 in their entirety.

1.6 ADDENDA

- .1 It may be necessary for a variety of reasons to issue Addenda. All information defined within the Addenda shall form an integral part of the Proposal document.
The Bidding System shall require Bidders to acknowledge any Addenda and applicable attachment(s) in order to submit a Bid.
The County will endeavour to issue any Addenda through the Bidding System forty-eight (48) hours prior to the closing date and time and may extend the closing date as deemed appropriate by the County.
The County encourages bidders not to submit their bid prior to forty-eight (48) hours before the bid closing date and time, in the event that any addenda are issued. If a bidder submits their bid prior to this or at any time prior to the bid closing and any addenda are issued by the County, the bidding system shall automatically withdraw the Bid submission and change the Bid submission to an incomplete status (not accepted by the County). The withdrawn Bid can be viewed by the Bidder in the "My Bids" section of the Bidding System.
The Bidder is solely responsible to:
Make any required adjustments to their Bid; and
Acknowledge the Addenda; and
Ensure the bid is re-submitted and received by the Bidding System no later than 2:00:00 p.m. local time, on the Bid Closing Date.

1.7 PERMITS AND FEES

- .1 The Owner will apply for and pay for the building permit. The Contractor shall be responsible for all other permits or fees necessary to complete the work.
- .2 The contractor will complete the permit application form, and obtain the permit. Provide copy to Architect.

1.8 MULTIPLE TENDERS

- .1 A contractor may amend their submitted bid at any time up to closing time by submitting a further bid form, subject to the same requirements for submission as the original bid. The last bid received shall govern. Amendments by facsimile transmission, electronic mail, or telephone will not be accepted.

1.9 PROJECT SCHEDULE

- .1 Commence work immediately upon award of contract. Contractor to indicate completion date in tender form.

1.10 ACCEPTANCE OF BIDS

- .1 The Owner reserves the right to reject the lowest or any Bid received.

1.11 BID REJECTION

- .1 The owner reserves the right to declare the bid informal and reject it if:
 - .1 The bid is qualified in any way.
 - .2 The bid deposit or consent to surety are not provided.
 - .3 The bid form is not completed properly or entirely.
 - .4 An improper bid form is used.
 - .5 Late receipt.
 - .6 The bid has been withdrawn prior to closing.
 - .7 The bid is completed in pencil.
 - .8 The bid envelope is unsealed.
 - .9 The authorized signatory signature is missing.
 - .10 Other factors that would cause the bid to be rejected as noted herein, or as are considered reasonable.

1.12 TAXES

- .1 Refer to the General Conditions of the Contract.

1.13 BONDING AND CONSENT OF SURETY

- .1 The successful General Contractor shall be required to furnish a Surety Bond as approved by the C.C.A. from a licensed Canadian Surety Company as follows:
 - Performance Bond - 50% of the Contract Sum
 - Labour and Materials Bond Payment Bond - 50% of the Contract SumEach Contractor shall include the cost of such Bond in his Bid.

1.14 BID BOND

- .1 The Bid shall be accompanied by a Bid Bond, as approved by the C.C.A. from a licensed Canadian Surety Company made out in favour of the Owner in the amount of 10% of the bid price or a Certified Cheque in the amount of the Bid Price. The Bid Bond shall be valid for a period of 30 days from the date of receipt of Bids.

1.15 BID ENCLOSURE – INSURANCE

- .1 Provide a signed “Undertaking of Insurance”: including Builder Risk on a standard form provided by the insurance company stating their intention to provide insurance to the bidder in accordance with the insurance requirements of the Contract Documents.

1.16 DOMESTIC SUPPLY CHAIN COMMITMENT PLAN (DSCCP)

- .1 In accordance with the Buy Ontario Procurement Directive, Bidders are required to submit a Domestic Supply Chain Commitment Plan confirming their commitment to meet or exceed the prescribed minimum levels of Ontario and/or Canadian content for the major goods and services identified in the DSCCP table on the Bid Form.

This requirement is **mandatory** and is not subject to evaluation scoring. It is an eligibility requirement of this procurement.

Bidder Attestation

Bidders shall complete the table on the Bid Form by indicating “**Yes**” or “**No**” to confirm whether they **commit to meeting or exceeding** the minimum prescribed percentage for each category.

- A response of “**Yes**” constitutes a binding commitment that the Bidder will achieve at least the stated percentage through the use of Ontario-Made Goods, Canadian-Made Goods, Ontario Services, and/or Canadian Services, as applicable.
- A response of “**No**”, failure to complete the table, or qualification of the response will result in the **Bid being deemed non-compliant**.
- By submitting its Bid, the Bidder acknowledges that these commitments will form a **contractual obligation** in any resulting agreement.

- .2 By submitting this bid, the Bidder commits that they will not source any goods or services from a US Business.

.3 Additional Requirements

.1 **Verification and Compliance** The Owner reserves the right to request supporting documentation during contract performance to verify compliance with the commitments made.

.2 **Contractual Obligation** The successful Bidder’s commitments shall be incorporated into the Agreement and failure to meet these commitments may constitute a **material breach of contract**, subject to remedies outlined in the Agreement.

.3 Refer to the Buy Ontario Procurement Directive, for the following definitions of:

- Canadian business
- Canadian-Made Good
- Canadian Service
- Ontario Business
- Ontario-Made Good
- Ontario Service
- Ontario-Made Good
- U.S. Business

1.17 **OWNER:** County of Lennox & Addington

2 **Products (not applicable)**

3 **Execution (not applicable)**

END OF SECTION

BID FORM**Submitted to:** Chris Wagar

Director of Infrastructure Services

County of Lennox and Addington

PROJECT: Loyalist Ambulance Base**CKA PROJ. NO.:** 24073**DATE:** _____**1. Bidder****Name:** _____**Address:** _____**Email:** _____**2. Bid Price**

Having examined the Place of Work and bid documents for Loyalist Ambulance Base

as prepared by Colbourne & Kembel, Architects Inc., including addenda No _____

to No. _____ inclusive, we hereby offer to enter into a Contract to perform the Work required by
the documents for the Stipulated price of: _____

_____ dollars. (\$ _____)

in Canadian Funds, which price excludes Value added Taxes (HST).

This offer is valid for a period of thirty (30) days from receipt of bid by Owner.

3. AddendaThe following Addenda have been received. The modifications resulting from the below
Addenda to the Bid Documents noted therein have been considered and all costs thereto are
included in the Bid Price.

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

Addendum # _____ Dated _____

4. Schedule:

The Contractor hereby declares that they will commence work immediately upon award of Contract

and attain Substantial Performance of the Work within _____ weeks from commencement of

the work, and thereafter obtain total completion of the work within _____ weeks from
commencement of the work.

5. Separate Prices

I / We, the undersigned have inserted below all separate prices requested. I/We agree that

- .1 all prices submitted take into consideration and allow for changes and adjustments in other work as may be necessary to provide a finished and functional result, unless specifically indicated otherwise,
- .2 separate prices are for work which is added to or deleted from the base bid price listed on Bid Form but which may be accepted by the Owner for the price quoted hereunder (added or deleted as indicated),
- .3 and that the Owner reserves the right to accept or reject any of the prices proposed hereunder.
- .4 prices listed hereunder do not include HST and will remain in effect for a period of 30 days from date of Bid closing.

SEPARATE PRICES:

Separate Price No. 1 – DELETE Decon Bay

- .1 Provide a separate price to remove the Decon Bay from the scope of work, including all rooms between Grids 8 to 10 and as per all Drawings with areas noted as "SEPARATE PRICE" in red. There may be minor modifications to other works and details required to suit the revised scope -- no additional fees will be considered for revisions that are reasonably predicted for the revised scope. **Deduct from Bid Price**
- .2 The separate price is to be all-inclusive, and will cover all extras and credits required to construct the reduced building.
- .3 To be clear: The Base Bid Price includes the Decon Bay (Grids 8 to 10). Separate Price #1 would be the credit to remove the Decon Bay from the scope of work.

\$ _____

Separate Price No. 2 – PV System

- .1 Provide a separate price to ADD the Photo Voltaic Array System to the scope of work as per Electrical drawings. **ADD to Bid Price**

\$ _____

Separate Price No. 3 – Rainwater System

- .1 Provide a separate price to ADD the rainwater collection system to the scope of work, including all ancillary work except as noted otherwise, as per the Electrical drawings. **ADD to Bid Price**

\$ _____

6. Cash Allowances:

The following Cash Allowances as outlined in Section 01 21 00 are included as part of the Base Bid Price:

.1	Inspection & Testing Allowance:	\$10,000.00
.2	Exterior Building Mounted Signage:	\$10,000.00

7. Unit Prices

.1 Removal and disposal of excess non-contaminated material (disposable fill and waste). \$_____ /tonne

Note: Include in Bid Price for an allowance of 2,650 tonnes of non-contaminated excess material. The unit rate will be used to adjust contract price (extra/credit) based on actual removal quantity based on verified weigh bill slips.

.2 Removal and disposal of Subject Waste (contaminated materials) as per O. Reg 406/19 \$_____ /tonne

Note: Soils testing is currently being conducted. For bid purposes, assume there is no contaminated material on site. This item will be used to compensate the Contractor for the disposal of subject waste at a licensed facility including trucking and tipping fees.

8. Alternate Prices

The Bidder may propose additional alternate materials or Subcontractors which may be used subject to the Owner's approval in lieu of those specified or listed with additions or deductions to the Bid price as noted below:

Trade, Section, or Division	Sub-Contractor or Material	Add to Bid Price	(Deduct From) Bid Price

9. List of Sub-Contractors/Suppliers

List all major sub-trades included as part of this bid. Use of the General Contractor's "own forces" is subject to suitable experience, to the satisfaction of the consultant.

The Bidder agrees that no Subcontractor or supplier listed in this Bid Form will be changed without the prior written approval of the Owner, and the Owner shall have the right to reject any subcontractor or supplier which the Bidder proposes to use without releasing the Bidder from this Bid.

A US business is as defined in the Buy Ontario Procurement Directive. US Businesses are excluded from this procurement. Each row below must have "Yes" in the "Non-US Business Column or this bid will be rejected.

Division or Section of Work	Name of Subcontractor	Non-US Business (Yes or No)
Civil Works		
Excavation / Backfill		
Landscaping		
Concrete		
Masonry		
Structural Steel		
Framing		
Millwork		
Roofing		
Windows		
Doors & Frames		
Door Hardware		
Overhead Doors		
Painting		
Flooring		
Acoustic Ceilings and Drywall		
Mechanical – Plumbing		
Mechanical – HVAC		
Electrical		

The above list of major sub-trades is not necessarily all-inclusive.

By submitting this bid, the bidder attests that their bid excludes any goods or services from any U.S. Business.

10. DSCCP

Refer to Item 1.17 of Section 00 10 00 and complete every row of the below table by indicating yes or no.

Major Good	% of Goods that are Ontario/Canada Manufactured	Yes/No
HVAC Equipment	40%	
Concrete	100%	
Electrical Equipment	50%	
Electrical Fixtures	50%	
Windows	100%	
Glazing	100%	
Doors	100%	
Lumber	100%	
Aggregates	100%	
Roofing Materials	50%	
Masonry Veneer	100%	
Metal Siding	50%	
Steel & Misc Metal	50%	
Plumbing Fixtures	50%	
Generator	100%	

By submitting this Bid, the Bidder commits that they will not source any goods or services from a US business.

11. Declarations:

We hereby declare that no person, firm, or corporation other than the undersigned has any interest in this Bid or in the proposed Contract for which this Bid is made.

[SIGNATURE PAGE TO FOLLOW]

12. Signatures:

Signed and Submitted for and on behalf of:

name of bidder**Seal:**

signature

print name and title of person signing**Witness:**

signature

signature

print name and title of person signing

print name and title of person signing**Date:** _____

Note: this Bid form must be signed in one of the following ways:

For a corporation: minimum of one signing officer plus one witness.

For a Partnership: one Partner plus a Witness must sign.

For a Sole Proprietorship: The Owner plus one witness must sign.

Part 1 General

1.1 CONTRACT FORM

- .1 The Standard Construction Document for Stipulated Price Contract, 2020 English version, consisting of the Agreement Between *Owner* and *Contractor*, Definitions, and General Conditions of the Stipulated Price Contract, Parts 1 to 13 inclusive, governing same is hereby made part of these *Contract Documents*, with the following amendments, additions and modifications. Where these amendments, additions, and modifications specifically reference a change to the Agreement, Definitions, or General Conditions, these amendments, additions and modifications shall govern.

1.2 ARTICLE A-5 PAYMENT

- .1 In paragraph 5.1.1 of Article A-5 add the following words to the end: "or, where there is no Payment Certifier, jointly by the Owner and Contractor"

1.3 ARTICLE A-6 RECEIPT AND ADDRESSES FOR NOTICES IN WRITING

- .1 Delete Article A-6.1 and substitute new article 6.1:
- .1 6.1 Notices in Writing between the parties or between them and the Consultant shall be considered to have been received by the addressee on the date of receipt if delivered by hand or by commercial courier or if sent during normal business hours by fax and addressed as set out below. Such Notices in Writing will be deemed to be received by the addressee on the next business day if sent by fax after normal business hours or if sent by overnight commercial courier. Such Notices in Writing will be deemed to be received by the addressee on the fifth Working Day following the date of mailing, if sent by pre-paid registered post, when addressed as set out below. An address for a party may be changed by Notice in Writing to the other party setting out the new address in accordance with this Article.
- .2 Delete Article A-6.5 and substitute new article 6.5:
- .1 6.5 Contact information for a party may be changed by Notice in Writing to the other party setting out the new contact information in accordance with this Article.

1.4 DEFINITIONS

- .1 Definition, Consultant:
- .1 Delete in its entirety and replace with the following:
"The Consultant: is the person or entity identified as such in the Agreement. The Consultant is the duly authorized representative, designated from time to time by the Owner, to exercise such power, authority or discretion as is required under the Contract."
- .2 Definition, Provide:
- .1 Add the words "or supply, install and connect as applicable, complete and in place including accessories, finishes, tests, and services required to render item so specified complete and ready for use." to the end of the first line.
- .3 Add the following new definition:
- .1 **Submittals**
Submittals are documents or items required by the *Contract Documents* to be provided by the *Contractor*, such as:
- *Shop Drawings*, samples, models, mock-ups to indicate details or characteristics, before the portion of the *Work* that they represent can be incorporated into the *Work*; and

- As built drawings and manuals to provide instructions to the operation and maintenance of the *Work*.

.4 Add the following new definition:

.1 **Contract Completion**

Shall mean when the entire *Work*, except those items arising from the provisions of GC 12.3 Warranty has been performed to the requirements of the Contract Documents and is so certified by the Consultant.

.5 Add the following new definition:

.1 **Authorities Having Jurisdiction**

The phrase "authorities having jurisdiction" or the term "authorities" shall mean those having jurisdiction under law over the *Work* or parts thereof."

.6 Add the following new definition:

.1 **Supply or Furnish**

Shall mean fabrication or procurement of materials, equipment, or components, or performance of services to the extent specified and shown. Where used with respect to materials, equipment, or components, the term includes crating and delivery to the Place of *Work* but is not intended to include installation of item, either temporary or final."

.7 Add the following new definition:

.1 **Install**

Shall mean placement of materials, equipment, or components, including receiving, unloading, transporting, storage, uncrating and installing, and performance of such testing and finish work as is compatible with degree of installation specified.

.8 Add the following new definition:

.1 **Commission**

Shall mean the procedure which includes checking, testing, adjusting and measuring performed by the Contractor to demonstrate and verify the installation, operation and performance of all components and the entire system

.9 Add the following new definition:

.1 **Other Contractor**

Shall mean the individual, firm, partnership or corporation having a separate contract with the Owner for work other than that required by the Contract Documents.

.10 Add the following new definition:

.1 **Proper Invoice**

Proper Invoice means a "proper invoice" as defined in the Payment Legislation, if any, and as may be modified by written agreement between the parties to the extent permitted by such Payment Legislation.

1.5 GENERAL

.1 Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

1.6 GC 1.1 CONTRACT DOCUMENTS

.1 Delete paragraph 1.1.3 in its entirety and replace with the following:

1.1.3 The *Contractor* shall review the *Contract Documents* for the purpose of facilitating and co-ordination and execution of the *Work* by the *Contractor*. The *Contractor* shall report promptly to the *Consultant* any ambiguities, design issues or other matters requiring clarification made known to the *Contractor* or that the *Contractor* may discover from such a review. Such review by the *Contractor* shall comply with the standard of care described in paragraph 3.9.1 of the *Contract*.

- .2 Delete paragraph 1.1.4 in its entirety and replace with the following:
1.1.4 Except for its obligation to review the *Contract Documents* and report the result pursuant to paragraph 1.1.3, the *Contractor* is not responsible for ambiguities, design issues or other matters requiring clarification in the *Contract Documents* and does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents*. Without limiting the foregoing, the *Contractor* shall not be liable for any damages or costs resulting from any ambiguities, design issues or other matters requiring clarification in the *Contract Documents* which the *Contractor* could not reasonably have discovered from such a review in accordance with the standard of care. If the *Contractor* does discover any ambiguities, design issues or other matters requiring clarification in the *Contract Documents*, the *Contractor* shall not proceed with the work affected until the *Contractor* has received modified or additional information from the *Consultant*. The impacts of any ambiguities, design issues or other matters requiring clarification in the *Contract Documents*, including to the *Contract Price* and *Contract Time*, shall be addressed by the parties in accordance with Part 6 – CHANGES.”
- .3 Add the following to the end of subparagraph 1.1.6.2
Except where the *Consultant* is indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4, 9.5.3.4 and in 13.1.3.
- .4 Add new paragraph 1.1.12:
1.1.12 The Owner shall provide the Contractor, without charge, 1 pdf copy of the *Contract Documents* to perform the *Work*.

1.7 GC 1.4 ASSIGNMENT

- .1 Clause 1.4. 1: Delete in its entirety and replace with the following "The Contractor shall not assign or transfer their interest in the Contract or any portion thereof directly or indirectly, without the prior written consent of the Owner".

1.8 GC 2.2 ROLE OF THE CONSULTANT

- .1 Add at the end of paragraph 2.2.3. "Without limiting the foregoing, the *Consultant* may appoint one or more authorized representatives in writing who may fulfill the obligations of the *Consultant* under this *Contract*."
- .2 In paragraph 2.2.8 add the words “, written statements” after the word “interpretations” in both the first and second sentences; and
- .1 Add the following to the end of paragraph 2.2.8:
The *Owner* and the *Contractor* shall waive any claims against the *Consultant* arising out of its making of any interpretations, written statements or findings in accordance with paragraphs 2.2.6, 2.2.7, 2.2.8, and 7.1.2, but only to the extent that any such interpretations, written statements, and findings are made by the *Consultant* in an unbiased manner, and in accordance with the *Consultant's* professional standard of care at law.
- .3 In paragraph 2.2.13 add the words “which are provided” before the words “by the *Contractor*”.

1.9 GC 2.4 DEFECTIVE WORK

- .1 Clause 2.4.1: Add the words "at his own expense," after "The Contractor Shall" in the first line.
- .2 In paragraph 2.4.1:
- .1 Add after the words “shall promptly correct” the phrase “in a manner acceptable to the *Owner* and the *Consultant*”; and
- .2 Add after the words “*Contract Documents*” the phrase “or work that the *Contractor* discovers to be defective, whether or not the defective work had been identified by the *Consultant*, and”.

- .3 Add new paragraph 2.4.4 as follows:
2.4.4 The *Contractor* shall prioritize the correction of any defective work which, in the sole discretion of the *Owner*, adversely affects the day-to-day operation of the *Owner*.

1.10 GC 3.1 CONTROL OF THE WORK

- .1 Add new paragraph 3.1.3:
3.1.3 Prior to commencing individual procurement, fabrication and construction activities, the *Contractor* shall verify, at the *Place of the Work*, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included, or contradictions exist, or exact locations are not apparent, the *Contractor* shall immediately notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceeding with any part of the affected work.

1.11 GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

- .1 Clause 3.2.2:
.1 Paragraph 3.2.2.2: Delete in its entirety.
.2 Add new paragraph 3.2.7 as follows:
3.2.7 At the commencement of the *Work*, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant*, a schedule indicating the times, within the construction schedule referred to in GC 3.4, that items that are specified to be *Owner* purchased and *Contractor* installed or hooked up are required at the site to avoid delaying the progress of the *Work*.

1.12 GC 3.4 CONSTRUCTION SCHEDULE

- .1 Revise 3.4.1.1: to read as follows:
3.4.1.1 prepare and submit to the *Owner* and the *Consultant* within ten (10) calendar days of award of Contract and prior to the first application for payment, a construction schedule that indicates the timing of the major activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time*; Such schedule is subject to approval by the *Owner*.

1.13 GC 3.7 LABOUR AND PRODUCTS

- .1 Add the following to the end of paragraph 3.7.1:
The *Contractor* represents that it has sufficient skilled employees to replace, subject to the *Owner's* approval, acting reasonably, its designated supervisor and project manager in the event of death, incapacity, removal or resignation.
.2 Add new paragraph 3.7.4:
3.7.4 The *Owner* shall provide the *Contractor* in a timely manner with all relevant information (including storage, protection, and installation requirements) regarding *Products* to be supplied by the *Owner* or other contractors and, prior to delivery of any such *Products* to the *Place of the Work*, the *Owner* shall obtain the *Contractor's* written approval of the delivery date and proposed storage, protection and installation requirements.
.3 Add new paragraph 3.7.5:
3.7.5 Once the *Contractor* has accepted delivery of *Products*, the *Contractor* shall be responsible for the safe storage and protection of *Products* as required to avoid dangerous conditions or contamination to the *Products* or other persons or property. *Products* shall be stored in locations and at the *Place of the Work* to the satisfaction of the *Owner* and the *Consultant* as agreed and approved by the *Contractor* pursuant to paragraph 3.7.4.

Notwithstanding the foregoing, the *Contractor* shall not be responsible for any *Products* supplied by the *Owner* or other contractors unless:

- (i) the *Contract Documents* expressly stipulate that such *Product* is to be the *Contractor's* responsibility and to be installed by the *Contractor* as part of the *Work*;
- (ii) the *Contractor* has or has received from the *Owner* proof of insurance coverage sufficient, at a minimum, to cover the replacement cost of such *Product*; and
- (iii) the *Owner* obtained the *Contractor's* approval as required by paragraph 3.7.4.

.4 Add the following new clause 3.7.6:

"All products and materials brought onto the place of Work by the Contractor shall be deemed to be the property of the Owner, but the Owner shall be under no liability for loss thereof or damage thereto arising from any cause whatsoever. The said Products and materials shall be at the sole risk of the Contractor."

.5 Add new paragraph 3.7.7:

3.7.7 All materials, work services and equipment used and delivered to the Place of Work and intended to be used in the carrying out of this Contract shall be free and clear and kept free and clear of all items, charges and encumbrances. In the event of there being a lien, charge or encumbrance or a claim for an item, charge or encumbrance the Owner may retain from the amount otherwise payable to the Contractor, an amount sufficient to satisfy and discharge the same. If the Owner gives to the Contractor written notice of their intention to satisfy and discharge any such lien, charge or encumbrance or a claim for an item, charge or encumbrance and, within three days of receipt of such notice, the Contractor does not show cause, satisfactory to the Consultant, why such item, charge or encumbrance should not be satisfied and discharged, the Owner shall be at liberty and authorized to satisfy and discharge the same and charge the costs thereof to the Contractor. The Contractor agrees to indemnify and keep indemnified and save harmless, the Owner from any and all claims, charges and encumbrances.

1.14 GC 3.8 SHOP DRAWINGS

.1 Add the words "AND OTHER SUBMITTALS" to the Title of GC 3.8 after the words "SHOP DRAWINGS".

.2 Add the words "and *Submittals*" after the words "*Shop Drawings*" in paragraphs 3.8.1, 3.8.2, 3.8.3, 3.8.3.2, 3.8.5, 3.8.6, 3.8.7.

.3 Delete paragraph 3.8.2 in its entirety and Replace it with new paragraph 3.8.2 as follows:
3.8.2 Prior to the first application for payment, the *Contractor* shall prepare a schedule of the dates for submission and return of *Shop Drawings* and *Submittals* in an orderly sequence.

.4 Delete the words "*with reasonable promptness so as to cause no delay in the performance of the Work*" and replace them with the words "*within 10 Working Days or such longer period as may be reasonably required*" in paragraph 3.8.7.

1.15 GC 3.9 PERFORMANCE BY CONTRACTOR

.1 Add new General Condition GC 3.9 as follows:
GC 3.9 PERFORMANCE BY CONTRACTOR

3.9.1 In performing its services and obligations under the *Contract*, the *Contractor* shall exercise a standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The *Contractor* acknowledges and agrees that throughout the *Contract*, the *Contractor's* obligations, duties and responsibilities shall be interpreted in accordance with this standard. The *Contractor* shall exercise the same standard of due care and diligence in respect of any *Products*, personnel, or procedures which it may recommend to the *Owner*.

1.16 GC 3.10 CLEAN UP

- .1 Add new General Condition GC 3.10 as follows:
GC 3.10 CLEAN UP
3.10.1 In the event of any dispute regarding the removal of waste products and debris the Owner may remove the rubbish and debris and charge the cost to the Contractor to the extent that the Consultant shall determine to be just.

1.17 GC 4.1 CASH ALLOWANCES

- .1 Delete paragraph 4.1.4 in its entirety and substitute new paragraph 4.1.4:
4.1.4 Where costs under a cash allowance exceed the amount of the allowance, unexpended amounts from other cash allowances shall be reallocated at the *Consultant's* direction to cover the shortfall, and, in that case, there shall be no additional amount added to the Contract Price for overhead and profit. Only where the actual cost of the Work under all cash allowances exceeds the total amount of all cash allowances shall the Contractor be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the Contract Documents.
- .2 Delete paragraph 4.1.5 in its entirety and substitute new paragraph 4.1.5:
4.1.5. The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the Contract Price by Change Order without any adjustment for the Contractor's overhead and profit on such amount.
- .3 Delete paragraph 4.1.7 in its entirety and Replace it with the following:
4.1.7 At the commencement of the work, the *Contractor* shall prepare for the review and acceptance of the *Owner* and the *Consultant*, a schedule indicating the times, within the construction schedule referred to in GC 3.4, that items called for under cash allowances are required to be delivered to the Place of the Work to avoid delaying the progress of the *Work*.
- .4 Add new paragraph 4.1.8:
4.1.8 The *Owner* reserves the right to call, or to have the *Contractor* call, for competitive bids for portions of the *Work*, to be paid for from cash allowances.
- .5 Add the following new clause 4.1.9:
"Purchases from cash allowances must be authorized by written instructions issued by the Consultant and the form and methods of accounting for costs shall be agreed to by the Consultant and Contractor before proceeding with the purchase."

1.18 GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

- .1 Clause 5.1.1: Delete in its entirety
.2 Clause 5.1.2: Delete in its entirety.

1.19 GC 5.2 APPLICATION FOR PAYMENT

- .1 Delete paragraph 5.2.2 in its entirety and substitute the following"
5.2.2 Applications for payment shall be dated the last day of each payment period, which is the last day of the month or an alternative day of the month agreed in writing by the parties. The amount claimed shall be for the value, proportionate to the amount of the *Contract*, or work performed and *Products* delivered and incorporated into the *Work* at that date. No amount claimed shall include products delivered and incorporated into the work, unless the products are free and clear of all security interests, liens and other claims of third parties.
Each application for payment, except the first, shall include a statutory declaration, in the CCDC 9A – 2001 form, up to the date of the application for payment, in a form approved by the Consultant. Each application for payment (including the first), shall also include:
- .1 A certificate, issued by an agency or firm providing workers' compensation insurance to the *Contractor*, verifying that coverage is in force at the time of

- making the application for payment, and that coverage will remain in force for at least sixty (60) days thereafter.
- .2 A declaration by the Contractor, in a form approved by the *Consultant*, verifying that the performance of the *Work* is in compliance with all applicable regulatory requirements respecting environmental protection, first safety, public safety and occupational health and safety.
- .3 A pre-approved schedule of values, supplied by the *Contractor*, for Divisions 1 through 14 of the *Work*, aggregating the total amount of the *Contract Price*.
- .4 A separate pre-approved schedule of values, supplied by each *Subcontractor*, for Mechanical and Electrical Divisions of the *Work*, aggregating the total amount of the *Contract Price*.
- .5 Invoices to support all claims against the cash allowance.
- .6 An acceptable construction schedule pursuant to GC 3.5.

1.20 GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK AND PAYMENT OF HOLDBACK

- .1 Delete all paragraphs of GC 5.4 in their entirety and Replace them with the following paragraphs:
- .1 5.4.1 When the *Contractor* considers that the *Work* is substantially performed, or if permitted by the lien legislation applicable to the *Place of the Work* a designated portion thereof which the *Owner* agrees to accept separately is substantially performed, the *Contractor* shall, within five (5) *Working Days*, deliver to the *Consultant* and to the *Owner* a comprehensive list of items to be completed or corrected, together with a written application for a review by the *Consultant* to establish *Substantial Performance of the Work* or substantial performance of the designated portion of the *Work*. Failure to include an item on the list does not alter the responsibility of the *Contractor* to complete the *Contract*.
- .2 5.4.2 The *Consultant* will review the *Work* to certify or verify the validity of the application and shall promptly, and in any event, no later than 10 calendar days after receipt of the *Contractor's* application:
- .1 advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or
- .2 state the date of *Substantial Performance of the Work* or a designated portion of the *Work* in a certificate and issue a copy of that certificate to each of the *Owner* and the *Contractor*.
- .3 5.4.3 Where the holdback amount required by the applicable lien legislation has not been placed in a separate lien holdback account, the *Owner* shall, no later than 10 calendar days prior to the expiry of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, place the holdback amount in a bank account in the joint names of the *Owner* and the *Contractor*.
- .4 5.4.4 Subject to the requirements of any *Payment Legislation*, all holdback amounts prescribed by the applicable lien legislation for the *Place of the Work* shall become due and payable to the *Contractor* no later than 10 *Working Days* following the expiration of the holdback period stipulated in the lien legislation applicable to the *Place of the Work*, as certified or verified by the *Consultant* when permitted by any *Payment Legislation*.
- .5 5.4.5 The *Contractor* shall submit an application for release of the lien holdback amount in accordance with the lien legislation applicable to the *Place of the Work*. Except to the extent required by any *Payment Legislation*, such application for release of the holdback shall not constitute an application for payment that is subject to *Proper Invoice* requirements.
- .6 5.4.6 Where legislation permits progressive release of the holdback for a portion of the *Work* and the *Consultant* has certified or verified that the part of the *Work* has been performed prior to *Substantial Performance of the Work*, the *Owner*

hereby agrees to release, and shall release the holdback for such portion of the *Work* to the *Contractor* in accordance with such legislation.

- .7 5.4.7 Notwithstanding any progressive release of the holdback, the *Contractor* shall ensure that such parts of the *Work* are protected pending the issuance of a final certificate for payment or until the *Owner* takes early occupancy in accordance with GC12.2, whichever comes first, and shall be responsible for the correction of defects or work not performed regardless of whether or not such was apparent when the holdback was released.

1.21 GC 5.5 FINAL PAYMENT

- .1 Add to the end of paragraph 5.5.1 the following sentence:
The application for final payment shall meet the requirements of a *Proper Invoice*.
- .2 Add the following to the end of paragraph 5.5.3:
Subject to any *Payment Legislation*, when the *Consultant* finds the *Contractor's* application for final payment to be not valid, the *Contractor* shall revise and resubmit the application when the *Contractor* has addressed the reasons given by the *Consultant*.

1.22 GC 5.8 DEFICIENCY HOLDBACK

- .1 Add a new General Condition 5.8 as follows:
5.8.0 Notwithstanding any provisions contained in the Contract Documents concerning certification and release of monies to the Contractor, the Owner reserves the right to establish a deficiency holdback, at the time of the review for Substantial Performance, based on a 200% dollar value of the deficiencies listed by the Consultant. The value of work outstanding for the calculation of Substantial Performance of the Work under the Construction Act (Ontario) shall utilize this 200% dollar value. No individual deficiency will be valued at less than two hundred dollars (\$200.00). The Owner shall retain the entire deficiency holdback amount until completion of all of the deficiencies listed by the Consultant to the satisfaction of the Consultant.

1.23 GC 6.2 CHANGE ORDER

- .1 Add the following sub-paragraphs .1 to .13 to GC6.2.1:
- .1 Where a change in the Work involves additions, deletions, or other revisions to the Work, the Contract Price shall be increased only by the net actual value of the change in the Work, including taxes, but excluding Value Added Taxes, plus allowances for overhead and profit as follows:
- .1 Where a change is made in work to be carried out by the *Contractor's* own forces, and for which no Contract Unit Prices are scheduled, the value of the additional work shall be determined by adding to the reasonable cost of materials and labour (as assessed by the Consultant), an allowance for the *Contractor's* overhead of not more than ten percent (10%), plus a further allowance for the *Contractor's* profit of not more than five percent (5%) of the total.
- .2 Where a change is made in work to be carried out by a Sub-contractor, the value of the additional work shall be determined in a similar manner, the allowances for the Sub-contractor's overhead of not more than ten percent (10%), plus a further allowance for the Sub-contractor's profit of not more than five percent (5%) of the total. In such cases, the *Contractor* shall be permitted to add thereto an allowance in respect of combined overhead and profit of not more than ten percent (10%) on the total of the Sub-contractor's quotation.
- .3 If a Subcontractor retains another subcontractor (sub-subcontractor), no additional mark-up shall be charged to the Owner for the sub-subcontract work.

.2 The above percentages for overhead and profit shall include all costs for job supervisors, job superintendents, project management, administrative personnel, site overhead, office overhead, site measuring, estimating, bonding, insurance, financing, building permit, as-built drawings, site facilities, safety, clean-up, equipment, tools, travel costs to the *Place of Work*, and other job administration charges related to the change and not directly relating to site labour or materials.

.3 The above percentages for Contractor and sub-contractor overhead and profit shall apply for net changes in the *Work* of \$15,000.00 or less. Changes in the *Work* in excess of \$15,000.00 shall carry an allowance for overhead and profit, at a percentage rate of one half of those called for above.

.4 If a change in the *Work* results in a net decrease in the *Contract Price*, the amount of the credit shall be the net cost, without deduction for overhead or profit. When both additions and deletions covering related work or substitutions are involved in a change in the *Work*, the allowance of overhead and profit shall be calculated on the basis of the net increase, if any, with respect to that change in the *Work*.

.5 Labour costs shall be the actual rates paid to the workers plus a documented mark-up (not exceeding 60% of actual wage rates) to cover contributions, assessments, or taxes incurred for such items as unemployment and other insurance, provincial health insurance, Workers' Compensation, Canada or Quebec Pension Plan, Holiday & Vacation Pay, Traveling Time, Travel and Parking, Welfare, Union, Industry Training and Pension Funds, rest periods, down time, personal hygiene, personal protection, small tools and the like. Travel time to and from site shall be at no charge to the Owner.

.6 Quotations for changes in the *Work* shall be accompanied by itemized breakdowns together with detailed, substantiating quotations or cost vouchers from *Subcontractors* and *Suppliers*, submitted in a format acceptable to the *Consultant*.

.7 Breakdown shall show areas and quantities on which costs are based, unit costs for labour and material, wage burdens and other direct costs, and all information necessary for a complete understanding of the costs submitted. In the case of changes involving *Subcontractors'* quotations shall be provided in support of each claim for extra or credit offered. *Subcontractors'* quotations shall be broken down as specified above.

.8 The *Contractor* is obliged to review and consider the value and validity of *Subcontractors* and *suppliers* quotations to be used as backup for proposed *Change Order* pricing before submission to the *Consultant*. The *Contractor* shall ensure that only valid, and fair and reasonable costs are submitted to the *Consultant*. The *Consultant* will not directly negotiate with *Subcontractors* and *Suppliers* on behalf of the *Contractor*. The *Contractor* shall maintain financial oversight of the *Subcontractors* and *Suppliers* and filter out unreasonable claims.

.9 Unit and alternative prices included in the *Contract* include supply, installation, *Products*, *Construction Equipment*, services, materials, labour, overhead and profit, but exclude Value Added Taxes and Provincial Sales Tax.

.10 The *Owner* through the *Consultant*, reserves the right to authorize payment for changes in the *Work* by means of cash allowance disbursement authorizations.

.11 If any change or deviation in, or omission from the *Work* is made by which the amount of *Work* to be performed is decreased, or if the whole or a portion of the *Work* is

dispensed with, no compensation is claimable by the *Contractor* for any loss of anticipated profit in respect thereof.

.12 Should the Contractor proceed with any change in the method of construction, volume or location of the Work which has not been both ordered and valued as set out above, or as a Change Directive, it shall be conclusively presumed that the parties were in agreement that such change should be made at no additional cost to the Owner.

.13 A change order signed by the Contractor indicates his complete agreement therewith, including the adjustment if any, in the Contract Price and the Contract Time. Contractor agrees that in no event shall he make any subsequent claim relating to the items covered by such change order, either regarding the Contract Price, or the Contract Time. Except as permitted in GC 6.3.5, the Contractor shall not bill for changes in the Work until after a Change Order has been executed by the Contractor, Consultant, and Owner.

1.24 GC 6.3 CHANGE DIRECTIVE

- .1 Delete Paragraph 6.3.6 and replace with the following:
6.3.6 The adjustment in the *Contract Price* for a change carried out by way of a *Change Directive* shall be determined in one of the following methods.
 - .1 Estimate and acceptance in a lump sum;
 - .2 Unit prices set out in the Contract or subsequently agreed upon;
 - .3 Actual cost of expenditures and credits to perform the work attributable to the change valued in accordance with GC 6.2 CHANGE ORDER.
- .2 Delete Paragraph 6.3.7 and replace with the following.
6.3.7 The Contractor shall present in a form acceptable to the *Consultant* an amount of adjustment for the *Contract Price*, if any, and an adjustment in the *Contract Time*, if any, for the changes covered by a *Change Directive*. The Procedures of evaluation including applicable overhead and profit mark-up provisions shall be as described under GC 6.2 CHANGE ORDER.
 - .1 In the case of a change in the *Work* to be valued in accordance with paragraph 6.3.6.1, the *Contractor* shall present to the *Consultant* for approval a detailed estimate of the costs of the *Contractor* and the involved *Subcontractors* including products, labour itemized by man hours, labour burden and the overhead and profit of each of the involved *Subcontractors* shown separately.
 - .2 In the case of a change to be valued under methods prescribed in Paragraph 6.3.6.2, the form of the presentation of costs and methods of measurement shall be agreed to by the *Owner*, through the *Consultant*, and the *Contractor* before proceeding with the change.
 - .3 When method prescribed in Paragraph 6.3.6.3 is used to determine the value of a change in the *Work*, the *Contractor* shall keep and present, in such form as the *Consultant* may require, an itemized accounting of the actual cost of expenditures and savings together with supporting data.

1.25 GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

- .1 Clause 6.4.1:
 - .1 Paragraph 6.4.1.1: Replace "materially" with "substantially" in the second line.
 - .2 Paragraph 6.4.1.2: Replace "materially" with "substantially" in the first line.
 - .3 Clause 6.4.2: Replace "materially" with "substantially" in the second line.
 - .4 Clause 6.4.3: Replace "materially" with "substantially" in the first line.
 - .5 Add new subparagraph 6.4.5:
6.4.5 The *Contractor* confirms that, prior to bidding the *Project*, it carefully reviewed the *Place of the Work* and applied to that review the degree of care and skill described in paragraph 3.9.1, given the amount of time provided between

the issue of the bid documents and the actual closing of bids, the degree of access provided to the *Contractor* prior to submission of bid, and the sufficiency and completeness of the information provided by the *Owner*. The *Contractor* is not entitled to compensation or to an extension of the *Contract Time* for conditions which could reasonably have been ascertained by the *Contractor* by such review undertaken in accordance with this paragraph 6.4.5.

1.26 GC 6.5 DELAYS

- .1 Delete the period at the end of paragraph 6.5.1, and substitute the following words:
“, but excluding any consequential, indirect or special damages.”
- .2 Delete the period at the end of paragraph 6.5.2, and substitute the following words:
“, but excluding any consequential, indirect or special damages.”
- .3 Clause 6.5.3: Add the following sentence to the end of the clause: "If such delays, in the Owner's opinion, may materially affect the Contract Price or the Contract Time the Owner may terminate the Contract by giving written notice to the Contractor."
- .4 Add new subparagraph 6.5.6.
6.5.6 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contractor* or anyone employed or engaged by the *Contractor* directly or indirectly, or by any cause within the *Contractor's* control, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may decide in consultation with the *Contractor*. The *Owner* shall be reimbursed by the *Contractor* for all reasonable costs incurred by the *Owner* as the result of such delay, including all services required by the *Owner* from the *Consultant* as a result of such delay by the *Contractor* and, in particular, the cost of the *Consultant's* services during the period between the date of *Substantial Performance of the Work* stated in Article A-1 herein as the same may be extended through the provisions of these General Conditions and any later, actual date of *Substantial Performance of the Work* achieved by the *Contractor*.
- .5 Add new subparagraph 6.5.7.
6.5.7 In addition to the amount set out in paragraph 6.5.6, the Contractor recognizes and agrees that the Owner will suffer a financial loss if the Work is not completed within the time prescribed by the Contract. The Contractor also recognizes the delays, expenses and difficulties involved in proving the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, the Contractor agrees that as liquidated damages for delay (but not as penalty) the Contractor shall pay the Owner, as liquidated damages, an amount per day, as designated in the Specific Provisions of Contract for each and every day's delay from the specified time for completion of the Work until actual completion of the Work, and it is further expressly acknowledged and agreed by the Contractor that:
(a) this amount is a reasonable estimate of the actual damages that will be incurred by the Owner due to any failure to complete the Work within the time required by this Contract;
(b) the Owner may deduct the amount due under this section from any monies that may be due or payable to the Contractor, whether under the Contract or any other agreement; and,
(c) the liquidated damages provided for in this section shall be without prejudice to any other remedy to which the Owner is entitled at law or in equity.

1.27 GC 6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

- .1 Delete paragraph 6.6.5. in its entirety and substitute new paragraph 6.6.5.
6.6.5. The *Consultant's* findings, with respect to a claim made by either party, will be given by *Notice in Writing* to both parties within 30 *Working Days* after receipt of the claim as noted in Paragraph 6.6.3 by the *Consultant*, or within such other time period as may be agreed by the parties and the *Consultant*.

- .2 Add new paragraph 6.6.7
6.6.7 The Owner shall be reimbursed for all costs incurred for additional services provided by the *Consultant* resulting from the *Contractor's* failure to reasonably perform the Work in accordance with the terms and conditions of the Contract, including the *Contractor's* issuance of unnecessary Requests for Information. The *Consultant* will notify the *Owner* and *Contractor* where it has been determined by the Consultant that additional services will be required or have been provided in order not to cause a delay. The *Owner* shall make claims based on the *Consultant's* invoices.

1.28 GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

- .1 Clause 7.1.1: Add the words "or if they should fail to comply substantially with the construction schedule" after the second "insolvency" at the end of the second line.
.2 Clause 7.1.2: Add the words "but without affecting in any respect the liability of the Contractor in respect of earlier defaults." at the end of the clause.
.3 Clause 7.1.3:
Paragraph 7.1.3.1: Add the words "and is diligently proceeding with" after the "commences" in the first line.

1.29 GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

- .1 Clause 7.2.4: Add the sentence "The foregoing defaults in contractual obligations shall not apply to the withholding of certificates of payments, or both, in accordance with the General Conditions, because of the registration of liens against the Owner's Property, unfit such claims and liens are discharged as a result of payment by the Contractor." to the end of the clause.

1.30 GC 8.2 AJUDICATION

- .1 Delete the word "prescribed" from paragraph 8.2.1 and substitute the words "provided for".

1.31 GC 8.3 NEGOTIATION, MEDIATION AND ARBITRATION

- .1 Add the following new paragraphs 8.3.9, to 8.2.13:
.1 8.3.9 Within five days of receipt of the notice of arbitration by the responding party under paragraph 8.3.6, the *Owner* and the *Contractor* shall give the *Consultant* a written notice containing:
1) a copy of the notice of arbitration;
2) a copy of supplementary conditions 8.3.9 to 8.3.14 of this *Contract*, and;
3) any claims or issues which the *Contractor* or the *Owner*, as the case may be, wishes to raise in relation to the *Consultant* arising out of the issues in dispute in the arbitration.
.2 8.3.10 The *Owner* and the *Contractor* agree that the *Consultant* may elect, within ten days of receipt of the notice under paragraph 8.3.9, to become a full party to the arbitration under paragraph 8.3.6 if the *Consultant*:
1) has a vested or contingent financial interest in the outcome of the arbitration;
2) gives the notice of election to the *Owner* and the *Contractor* before the arbitrator is appointed;
3) agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.3.6, and,
4) agrees to be bound by the arbitral award made in the arbitration.
.3 8.3.11 Without limiting and subject to the *Owner* and *Contractor's* rights under paragraph 8.3.12 to challenge whether the *Consultant* has satisfied the requirements of paragraph 8.3.10, if an election is made under paragraph 8.3.10:

- 1) the *Owner* or *Contractor* may request particulars and evidence of the *Consultant's* vested or contingent financial interest in the outcome of the arbitration;
 - 2) the *Consultant* shall participate in the appointment of the arbitrator; and,
 - 3) notwithstanding the rules referred to in paragraph 8.3.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the respondent receives a copy of the notice of arbitration.
- .4 8.3.12 The arbitrator in the arbitration in which the *Consultant* has elected under paragraph 8.3.10 to become a full party may:
- 1) on application of the *Owner* or the *Contractor*, determine whether the *Consultant* has satisfied the requirements of paragraph 8.3.10, and;
 - 2) make any procedural order considered necessary to facilitate the addition of the *Consultant* as a party to the arbitration.
- .5 8.3.13 The provisions of paragraph 8.3.9 shall apply (with all appropriate changes being made) to written notice to be given by the *Consultant* to any sub-consultant;

1.32 GC 9.1 PROTECTION OF WORK AND PROPERTY

- .1 Delete subparagraph 9.1.1.1 in its entirety and substitute new subparagraph 9.1.1.1: 9.1.1.1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.9.1;
- .2 Delete paragraph 9.1.2 in its entirety and Replace it with the following new paragraph 9.1.2:
9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground utilities and structures indicated in the *Contract Documents*, or that are discoverable by applying to an Inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.9.1.

1.33 GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

- .1 Add to paragraph 9.2.6 after the word "responsible", the following new words:
or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the *Owner* or others,
- .2 Add "and the *Consultant*" after the word "*Contractor*" in subparagraph 9.2.7.4.
- .3 Add to paragraph 9.2.8 after the word "responsible", the following new words:
or that any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the *Owner* or others,

1.34 GC 9.5 MOULD

- .1 Add "and the *Consultant*" after "*Contractor*" in subparagraph 9.5.3.4.

1.35 GC 10.1 TAXES AND DUTIES

- .1 Clause 10.1.1: Replace "Value Added Taxes" with "Harmonized Sales Tax (HST)" in the line.
- .2 Clause 10.1.1: Add these sentences The Contractor shall bill the Owner upon each payment certificate, to the appropriate amount of HST the Owner is legally obliged to pay.

This amount for HST will be paid in addition to the amount certified for payment under the Contract and will therefore not affect the Contract Price." at the end of the clause.

- .3 Clause 10.1.2: Delete in its entirety and replace with the following clauses:

- .1 10.1.2 When an exception or recovery of government sales taxes, customs duties or excise taxes is applicable to the contract, the Contractor shall at the request of the Owner (or his agent) assist, join in, or make application for an exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the Owner. The Contractor agrees to endorse over to the Owner any cheques received from the Federal or Provincial Governments as may be required to implement the foregoing.
- .2 10.1.3 Where the Owner is entitled to any available exemptions for rebates of sales tax or customs duty or both or them, the Contractor shall supply to the Owner full particulars of all sales tax or customs duty paid, in order to facilitate the application by the Owner for such refund. The Owner will retain such funds for its own use.
- .3 10.1.4 The Contractor is not entitled to any mark-up on account of profit, overhead, or otherwise due to any increase in taxes or duties. Should the cost be retroactively reduced by a change in taxes and/or duties, the Owner will be entitled to withhold payment to the Contractor of a sum equal to the amount of the tax and/or duty reduction. Should the cost of Work be increased by a change of the work, the Subcontractor shall be entitled to claim for the increase in cost equal to the amount of the tax and/or duty increase. No mark-up shall be permitted on the increase.
- .4 10.1.5 The Contractor shall maintain accurate records tabulating equipment and component costs showing respective taxes and customs duties or excise taxes

1.36 GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

- .1 Delete from the first line of paragraph 10.2.5 the word, "The" and substitute the words: "Subject to paragraph 3.9.1, the".
- .2 Clause 10.2.5: Add the words "and no further work on such phase of the Contract shall be proceeded with until instructions rectifying such discrepancy have been obtained by the Contractor from the Consultant."

1.37 GC 11.1 INSURANCE

- .1 Clause 11.1.1:
- .1 Paragraph 11.1.1.1: Delete the last sentence in its entirety and replace it with the following:
"Such insurance shall be issued by companies approved in writing by the Owner and shall be primary and noncontributing with, and not in excess of, any other insurance available to the Owner and other covered parties, and endorsed to provide the Owner and other covered parties with not less than fifteen (15) days written notice in advance of any cancellation, change or amendment restricting coverage."
- .2 Add the following new Paragraph 11.1.1.9:
"Other Insurance: Subject to the provisions above, each Contractor and Subcontractor shall provide, at its own cost, any additional insurance which it is required by law to provide or which it considers necessary for the performance and protection of the Work."
- .2 Clause 11.1.5: Add the sentences "The Contractor shall provide the Owner with proof of insurance prior to commencement of Work and shall promptly provide the Owner with a certified true copy of each insurance policy exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of Insurance."

- .3 Add the following new Clause 11.1.9:
"Unless specified otherwise the duration of each insurance policy shall be from the date of commencement of the Work until the date of the final certificate of payment. The Contractor shall be responsible for deductible amounts under all policies. It shall be the responsibility of the Contractor not to violate, nor knowingly permit to be violated, any conditions of the policies maintained according to the provisions of the conditions of the Contract and shall be the Contractor's duty and responsibility to impose upon each Subcontractor the same responsibilities and obligations imposed upon the Contractor under such provisions."

1.38 GC 12.1 READY-FOR-TAKEOVER

- .1 After the second occurrence of the term "*Ready-for-Takeover*" insert before the term "*Ready-for-Takeover*" in paragraph 12.1.3 the words "determination of".

1.39 GC 12.2 EARLY OCCUPANCY BY THE OWNER

- .1 Delete the word "achieve" in paragraph 12.2.4 and replace it with the words "have achieved".

1.40 GC 12.3 WARRANTY

- .1 Delete from the first line of paragraph 12.3.2 the word, "The" and substitute the words: "Subject to paragraph 3.9.1, the...".

1.41 GC 13.1 INDEMNIFICATION

- .1 Add new paragraph 13.1.0:
13.1.0 The *Contractor* shall indemnify and hold harmless the *Consultant*, its agents and employees from and against all claims, demands, losses, costs, damages, actions, suits, or proceedings by third parties that arise out of, or are attributable to the *Contractor's* performance of the *Contract*, provided such claims are:
.1 attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and
.2 caused by negligent acts or omissions of the *Contractor* or anyone for whose negligent acts or omissions the *Contractor* is liable, and
.3 made by *Notice in Writing* within a period of 6 years from the *Ready-for-Takeover* date or within such shorter such period as may be prescribed by any limitation statute or the Province or Territory of the *Place of Work*.
.2 Add the words "13.1.0," after the word "paragraphs" in paragraph 13.1.3.

1.42 GC 14.1 CONFIDENTIALITY

- .1 Add the following new General Condition GC 14.0 CONFIDENTIALITY as follows:
GC 14.1 CONFIDENTIALITY
14.1.1 Contractor shall treat as confidential all data, drawings, specifications, and documents related to the Project and shall not lend out to others such information or documents.
.2 14.1.2 Data or design provided by or developed under this Contract shall be for the strict use and benefit of the Owner and not to be used for any other purpose.

END OF SECTION

Part 1 General**1.1 GENERAL**

- .1 Coordinate related work and modify surrounding work as required to complete Separate Price work if included in construction contract.
- .2 Indicate separate prices on Bid Form.
- .3 Separate Prices are listed individually on the Bid Form and are not part of the Base Bid price.
- .4 Separate prices will not be considered in determining the lowest bidder.
- .5 The Owner may accept or reject any Separate Prices prior to award or after award at their sole discretion.
- .6 The addition or deletion of any separate price item shall be the amount listed on the bid form, net of HST.

1.2 LIST OF SEPARATE PRICES

- .1 Separate Price No.1: DELETE Decon Bay
 - .1 Provide a separate price to remove the Decon Bay from the scope of work, including all rooms between Grids 8 to 10 and as per all Drawings with areas noted as "SEPARATE PRICE" in red. There may be minor modifications to other works and details required to suit the revised scope -- no additional fees will be considered for revisions that are reasonably predicted for the revised scope.
 - .2 The separate price is to be all-inclusive, and will cover all extras and credits required to construct the reduced building.
 - .3 To be clear: The Base Bid Price includes the Decon Bay (Grids 8 to 10). Separate Price #1 would be the credit to remove the Decon Bay from the scope of work.
- .2 Separate Price No.2: PV System
 - .1 Provide a separate price to ADD the Photo Voltaic Array System to the scope of the work as per the Electrical drawings.
- .3 Separate Price No.3: Rainwater System
 - .1 Provide a separate price to ADD the rainwater collection system to the scope of work, including all ancillary work except as noted otherwise, as per the Electrical drawings.

Part 2 Products - Not Used**Part 3 Execution - Not Used****END OF SECTION**

Part 1 General**1.1 SECTION INCLUDES**

- .1 Title and description of Work.
- .2 Existing services.
- .3 Contract method.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general construction of new Lennox and Addington Paramedic Station and Cold Storage Building located at Block 10 Loyalist Business Park, Amherstview, ON.
- .2 Work under this Contract covers the furnishing of all labour, materials, and equipment required for the Work described in the drawings and specifications prepared by Colbourne & Kembel, Architects Inc. and the project team.

1.3 CODES

- .1 Perform Work in accordance with the latest editions of the Ontario Building Code (OBC) and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents,
 - .2 Specified standards, codes and referenced documents.

1.4 SPECIFICATION GRAMMAR

- .1 Specifications are written in the imperative mood, in an abbreviated form.
- .2 The imperative language of all technical sections is directed to the Contractor:
 - .1 This form of statement requires the Contractor or one of their engaged Subcontractors to perform such action or work.
 - .2 Perform all requirements whether stated imperatively or otherwise.

1.5 CONTRACT METHOD

- .1 Construct Work under single, stipulated price contract. The Canadian Standard Construction Document CCDC 2, 2020, and the supplementary conditions are part of the Contract Documents.
- .2 The specification of all trades shall be carefully read by the Contractor so that they may make themselves acquainted with the extent and nature of the work of other trades.

1.6 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Copy of Approved Work Schedule.
 - .10 Health and Safety Plan and Other Safety Related Documents.
 - .11 Other documents as specified.

1.7 DOCUMENTS PROVIDED

- .1 Owner will supply the Contractor with:
 - .1 Electronic documents, in electronically delivered Adobe PDF formats.

END OF SECTION

Part 1 General**1.1 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.

1.2 USE OF SITE AND FACILITIES

- .1 The site is currently vacant and will remain unoccupied until building is turned over to the Owner.
- .2 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Consultant to facilitate work as stated.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

- .1 Notify, Consultant, Owner and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, carry out work at times as directed by governing authorities with minimum disturbance to tenant operations.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.
- .4 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .5 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .7 Record locations of maintained, re-routed and abandoned service lines.
- .8 Construct barriers, as required, in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 CASH ALLOWANCES**

- .1 Include in Contract Price , cash allowances stated herein.
- .2 Cash allowances, unless otherwise specified, cover net Contractor costs for services, products, Construction Equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing the work.
- .3 The Contract Price, not cash allowances, includes the Contractor's overhead and profit in connection with such cash allowance.
- .4 The Contract Amount will be adjusted, by Change Order, to provide for excess or deficit to each cash allowance.
- .5 Where costs under a cash allowance exceed amount of allowance, The Contractor will be compensated for costs incurred and substantiated in excess of appropriate cash allowance, plus allowance for overhead and profit, as set out in the Contract Documents.
- .6 Include cash allowance work progress in applications for progress payment.
- .7 The amount of each cash allowance is as follows:
 - .1 Inspection & Testing Allowance: \$10,000
 - .2 Exterior Building Mounted Signage: \$10,000

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 APPOINTMENT AND PAYMENT**

- .1 Consultant will appoint and Owner pay for services of testing laboratory except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of Consultant.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant to verify acceptability of corrected work.

1.2 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .2 Notify Consultant 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Consultant.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 ADMINISTRATIVE**

- .1 Schedule and administer project meetings throughout the progress of the work.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Consultant.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants affected parties not in attendance and, Consultant.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 7 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

1.3 PROGRESS MEETINGS

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

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General**1.1 SCHEDULES REQUIRED**

- .1 Contractor shall submit their detailed Construction Schedule for review within seven days after award of contract utilizing the critical path method. Schedule shall comply to milestone dates listed on Contractor's bid form. This schedule shall be updated monthly with electronic copy forwarded to the Consultant. Monthly updates must include actual percentages complete. The Construction Schedule will be shown as a line item on the Contractor's Cost Breakdown. Failure to provide monthly updates may result in the contractor's request for payment being returned.
- .2 The CPM Schedule shall include complete sequence of construction activities.
- .3 Include dates for commencement and completion of each major element of construction.
- .4 Show projected percentage of completion of each item as of first day of month.
- .5 Indicate progress of each activity to date of submission schedule.
- .6 Show changes occurring since previous submission of schedule:
 - .1 Major changes in scope.
 - .2 Activities modified since previous submission.
 - .3 Revised project icons of progress and completion.
 - .4 Other identifiable changes.
- .7 Provide a narrative report to define:
 - .1 Problem areas, anticipated delays, and impact on schedule.
 - .2 Corrective action recommended and its effect.

END OF SECTION

Part 1 General**1.1 ADMINISTRATIVE REQUIREMENTS**

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to Contract drawings and specifications.
- .3 Allow 10 days for Consultant's review of each submission.
- .4 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant before proceeding with Work.
- .5 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data, and sample.
 - .5 Other pertinent data.
- .7 Submissions to include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:

- .1 Subcontractor.
- .2 Supplier.
- .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of site measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified site dimensions and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After Consultant's review, distribute copies.
- .9 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- .10 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- .11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of Contract award for project.
- .12 Delete information not applicable to project.
- .13 Supplement standard information to provide details applicable to project.
- .14 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.3 SAMPLES

- .1 Submit for review samples in triplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Consultant's business address.
- .3 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant before proceeding with Work.
- .6 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 MOCK-UPS

- .1 Erect mock-ups in accordance with Specifications Sections.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

- .1 Submit to Consultant and Owner copies of the following documents, including updates issued:
 - .1 Health and Safety Program submit, prior to commencement of work on the work site.
 - .2 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.
 - .3 Accident or Incident Reports, within 24 hrs of occurrence.
- .2 Submit other data, information and documentation upon request by the Consultant as stipulated elsewhere in this section.

1.2 COMPLIANCE REQUIREMENTS

- .1 Comply with the latest edition of the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.
- .2 Observe and enforce construction safety measures required by:
 - .1 Ontario Building Code (latest edition).
 - .2 Provincial Worker's Compensation Board.
 - .3 Municipal statutes and ordinances.
- .3 In event of conflict between any provisions of above authorities the most stringent provision shall apply.
- .4 Provide and maintain Worker's Compensation Board coverage for all employees for the duration of the contract. Prior to commencement of the work, at each Interim Progress Claim, and prior to final payment, provide to the Consultant a letter of Clearance from the Worker's Compensation Board indicating that the Contractor's account is in good standing.
 - .1 Should the Contractor be a sole proprietor, provide documented proof in a form acceptable to the Consultant, of an alternative means of personal coverage that meets or exceeds the requirements set out above for Worker's Compensation Board coverage.

1.3 RESPONSIBILITY

- .1 The Contractor is responsible for safety of persons and property on the work site and the general public circulating adjacent to work site operations to extent that they may be affected by conduct of work.
- .2 The Contractor is to enforce compliance by workers and other persons granted access to work site with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with the Contractor's Health and Safety Program.
- .3 Should an unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise the Consultant verbally and in writing of the hazard or condition.

1.4 SITE CONTROL AND ACCESS

- .1 Control all work site access points and work site activities. Delineate and isolate the work site from adjacent and surrounding areas by use of appropriate means to maintain control of all work site access points.
- .2 Make provisions for granting permission to access onto work site to all persons who require access. Procedures for granting permission to access are to be in accordance

with the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act and the Contractor's Health and Safety Program.

- .3 Ensure persons granted access to the work site are in possession of and wear the minimum personal protective equipment (PPE) designated by the Contractor's Health and Safety Program. Ensure persons granted access to the work site are provided with, trained in the use of, and wear, appropriate PPE that are required above and beyond the designated minimums previously noted and as specifically related to the work site activity that they are involved in. Be responsible for the efficacy of the PPE that is provided above and beyond the designated minimums.
- .4 Erect signage at access points and at other strategic locations around the work site clearly identifying the work site area(s) as being "off-limits" to non-authorized persons. Signage must be professionally made with well understood graphic symbols and is not to be used as advertising but for the specific use as related to site safety and key contact information.
 - .1 Information to be provided on the signage is as follows:
 - .1 Project Name/Description:
 - .2 Contractor Company Name:
 - .3 Project Superintendent's Name/Phone No.:
- .5 Secure the work site at all times to protect against un-authorized access.

1.5 FILING OF NOTICE

- .1 File Notice of Project and any other required Notices with the Provincial/Territorial Authorities prior to commencement of the work. Provide the Owner with a copy of the filed Notice(s) prior to commencement of the work.

1.6 PERMITS

- .1 Obtain permits, licenses and compliance certificates, such as ESA, Plumbing permit etc., at appropriate times and frequencies as required by the authorities having jurisdiction.
- .2 Post all permits, licenses and compliance certificates on work site.
- .3 Owner to provide and pay for building permit.

1.7 ACCIDENT REPORTING

- .1 Investigate and report incidents and accidents as required Ontario Occupational Safety and Health Act, and the Regulations made pursuant to the Act.
- .2 For the purpose of this contract immediately investigate and provide a report on incidents and accidents that involve:
 - .1 A resulting injury that may or may not require medical aid but involves lost time at work by the injured person(s).
 - .2 Exposure to toxic chemicals or substances.
 - .3 Property damage.
 - .4 Interruption to adjacent and/or integral infrastructure operations with potential loss implications.
- .3 In the investigation and reporting of incidents and accidents, the Contractor is required to respond in a timely fashion to correct the action that was deemed to have caused the incident and/or accident and advise in writing on the action taken to prevent a re-occurrence of the incident and/or accident.

1.8 RECORDS ON SITE

- .1 Maintain on site a copy of the safety documentation as specified in this section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REPORTING FIRES

- .1 Know location of nearest fire alarm box and telephone, including emergency phone number.
- .2 Report immediately all fire incidents to Fire Department as follows:
 - .1 activate nearest fire alarm box; or
 - .2 telephone 911 from local phone; or
 - .3 from cellular phone dial 911 and tell 911 operator the location of the fire
- .3 Person calling in alarm will remain on site to direct Fire Department to scene of fire.
- .4 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

1.2 FIRE SAFETY PLAN

- .1 Prepare a fire safety plan in cooperation with the local fire department and other applicable regulatory authorities for the Work site before beginning Work on site.
- .2 Submit fire safety plan to local fire department for their review. Implement recommendations from local fire department into fire safety plan.
- .3 Limit scope of fire safety plan to Work site area only.
- .4 Prepare fire safety plan in conformance with OFC. Include:
 - .1 Emergency procedures in case of fire, including:
 - .1 sounding fire alarm
 - .2 notifying fire department
 - .3 instructing occupants on procedures to follow when fire alarm sounds
 - .4 evacuating occupants, including special provisions for persons requiring assistance
 - .5 confining, controlling, and extinguishing the fire
 - .2 Appointment and organization of designated supervisory staff to carry out fire safety duties
 - .3 Training of supervisory staff and other occupants in their responsibilities for fire safety
 - .4 Documents, including diagrams, showing type, location and operation of building fire emergency systems.
 - .5 Holding of fire drills
 - .6 Control of fire hazards in the building
 - .7 Inspection and maintenance of building facilities provided for the safety of occupants
- .5 Post fire safety plan at each entrance to Work site or near each Work site's health and safety board.
- .6 Review fire safety plan a maximum of every 12 months to ensure it takes into account changes in the use and other characteristics of the building. Revise fire safety plan when it can be improved.

1.3 INTERIOR AND EXTERIOR FIRE PROTECTION AND ALARM SYSTEMS

- .1 Fire protection and alarm system will not be:
 - .1 obstructed;
 - .2 shut off; and/or
 - .3 left inactive at end of working day without pre-arrangement with Owner.
- .2 Fire hydrants, standpipes and hose systems will not be used for other than fire-fighting purposes unless authorized by Fire Chief.

1.4 ACCESS FOR FIRE FIGHTING

- .1 Provide and maintain access for firefighting operations in accordance with OFC.
- .2 Submit written notification to Fire Chief a minimum of five Working Days before operation of activities that may cause problems that might impede fire department equipment access and personnel response including
 - .1 violation of minimum horizontal and overhead clearances
 - .2 other operations as directed by Fire Chief, or
 - .3 erecting of barricades and digging of trenches.
- .3 Maintain a minimum 6.0-m clear horizontal width for access routes, or as otherwise directed by Fire Chief.
- .4 Maintain a minimum 5.0-m vertical clearance for access routes, or as otherwise directed by Fire Chief.
- .5 Provide and maintain a safe exit path from all required building exits away from the building. Any exit paths within the designated area of work to be maintained by contractor.

1.5 SMOKING RESTRICTIONS

- .1 Smoking is prohibited in buildings, including buildings under construction.
- .2 Obey posted signs and restrict smoking to only existing designated smoking areas. Obey posted smoking restrictions near existing buildings.
- .3 Provide a temporary approved non-combustible receptacle at each designated smoking area in accordance with the Fire Safety Plan.

1.6 WASTE MANAGEMENT

- .1 Manage waste in accordance with Section 01 74 19 – Waste Management and Disposal, and as follows:
 - .1 Minimize waste materials.
 - .2 Do not burn waste materials.
 - .3 Storage:
 - .1 Store oily waste in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in approved receptacles. Remove at end of each Working Day.

1.7 HAZARDOUS SUBSTANCES

- .1 Perform Work involving the use of toxic or hazardous materials, chemicals or explosives, or otherwise creating hazard to life, safety or health, in accordance OFC.
- .2 Obtain a "Hot Work" permit for work involving welding, burning or use of blow torches and salamanders, in buildings or facilities.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the Fire Chief. Contractors are responsible for providing fire watch service for work on a scale established and in conjunction with Fire Chief at pre-work conference.
- .4 Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. Fire Chief is to be informed prior to and at cessation of such work.

1.8 QUESTIONS OR CLARIFICATION

- .1 Direct questions and requests for clarification on Fire Safety in addition to above requirements to Fire Department.

1.9 FIRE INSPECTION

- .1 Coordinate site inspections by Fire Chief through Project Manager.
- .2 Allow Fire Chief unrestricted access to work site.
- .3 Cooperate with Fire Chief during routine fire safety inspection of Work site.
- .4 Immediately remedy unsafe fire situations observed by Fire Chief.

1.10 HOT WORK

- .1 A Hot Work Permit is required for any operations involving open flames or work and equipment producing heat or sparks. This work includes but is not necessarily limited brazing, cutting, grinding, soldering, torching and cadwelding.
- .2 Fire watches are required during all hot work. It is the Contractor's responsibility to provide all labour material and equipment to include personnel for the fire watch. Fire watch to continue for a minimum of 30 minutes after completion of work, including end of work day, coffee breaks and lunch breaks.
- .3 Fully comply with all required precautions indicated on the hot work permit checklist. Provide owner with an electronic copy of each permit for Hot Work. Leave Hard Copy of the Original on Site with the Custodian.

Part 2 Products**2.1 NOT USED**

- .1 NOT USED

Part 3 Execution - Not Used

END OF SECTION

Part 1 General**1.1 FIRES**

- .1 On-site trash and other waste burning and fires are not permitted.

1.2 DISPOSAL OF WASTE

- .1 Do not bury rubbish and waste materials on site unless approved by Consultant.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.3 DRAINAGE

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

1.4 POLLUTION CONTROL

- .1 Control emissions from equipment and plant to local authorities emission requirements
- .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not used.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Inspection and testing, administrative and enforcement requirements.
- .2 Tests and mix designs.
- .3 Mill tests.
- .4 Equipment and system adjust and balance.

1.2 INSPECTION

- .1 Allow Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
- .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 Consultant may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such Work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Consultant for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 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 Consultant at no cost. Pay costs for retesting and reinspection.

1.4 ACCESS TO WORK

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

1.5 PROCEDURES

- .1 Notify appropriate agency and Consultant in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 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

Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Consultant.

1.7 REPORTS

- .1 Submit PDF copy of inspection and test reports.
- .2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Consultant and may be authorized as recoverable.

1.9 MILL TESTS

- .1 Submit mill test certificates as requested or required of Specification Sections.

1.10 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to Section 01 78 00 for definitive requirements.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 INSTALLATION AND REMOVAL**

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.
- .3 Arrange for, obtain and pay for any permits required.

1.2 WATER SUPPLY

- .1 Contractor to provide continuous supply of potable water for construction use by all sections.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Water shall be clean and non-staining.

1.3 TEMPORARY HEATING AND VENTILATION

- .1 Be responsible for damage to Work due to failure in providing adequate ventilation and protection during construction.
- .2 Furnish equipment, labour and fuel to provide temporary heat as required for proper execution of work.
- .3 Maintain temperatures of minimum 10 degrees Celsius in areas where construction is in progress.
- .4 Use propane or natural gas heaters where the flame is not exposed. Open flame heaters are not permitted.
- .5 Uniformly distribute heat to avoid hot and cold areas and to prevent excessive drying.
- .6 Provide minimum one (1) air change per hour for enclosed areas receiving architectural finishes.
- .7 Prior to commencement of work where hazardous or volatile adhesives, coatings or substances are used, install adequate mechanical ventilation.
- .8 Do not allow excess build-up of moisture inside building.

1.4 TEMPORARY POWER AND LIGHT

- .1 Provide temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection and pay all costs for installation, maintenance and removal including metering of sufficient size.
- .3 Provide and maintain temporary lighting throughout project.
- .4 Install and maintain temporary electrical systems in accordance with construction safety associations "temporary wiring standards on construction sites", the Ontario Electrical code and other authorities having jurisdiction.

1.5 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone, fax and data lines necessary for own use, for Contractor, Consultant & Owner as required.

1.6 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on Site.

1.7 TEMPORARY SANITARY FACILITIES

- .1 Provide toilet facilities, including hand wash facilities, for all personnel on site.
- .2 Keep facilities clean and sanitary and provided with required supplies at all times.
- .3 Except where temporary facilities are connected to municipal systems, periodically remove waste from site.

1.8 TEMPORARY FIRST-AID FACILITIES

- .1 Provide site equipment and medical facilities necessary to supply first-aid service to insured personnel in accordance with regulations of the workers' compensation act. Maintain facilities for the duration of the Contract.

1.9 TEMPORARY USE OF NEW PERMANENT SERVICE & EQUIPMENT

- .1 Do not use any new permanent service or equipment without the Owner's written approval.
- .2 Where permission is granted to use permanent services and equipment provide competent persons to operate services and equipment; inspect frequently and maintain facilities in proper operating condition.
- .3 Permanent services and equipment shall be turned over to the Owner in "as new" and perfect operating condition.
- .4 Use of permanent systems and equipment as: temporary facilities shall not affect the warranty conditions and warranty period for such systems and equipment. Make due allowance to ensure that the Owner will receive full benefits of equipment manufacturers warranty after project takeover.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution - Not Used

END OF SECTION

Part 1 General**1.1 INSTALLATION AND REMOVAL**

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.2 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps and ladders.

1.3 HOISTING

- .1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists cranes to be operated by qualified operator.

1.4 ELEVATORS

- .1 Permanent elevators not to be used by construction personnel and transporting of materials.
- .2 Provide protective coverings for finish surfaces of cars and entrances.

1.5 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.6 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Use existing roads for access to project site. Make good damage resulting from Contractor's use of roads and site.

1.7 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.9 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Consultant.
- .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary.
- .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .10 Dust control: adequate to ensure safe operation at all times.
- .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Consultant.
- .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .13 Provide snow removal during period of Work.
- .14 Remove, upon completion of work, haul roads designated by Consultant.

1.11 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution - Not Used

END OF SECTION

Part 1 General**1.1 INSTALLATION AND REMOVAL**

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

1.2 HOARDING

- .1 Erect temporary site enclosures to contain designated construction areas, as indicated, using new 1.8 m high temporary portable fencing. Panels to have 42mm welded galvanized frames with non-climbable mesh.
- .2 Provide lockable truck entrance gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .4 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
- .5 Relocate to maintain occupant access and safety, and in accordance with phasing plan.

1.3 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2 Provide as required by governing authorities.

1.4 WEATHER ENCLOSURES

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

1.5 DUST TIGHT SCREENS

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.6 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.7 PUBLIC TRAFFIC FLOW

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.8 FIRE ROUTES

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

1.10 PROTECTION OF BUILDING FINISHES

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

1.11 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 QUALITY**

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality (as per specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should disputes arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.
- .6 In specification sections where a specific manufacturer and/or product is specified as "an acceptable product is:" other manufacturers products meeting this standard ,as determined by the Consultant, may be accepted as an alternative unless specified otherwise.

1.2 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.3 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Consultant.
- .9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.5 MANUFACTURER'S INSTRUCTIONS

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

1.6 QUALITY OF WORK

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

1.7 CO-ORDINATION

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

1.8 CONCEALMENT

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

1.9 REMEDIAL WORK

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

1.10 LOCATION OF FIXTURES

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

1.11 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.

- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

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

1.13 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated without written approval of Consultant.

1.14 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and pedestrian and vehicular traffic.
- .2 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 capped service.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request before cutting or altering to existing conditions which may affect the following:
 - .1 Structural integrity of elements of Project.
 - .2 integrity of weather-exposed and moisture-resistant elements
 - .3 efficiency, maintenance, safety, or accessibility of operational elements
 - .4 visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate Contractor
- .3 Include in request:
 - .1 identification of the Project.
 - .2 location and description of affected work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.2 MATERIALS

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

1.3 PREPARATION

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

1.4 EXECUTION

- .1 All necessary cutting and patching of work for the Mechanical and Electrical or associated trades shall be done by the General Contractor. General Contractor is to coordinate and schedule related subtrades prior to pouring concrete, installing finishes to ensure that sub-trades routing, installation of services, finishes, etc. are in place prior to installing.
- .2 Execute cutting, fitting, and patching including excavation and fill, required to make work fit properly together and as necessary for the installation of new and existing materials.
- .3 Unless specified in other sections, furnish, set & secure inserts, hangers, sleeves, fasteners, adhesives, anchors and other supports and fittings required for proper installation of work.
- .4 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .5 Make good any damage resulting from work of this contract.
- .6 Tradesmen qualified in the work being cut and patched shall be employed to ensure that works are correctly done.

- .7 Core drill holes in areas after being located by the Trade concerned. No extras will be borne by the owner for redesign or relocation of systems due to incorrect placement.
- .8 Whenever it becomes necessary to cut or interfere in any manner with existing services or apparatus, do so at such times as approved by the Consultant.
- .9 For critical locations, consult with Consultant prior to commencing work.
- .10 Whenever existing items are designated for relocation or removal, relocate or remove these items unless specified to be done by other sections of the Specification. All waste and debris shall be disposed of by the General Contractor.
- .11 Coordinate work of all sections, taking into account existing installations to ensure best arrangement of components in available space. For critical locations, consult with Consultant prior to commencing work.
- .12 Make good all surfaces and finishes to match existing in areas from which items have been removed or in which items are relocated. Cap off all existing services required to be severed to affect the alterations and do all other work necessary to make good such areas the Consultant's satisfaction.
- .13 Core drill holes in concrete floors for piping where not previously sleeved, Do not use mechanical hammers or drills without prior approval in writing.
- .14 Any cutting/patching required after completion of new works shall be done by the General Contractor at the Sub-Trade concerned's expense.
- .15 Uncover Work to install ill-timed Work.
- .16 Remove and replace defective and non-conforming Work.
- .17 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .18 In locations where metal fasteners and accessories are exposed all materials to be of same texture, colour, and finish as base material on which they occur.
- .19 Select appropriate type of anchoring and fastening devices and sufficient quantity and in such a manner as to provide positive permanent anchorage of unit to be anchored in position. Keep exposed fasteners to a minimum evenly spaced & neatly laid out.
- .20 Do not use wood plugs.
- .21 Fasteners which cause spalling or cracking of material to which anchorage is being made shall not be used.
- .22 Location of fixtures, apparatus, equipment, fittings, outlets, conduits, pipes and ducts shown or specified, but not dimensioned shall be considered approximate locations to be reviewed by all trades & consultant prior to installation of major equipment. Any relocation caused by contractors failure to request direction from consultant shall be done by the contractor at no extra cost. Where job conditions require reasonable changes in indicated locations & arrangements, make changes at no additional cost.
- .23 Conserve space and co-ordinate with work of other sections to ensure that ducts, pipes, conduits, lighting, and other items will fit into allocated walls and ceiling spaces, while ensuring adequate access and maintenance.
- .24 Where ducts, piping and conduits are permitted to be exposed they shall be neatly and uniformly laid out parallel to adjacent building lines and parallel to each other where they run in the same direction. Review exposed installation with consultant prior to start of work. At no cost to owner make changes to exposed work as directed by consultant where such work is not installed in accordance with consultants prior review.
- .25 Walls, partitions and screens unless specifically noted otherwise shall be considered as extending from floor to underside of structural deck.
- .26 Keep municipal roads clean of mud & debris resulting from construction traffic. Clean paved surfaces daily to remove debris & mud resulting from the work of this contract.
- .27 Fit several parts together, to integrate with other Work.
- .28 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .29 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

- .30 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .31 Restore work with new products in accordance with requirements of Contract Documents.
- .32 Fit Work to airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .33 Provide firestopping in accordance with Section 07 84 00 - Firestopping to maintain the integrity of fire separations, including:
 - .1 Protecting penetrations at fire-resistance rated wall, ceiling or floor construction.
 - .2 Using construction joint fire stops and building perimeter fire stops to protect gaps at fire separations and between fire separations and other construction assemblies.
- .34 Refinish surfaces to match adjacent finishes. For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.
- .35 Conceal pipes, ducts and wiring in floor, wall, and ceiling construction of finished areas except where indicated otherwise.
- .36 Reinstate sidewalks and lawns to pre-construction conditions where existing materials are noted to remain.
- .37 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .38 Refer to the Hazardous Building Materials Assessment and the general specification notes relating to asbestos and hazardous materials abatement.
- .39 Masonry shall be saw cut and patching shall be toothed in to match existing adjacent finish.

1.5 WASTE MANAGEMENT AND DISPOSAL

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

1.6 DIMENSIONS

- .1 Check and verify dimensions wherever referring to work. Dimensions, when pertaining to work of another Section shall be verified with Section concerned. Details and measurements of work which is to fit or conform with work installed shall be taken at site.
- .2 Do not scale drawings. If there is ambiguity, lack of information or inconsistency, immediately consult Consultant for directions. Be responsible for extra costs involved through the disregarding of this notice.

Part 2 Products - Not Used

Part 3 Execution - Not Used

END OF SECTION

Part 1 General**1.1 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Section 01 74 19. Do not burn waste materials on site.
- .3 Clear snow and ice from access to new building until occupancy.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.
- .7 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .11 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste materials from site at regularly scheduled times. Do not burn waste materials on site.
- .5 Remove waste products and debris including that caused by Owner or other Contractors.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors, and ceilings.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.

- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REGULATORY AGENCIES

- .1 The Ontario Ministry of Environment (OME) in accordance with Section 7 of Ontario Regulation 103/94 requires a source separation program for the waste that will be generated in the construction or demolition of a structure.
- .2 The source separation program required shall:
 - .1 Deal separately with each of the categories of waste set out in Part III of the Schedule that have been source separated from other kinds of waste and also from each other category of waste in Part III; or
 - .2 Provide for removal from the building site of any commingled categories of waste set out in Part III of the Schedule and for the immediate separation of such waste from all other kinds of waste and also from each category of waste in Part III, at
 - .1 permanent premises of the person undertaking the construction project
 - .2 permanent premises of the person on whose behalf the construction project is undertaken or
 - .3 a waste disposal site operating under the authority of a certificate of approval
- .3 The source separation program shall be implemented before construction work begins on site.

1.2 SUBMITTAL

- .1 Prepare and submit a waste reduction work plan. Describe management of construction wastes. Identify materials which can be recycled, reused and indicate methods proposed for reducing, reusing and recycling wastes.

1.3 WASTE COLLECTION AND DISPOSAL

- .1 Separate and salvage materials suitable for reuse and/or recycling from general waste stream.
- .2 Provide on site facilities for collection, handling and storage of anticipated quantities of reusable and/or recyclable materials.
- .3 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
- .4 Collect, handle, store on site and transport off site, salvaged materials, salvaged for reuse and/or recycling in separate condition. Transport to authorized reuse/recycling location.
- .5 Separate non salvageable materials from salvaged items. Transport and deliver non salvageable items to licensed disposal facility.
- .6 Burying, burning, selling waste materials on site is prohibited.
- .7 Disposals of liquid wastes into waterways, sewers is prohibited.
- .8 Unless specified otherwise, materials for removal become Contractor's property.
- .9 Clean up work, storage and waste collection areas as work progresses.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution - Not Used

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
 - .1 Notify Consultant in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
 - .2 Request Consultant's inspection.
 - .2 Consultant's Inspection:
 - .1 Consultant and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Operation of systems: demonstrated to Owner's personnel.
 - .5 Commissioning of mechanical systems: completed in accordance with 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS and copies of final Commissioning Report submitted to Consultant.
 - .6 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Consultant, and Contractor.
 - .2 When Work incomplete according to Owner and Consultant, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Consultant considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
 - .7 Final Payment:
 - .1 When Consultant considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 Refer to CCDC 2: when Work deemed incomplete by Consultant, complete outstanding items and request re-inspection.
 - .8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.2 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products**2.1 NOT USED**

.1 Not used.

Part 3 Execution**3.1 NOT USED**

.1 Not used.

END OF SECTION

Part 1 General**1.1 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks before Substantial Performance of the Work, submit to the Consultant for review:
 - one digital copy of the operating and maintenance manuals and the as-built record drawing mark-ups.
- .3 Following Consultant review of the operating and maintenance manuals and the as-built record drawing mark-ups, revise contents of submittals as required based on Consultant comments and then submit to the Consultant within two weeks of receipt of comments:
 - one digital copy (USB) of the operating and maintenance manuals and the as-built record drawing mark-ups.
 - one hard copy (full size print out) of the as-built record drawing mark-ups.
- .4 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .5 Provide evidence, if requested, for type, source and quality of products supplied.

1.2 FORMAT

- .1 Organize data as instructional manual.
- .2 Arrange content by systems, under Section numbers and sequence of Table of Contents.

1.3 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: As required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: Refer to Section 01 79 00 - Demonstration and Training.

1.4 AS-BUILT DOCUMENTS AND SAMPLES

- .1 In addition to the requirements in General Conditions, maintain at the site one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Change Orders and other modifications to Contract.
 - .5 Reviewed shop drawings, product data, and samples.
 - .6 Site test records.
 - .7 Inspection certificates.
 - .8 Manufacturer's certificates.

- .2 Store record documents and samples in site office apart from documents used for construction.
 - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition.
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Consultant.

1.5 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

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

1.6 FINAL SURVEY

- .1 At completion of project, transfer recorded changes to Construction drawings and submit to the Consultant. All drawings to be submitted and marked "as-built".

1.7 EQUIPMENT AND SYSTEMS

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

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

1.8 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: Include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional requirements: As specified in individual specifications Sections.

1.9 MAINTENANCE MATERIALS

- .1 Spare Parts:
 - .1 Provide spare parts, in quantities specified in individual specification Sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Consultant.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit before final payment.
- .2 Extra Stock Materials:
 - .1 Provide maintenance and extra materials, in quantities specified in individual specification Sections.
 - .2 Provide items of same manufacture and quality as items in Work.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Consultant.
 - .2 Include approved listings in Maintenance Manual.
 - .5 Obtain receipt for delivered products and submit before to final payment.
- .3 Special Tools:
 - .1 Provide special tools, in quantities specified in individual specification Section.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue items.
 - .1 Submit inventory listing to Consultant.
 - .2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE, AND HANDLING

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

1.11 WARRANTIES AND BONDS

- .1 Assemble warranty information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index keyed to Table of Contents listing.
 - .2 List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by Subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .2 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .3 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .4 Written verification to follow oral instructions.

1.12 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil-and water-resistant tag approved by Consultant.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate the following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 DESCRIPTION**

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel at times indicated in the specifications.
- .2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.2 QUALITY CONTROL

- .1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems:
 - .1 Instruct Owner's personnel.
 - .2 Submit written report that demonstration and instructions have been completed.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks before designated dates, for Consultant's approval.
- .2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

1.4 CONDITIONS FOR DEMONSTRATIONS

- .1 For training during installation, confirm dates for installation have not changed.
- .2 For training after completion of construction ensure:
 - .1 Equipment has been inspected and put into operation in accordance with specifications.
 - .2 Testing, adjusting, and balancing has been performed and equipment and systems are fully operational.
 - .3 Copies of completed operation and maintenance manuals for use in demonstrations and instructions are provided.

1.5 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, installation, servicing, and maintenance of each item of equipment at agreed upon times, at the designated location.
- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution**3.1 NOT USED**

.1 Not Used.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Section includes general requirements relating to commissioning of project components, equipment, and systems.

1.2 QUALITY ASSURANCE

- .1 Co-operate with testing organization services under provisions specified in Section 01 45 00 - Quality Control.
- .2 Testing organization: certified to perform specified services.
- .3 Comply with applicable procedures and standards of the certification sponsoring association.
- .4 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.3 SUBMITTALS

- .1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
- .2 Submit documentation to confirm organization compliance with quality assurance provision.
- .3 Submit preliminary specimen copies of each of report forms proposed for use.
- .4 Fifteen days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.
- .5 Submit reports of testing, adjusting, and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

1.4 PROCEDURES - GENERAL

- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
- .2 Notify Consultant 3 days prior to beginning of operations.
- .3 Accurately record data for each step.
- .4 Report to Consultant any deficiencies or defects noted during performance of services.

1.5 FINAL REPORTS

- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.

1.6 CONTRACTOR RESPONSIBILITIES

- .1 Prepare each system for testing and balancing.
- .2 Cooperate with testing organization and provide access to equipment and systems.
- .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.
- .4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.

1.7 PREPARATION

- .1 Provide instruments required for testing, adjusting, and balancing operations.
- .2 Make instruments available to Consultant to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.
- .5 Verify lighting is turned on when lighting is included in cooling load.
- .6 Verify equipment such as computers, laboratory and electronic equipment are in full operation.

1.8 EXECUTION

- .1 Test equipment, balance distribution systems, and adjust devices for HVAC systems.

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 03 20 00 - Concrete Reinforcing
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 07 92 00 - Joint Sealants

1.2 ABBREVIATIONS AND ACRONYMS

- .1 HDO: High density overlay plywood
- .2 MDO: Medium density overlay plywood

1.3 DEFINITIONS

- .1 Environmental Product Declaration (EPD): Third-party verified documentation with the supporting Product Category Rule (PCR) and Life cycle Assessment information. Prepared in accordance with ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle-to-gate scope.
 - .1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.
 - .2 Product-specific Type III EPD - Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

1.4 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA O86:19, Engineering Design in Wood
 - .3 CSA O121-17, Douglas Fir Plywood
 - .4 CSA O151-17, Canadian Softwood Plywood
 - .5 CSA O153-13, Poplar Plywood
 - .6 CSA O325-16, Construction Sheathing
 - .7 CSA O437.0-93, OSB and Waferboard
 - .8 CSA S269.1-16, Falsework and Formwork
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S701.1-17, Standard for Thermal Insulation, Polystyrene Boards

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 20 00 - Concrete Reinforcing.
 - .2 Coordinate with Section 03 30 00 - Cast-in-Place Concrete.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature, and data sheets for proprietary materials used in formwork liners and coatings. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Submit shop drawings for formwork and falsework.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Prepare Shop Drawings in accordance with CSA S269.1 for formwork and falsework.
 - .3 Indicate formwork design data, permissible rate of concrete placement, and temperature of concrete in formwork.
 - .4 Indicate sequence of erection and removal of formwork and falsework.
 - .5 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.
 - .6 Indicate sequence of erection and removal of formwork and falsework.
 - .7 Include the following information on falsework Shop Drawings:
 - .1 Longitudinal, lateral, vertical, dead, live and impact loads used in design.
 - .2 Safe bearing capacity of soil underneath mud sills.
 - .3 Maximum column, post and support loads.
 - .4 Deflection diagrams for beams with deflection of 10 mm or more.
 - .5 Deflection diagrams indicating initial and final elevation of deck surfaces, roofs and soffits.
 - .6 Grade of structural steel.
 - .7 Indicate steel posts, girders, beams, connections, bracing and welding, providing sufficient detail for safe performance of falsework.
 - .8 Fully detailed steel frame shoring.
 - .9 Species, grades and sizes of wood.
 - .10 Type and weight of equipment (moving or stationary) supported by falsework.
 - .11 Sequence, methods and rate of concrete placement.
 - .12 Proprietary equipment, adequately identified for checking purposes
 - .13 Full details and locations of splices.

1.7 QUALITY CONTROL

- .1 Perform in accordance with Section 01 45 00 - Quality Control.
- .2 Retain a professional engineer registered or licensed in the Province of Ontario, Canada, with experience in formwork and falsework design of comparable complexity and scope, to perform the following services as part of work of this Section:
 - .1 Design of formwork and falsework.
 - .2 Review, stamp, and sign fabrication and erection Shop Drawings, design calculations and amendments.
 - .3 Conduct on-site inspections and prepare and submit inspection reports verifying this part of work is in accordance with Contract Documents and reviewed Shop Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
 - .1 Storage and Handling Requirements: Maintain formwork liners for architectural concrete without defects or damages that could affect concrete appearance or cause staining.

Part 2 Products**2.1 MATERIALS**

- .1 Formwork materials:
 - .1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O86
 - .2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.
- .2 Tubular column forms: Round, spirally wound, polyethylene impregnated virgin kraft interior layer and a waxed exterior internally treated with release material.
- .3 Form ties:
 - .1 For concrete not designated 'Architectural': Removable or snap-off metal ties, fixed or adjustable length, and free of devices leaving holes larger than 25 mm in diameter in concrete surface
 - .2 For Architectural concrete: Snap ties complete with plastic cones and provide light grey precast concrete plugs.
- .4 Form liner:
 - .1 Plywood: HDO Canadian Softwood Plywood to CSA O151
- .5 Form release agent: Proprietary, non-volatile material that will not stain concrete or hinder the application of subsequent coatings, treatments, or flooring materials to the concrete surface.
- .6 Falsework materials: To CSA S269.1.
- .7 Sealant: To Section 07 92 00 - Joint Sealants.

Part 3 Execution**3.1 PREPARATION**

- .1 Before placing concrete clean formwork in accordance with CSA A23.1/A23.2.

3.2 FABRICATION AND ERECTION

- .1 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with Drawings.
- .2 Obtain Consultant's approval for use of earth forms framing openings not indicated on Drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect falsework in accordance with CSA S269.1
- .5 Do not place shores and mud sills on frozen ground.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Fabricate and erect formwork in accordance with CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.
- .8 Align form joints and make watertight.
 - .1 Minimize the number of form joints used.
- .9 Locate horizontal form joints for exposed columns 2 400 mm above finished floor elevation.
- .10 Use 25-mm chamfer strips on external corners and 25-mm fillets at interior corners and joints, unless otherwise indicated on Drawings.
- .11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .12 Refer to architectural Drawings for concrete members requiring architectural exposed finishes.
- .13 Construct forms for architectural concrete, and place ties as indicated on Drawings.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .14 Build in anchors, sleeves, and other inserts required to accommodate work specified in other Sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

3.3 REMOVAL AND RESHORING

- .1 Leave formwork in place for the following minimum periods of time after placing concrete.
 - .1 2 days for walls.
 - .2 2 days for footings.

- .2 Remove formwork when concrete has reached 70 % of its 28 day design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.
- .4 Space reshoring in each principal direction at not more than 3000 mm apart.
- .5 Reuse formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.4 SITE QUALITY CONTROL

- .1 Site Inspections:
 - .1 Professional engineer responsible for signing and stamping shop drawings to conduct on-site inspections and prepare and submit inspection reports verifying this part of the work is in accordance with Contract Documents and reviewed Shop Drawings.

3.5 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Once a form can no longer be used, deposit in an on-site recycling bin.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 – Cast-in-Place Concrete

1.2 DEFINITIONS

- .1 Environmental Product Declaration (EPD): Third-party verified documentation with the supporting Product Category Rule (PCR) and Life cycle assessment information. Prepared in accordance with ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle-to-gate scope.
 - .1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.
 - .2 Product-specific Type III EPD - Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.

1.3 REFERENCE STANDARDS

- .1 American Concrete Institute (ACI):
 - .1 MNL-6620, ACI Detailing Manual
- .2 CSA Group (CSA):
 - .1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A283:19, Qualification Code for Concrete Testing Laboratories
 - .3 CSA A23.3:19, Design of Concrete Structures
 - .4 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement
 - .5 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .6 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 Reinforcing Steel Institute of Canada (RSIC):
 - .1 RSIC-2020, Manual of Standard Practice

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 30 00 – Cast-in-Place Concrete

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's instructions if available, product literature and data sheets for proprietary materials used in concrete reinforcement. Include product characteristics, performance criteria, physical sizes, finishes, and limitations.
- .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Shop Drawings:
 - .1 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
 - .2 Indicate placing of reinforcement and:
 - .3 Detail lap lengths and bar development lengths to CSA A23.3, unless otherwise indicated on Drawings.
 - .4 Indicate position and size of openings in slabs and walls. Coordinate with the different trades requiring openings.
 - .5 Indicate the concrete cover dimension to the reinforcement.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Testing Laboratory: Certified to CSA A283.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Package bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

Part 2 Products

2.1 MATERIALS

- .1 Substitute different sized bars only if permitted in writing by Consultant.
- .2 Reinforcing Steel: Billet steel, grade 400, deformed bars to CSA G30.18, unless otherwise indicated.
- .3 Reinforcing steel: Weldable low alloy steel deformed bars to CSA G30.18.
- .4 Cold-drawn annealed steel wire ties: To ASTM A1064.
- .5 Deformed steel wire for concrete reinforcement: To ASTM A1064.
- .6 Welded steel wire fabric:
 - .1 Plain in accordance with ASTM A1064/A1064M, fabricated from steel wire into flat sheets; sizes as indicated on Drawings.
 - .2 Finish:
 - .1 Galvanized: Hot dip galvanized after welding having Class A coating in accordance with ASTM A641/A641M.

- .3 Provide in flat sheets only.
- .7 Chairs, bolsters, bar supports, spacers: To CSA A23.1/A23.2.
- .8 Tie wire: 1.5 mm diameter annealed wire.
- .9 Mechanical splices: Subject to approval from Consultant.
- .10 Plain round bars: To CSA G40.20/G40.21.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Obtain Consultant's written approval for locations of reinforcement splices other than those shown on Contract Drawings and shop drawings.
- .3 Upon approval from Consultant, weld reinforcement in accordance with CSA W186.

Part 3 Execution

3.1 PREPARATION

- .1 Galvanizing to include chromate treatment.
 - .1 Duration of treatment: 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 SITE BENDING

- .1 Do not bend or weld reinforcement on site except where indicated or when authorized by Consultant.
 - .1 If site bending is authorized, bend reinforcement without heat, applying slow and steady pressure.
 - .2 Replace reinforcement bars that develop cracks or splits.

3.3 PLACING REINFORCEMENT

- .1 Cutting or puncturing vapour retarder is not permitted. Repair damage and reseal vapour retarder before placing concrete.
- .2 Place reinforcing steel as indicated on placing drawings and in accordance with CSA A23.1/A23.2.
- .3 Use plain round bars as slip dowels in concrete.
 - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.
 - .2 After paint has dried, apply thick even film of mineral lubricating grease.
- .4 Before placing concrete, obtain Consultant's approval of reinforcing material and placement.
- .5 Maintain minimum concrete cover to reinforcement during concrete placement.

3.4 SITE QUALITY CONTROL

- .1 Site tests: Conduct tests on the following in accordance with Section 01 45 00 - Quality Control and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section:

- .1 Reinforcing steel and welded wire fabric.
- .2 Inspection and testing of reinforcing and reinforcing materials carried out by testing laboratory designated by Consultant for review to CSA A23.1/A23.2.
- .3 Distribute test results for discussion at pre-pouring concrete meeting between testing laboratory and Consultant.
- .4 Owner will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .5 Inspection or testing by Owner does not augment or replace Contractor's quality control nor relieve Contractor of any contractual responsibility.

3.5 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 03 10 00 - Concrete Forming and Accessories
- .2 Section 03 20 00 - Concrete Reinforcing

1.2 ABBREVIATIONS AND ACRONYMS

- .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:
 - .1 GU, GUb, GUL and GULb - General use cement
 - .2 MS, MSb and MSLB - Moderate sulphate-resistant cement
 - .3 MH, MHb, MHL and MSLB - Moderate heat of hydration cement
 - .4 HE, HEb, HEL and HELb - High early-strength cement
 - .5 LH, LHb, LHL LHLb - Low heat of hydration cement
 - .6 HS, HSb and HSLb - High sulphate-resistant cement
- .2 Fly ash types:
 - .1 F - with a maximum CaO content of 8%
 - .2 CI - with CaO content of 15% and 20%
 - .3 CH - with a minimum CaO content of 20%
- .3 Other Supplementary Cementitious Materials (SCM) types:
 - .1 S-GGBFS - Ground, granulated blast-furnace slag
 - .2 N – Natural pozzolan
 - .3 SF – Silica fume with minimum silicon dioxide (SiO₂) content of 85%
 - .4 SFI – Silica fume with silicon dioxide (SiO₂) content between 75% and 85%
 - .5 GL – Ground glass with maximum total alkali (NaEq) content of 4%
 - .6 GH – Ground glass with total alkali (NaEq) content between 4% and 13%

1.3 DEFINITIONS

- .1 Environmental Product Declaration (EPD): Third-party verified documentation with the supporting Product Category Rule (PCR) and Life Cycle Assessment information. Prepared in accordance with ISO 14025, ISO 14040, ISO 14044, and EN 15804 or ISO 21930 and having at least a cradle-to-gate scope.
 - .1 Industry-wide (generic) EPD with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.
 - .2 Product-specific Type III EPD - Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator.
- .2 Supplementary Cementitious Materials (SCM)s: Materials added to concrete which contribute to the properties of hardened concrete through hydraulic or pozzolanic activity.
- .3 Workability: This term broadly describes the total properties and expectations for concrete delivered to site as follows:

- .1 Individual tested properties of concrete that account for confined or free flow slump, penetration, compaction, or relative plasticity of various concrete mix designs used for the project.
- .2 Overall properties involved with mixing, handling, transportation, and placement using vibratory compaction methods without loss of homogeneity of in-place concrete.

1.4 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-51.34-M 86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- .2 CSA Group (CSA):
 - .1 CSA A23.1: 19 /A23.2: 19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A283: 19, Qualification Code for Concrete Testing Laboratories
 - .3 CSA A3000- 18, Cementitious Materials Compendium

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for proprietary materials used in cast-in-place concrete and additives and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Samples:
 - .1 When requested, submit two samples a minimum 4 weeks before beginning work for review and acceptance of materials proposed for use as follows:
 - .2 Samples will not be returned for inclusion into work.
- .4 Site Quality Control Submittals:
 - .1 Submit testing reports for review by Consultant and do not proceed without written approval when deviations from mix design or parameters are found.
 - .2 Concrete pours: Submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in SITE QUALITY CONTROL in Part 3 of this Section.

1.6 QUALITY CONTROL

- .1 Quality Assurance: In accordance with Section 01 45 00 - Quality Control.
- .2 Submit proposed quality control procedures a minimum four weeks before starting concrete work, for review by Consultant on the following items:
 - .1 Hot weather concrete
 - .2 Cold weather concrete
 - .3 Curing
 - .4 Finishes
 - .5 Joints

- .3 Quality Control Plan: Submit written report to Consultant verifying compliance that cast-in-place concrete meets performance requirements of concrete as established in PRODUCTS in Part 2 of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Delivery and Acceptance Requirements:
 - .1 Concrete hauling time: Deliver to site of Work and discharge within a maximum of 120 minutes after batching.
 - .2 Modifying maximum time limit before receiving written agreement from Consultant and concrete producer as described in CSA A23.1/CSA A23.2 is prohibited.
 - .3 Submit deviations for review by Consultant.
 - .4 Concrete delivery: Ensure continuous concrete delivery from plant meets CSA A23.1/CSA A23.2.

1.8 SITE CONDITIONS

- .1 Placing concrete during rain or weather events that could damage concrete is prohibited.
- .2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/CSA A23.2
- .3 Cold weather protection:
 - .1 Maintain protection equipment in readiness on Site.
 - .2 Use protection equipment when ambient temperature is below 5°C, or when temperature may fall below 5°C before concrete has cured.
 - .3 Placing concrete upon or against surface at temperature below 5°C is prohibited.
- .4 Hot weather protection:
 - .1 Protect concrete from direct sunlight when ambient temperature is above 27°C.
 - .2 Prevent forms from getting too hot before concrete is placed. Apply accepted methods of cooling that will not negatively affect concrete.
- .5 Protect concrete from drying.

Part 2 Products

2.1 MATERIALS

- .1 Portland Cement: Normal
- .2 Portland-limestone cement: Type GUL to CSA A3000 (specifically CSA A3001) .
- .3 Water: To CSA A23.1/CSA A23.2.
- .4 Aggregates: To CSA A23.1/CSA A23.2 Non-reactive permitted
- .5 Admixtures:
 - .1 Air entraining admixture: To ASTM C260/C260M.
 - .2 Consultant to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .6 Post-Tensioning Ducts: To CSA A23.1/CSA A23.2.

- .7 Curing Compound: To CSA A23.1/CSA A23.2 white and ASTM C309, Type 1 Clear or translucent without dye.
- .8 Pre-moulded Joint Fillers:
 - .1 Bituminous impregnated fibreboard: To ASTM D1751.
- .9 Weep hole tubes: Plastic
- .10 Concrete Bonding Agents: Epoxy to ASTM C881/C881M, Type V

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Consultant's approval before placing concrete.
 - .1 Provide a minimum of 24 hours notice before placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitate placing with minimum amount of re-handling, and without damage to existing structure or Work.
- .4 Disturbing reinforcement and inserts during concrete placement is prohibited.
- .5 Before placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous work from staining.
- .7 Clean and remove stains before application for concrete finishes.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, workability, air content, temperature and test samples taken.
- .9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
 - .1 Place steel dowels smooth steel bars and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated.
- .10 Do not place load upon new concrete until authorized by Consultant.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work in accordance with CSA A23.1/CSA A23.2.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved Consultant.
 - .2 Where approved by Consultant, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

- .3 Sleeves and openings greater than 100 x 100 mm that are not indicated in the reviewed shop drawings must be approved by Consultant.
- .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Consultant before placing concrete.
- .5 Confirm locations and sizes of sleeves and openings shown on drawings.
- .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Installation - Anchor bolts:
 - .1 Set anchor bolts to templates in coordination with appropriate Subcontractor before placing concrete.
 - .2 Protect anchor bolt holes from water accumulation, and snow and ice build-ups.
- .4 Installation - Drainage holes and weep holes:
 - .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - Concrete Forming and Accessories. If wood forms are used, remove them after concrete has set.
 - .2 Install weep hole tubes and drains as indicated on Drawings.
- .5 Installation - Dovetail anchor slots: In accordance with Section 04 05 00 - Common Work Results for Masonry.
 - .1 Install continuous vertical anchor slot to forms where masonry abuts concrete wall or columns.
 - .2 Install continuous vertical anchor slots at 800 mm on centre where concrete walls are masonry faced.
- .6 Installation - Grout under base plates and machinery using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .7 Finishing and curing:
 - .1 Use procedures as reviewed by Consultant or those noted in CSA A23.1/CSA A23.2 to remove excess bleed water. Ensure surface is not damaged.
 - .2 Cure concrete in accordance with CSA A23.1/CSA A23.2. If required, use curing compounds compatible with applied finish on concrete surfaces. Use sheet materials in accordance with ASTM C171 for curing concrete floor slabs.
- .8 Installation - Joint fillers:
 - .1 Provide filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
 - .2 When more than one piece required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction, expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12-mm-thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless otherwise indicated.
- .9 Installation - Damp-proof membrane:
 - .1 Install damp-proof membrane under concrete slabs-on-grade inside building.
 - .2 Lap damp-proof membrane a minimum 150 mm at joints and seal.

- .3 Seal punctures in damp-proof membrane before placing concrete.
- .4 Use patching material a minimum 150 mm larger than puncture and seal.

3.3 TOLERANCES

- .1 Concrete surface tolerance to CSA A23.1/CSA A23.2

3.4 SITE QUALITY CONTROL

- .1 Site tests: Conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in ACTION AND INFORMATIONAL SUBMITTALS in Part 1 of this Section.
 - .1 Concrete pours
 - .2 Slump
 - .3 Air content
 - .4 Compressive strength at 28 days
 - .5 Air and concrete temperature
- .2 Inspection and testing of concrete and concrete materials carried out by testing laboratory designated by Consultant to CSA A23.1/CSA A23.2.
 - .1 Ensure testing laboratory certified to CSA A283.
- .3 Distribute test results for discussion at pre-pouring concrete meeting between testing laboratory and Consultant.
- .4 Owner will pay for costs of tests or as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .5 Testing agency will take additional test cylinders during cold weather concreting. Cure cylinders on Project site under same conditions as concrete which they represent.
- .6 Non-Destructive Methods for Testing Concrete: To CSA A23.1/CSA A23.2.
- .7 Inspection or testing by Consultant not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Provide appropriate area on Project site where concrete trucks can be safely washed.
- .2 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 - Cast-in-Place Concrete
- .2 Section 09 65 16 - Resilient Sheet Flooring
- .3 Section 09 65 19 - Resilient Tile Flooring
- .4 Section 09 91 33 – Interior Painting

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors
- .2 CSA Group (CSA):
 - .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination:
 - .1 Coordinate with Section 03 30 00 - Cast-in-Place Concrete for wet curing.
 - .2 Coordinate concrete curing accelerators with integral concrete colour material to avoid detrimental chemical interactions.
 - .3 Coordinate concrete curing agents, ensure compatibility with subsequently applied floor finishes and with the minimum substrate conditions of Section 09 65 16 - Resilient Sheet Flooring 09 65 19 - Resilient Tile Flooring 09 91 23 – Interior Painting.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product literature and data sheets for concrete finishing products. Include product characteristics, performance criteria, and resulting finishes, and limitations.
 - .2 Submit WHMIS Safety Data Sheet (SDS).
- .3 Samples: Submit the following a minimum of four weeks before beginning work of this Section
 - .1 Samples for Initial Selection: Submit manufacturer's colour chart small actual samples of integrally coloured concrete for initial selection by Consultant.
 - .2 Samples for Verification:
 - .1 Submit a minimum 100-mm-long by 100-mm-wide concrete sample with applied sealing compound illustrating colour and gloss level.
 - .2 Submit a minimum 100-mm-long by 100-mm-wide concrete sample with applied curing compound illustrating colour and gloss level.
 - .3 Submit a minimum 100-mm-long by 100-mm-wide concrete sample of integrally coloured concrete for verification by Consultant.

- .4 Manufacturers' Instructions: Submit application instructions for each concrete floor treatment.
- .5 Qualification Statements:
 - .1 Submit written declaration that concrete floor finishing products used on this Project are compatible with subsequently installed finish flooring products and adhesives.

1.5 QUALITY CONTROL

- .1 Quality Assurance: Perform in accordance with Section 01 45 00 - Quality Control.
- .2 Submit proposed quality control procedures a minimum of four weeks before starting concrete finishing work for review by Consultant on the following items:
 - .1 Curing

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Packaging Waste Management: Remove pallets, crates, padding, and packaging materials for reuse and return by manufacturer in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 SITE CONDITIONS

- .1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface for each 40 m² of floor being treated.
- .2 Make work area watertight and protected against rain and detrimental weather conditions.
- .3 Temperature: Maintain a minimum 10°C ambient temperature for seven days before installation and a minimum 48 hours after completion of work. Maintain relative humidity at a maximum 40% during both periods.
- .4 Moisture: Ensure concrete substrate is within moisture limits prescribed by manufacturer.

Part 2 Products

2.1 CURING COMPOUNDS

- .1 Waterborne, membrane-forming curing membrane: To ASTM C309, Type 1 Clear Class B.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that concrete slabs are ready to receive work and elevations as indicated on Drawings as recommended by manufacturer's written instructions.

3.2 APPLICATION – GENERAL

- .1 Finish concrete floor slab surfaces to CSA A23.1/CSA A23.2, Table 21

3.3 PROTECTION

- .1 Protect finished surfaces in accordance with manufacturer's recommendations.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 13 - Masonry Mortaring and Grouting

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CSA A23.3:19, Design of Concrete Structures
 - .3 CSA A23.4-16, Precast Concrete - Materials and Construction

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store and protect precast elements from damage.

1.5 WARRANTY

- .1 For spalling and cracking of precast elements, the 12 month warranty period prescribed is extended to 60 months.

Part 2 Products**2.1 MATERIALS**

- .1 Cement, white cement, aggregates, water, admixtures: To CSA A23.4 and CSA A23.1/CSA A23.2, and in accordance with Section 03 30 00 – Cast-in-Place Concrete.
- .2 Use same brands and source of cement and aggregate for the entire project to ensure uniformity of colouration and other mix characteristics.
- .3 Forms: To CSA A23.4.
- .4 Curing Compound: not permitted without before approval of Consultant.

2.2 CONCRETE MIXTURES

- .1 Proportion normal density concrete in accordance with CSA A23.1/CSA A23.2 to give the following properties:
 - .1 Cement: Use Type [10] White Portland cement, and in accordance with Section 03 30 00 – Cast-in-Place Concrete.
 - .2 Minimum compressive strength at 28 days: 30 MPa.
 - .3 Class of exposure: F2.
 - .4 Nominal size of coarse aggregate: 12 mm.
 - .5 Air content: 4 to 7%.

2.3 FABRICATION

- .1 Manufacture units to CSA A23.4.
- .2 Form to profile indicated on drawings with smooth sloped top and drip edge at underside.

2.4 FINISHES

- .1 Smooth finish: as cast using smooth plastic form liners.

Part 3 Execution**3.1 GENERAL**

- .1 Do precast concrete work to CSA A23.4 and CSA A23.3.

3.2 EXAMINATION

- .1 Verification of Conditions: Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.
 - .1 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.3 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 13 - Masonry Mortaring and Grouting
- .2 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .3 Section 04 05 23 - Masonry Accessories
- .4 Section 04 22 00 – Concrete Unit Masonry
- .5 Section 05 50 00 – Metal Fabrications
- .6 Section 07 62 00 – Sheet Metal Flashing and Trim
- .7 Section 07 84 00 – Firestopping
- .8 Section 07 92 00 – Joint Sealants

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CSA A165 Series-14, CSA Standards on concrete masonry units
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry
 - .3 CAN/CSA-A371-14, Masonry Construction for Buildings

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings: Conduct a meeting in accordance with Section 01 31 19 - Project Meetings a minimum one week before beginning masonry installation to:
 - .1 Verify Project requirements, including mock-up requirements and mock-up location.
 - .2 Verify minimum acceptable substrate conditions required for performance of work.
 - .3 Coordinate products and installation methods.
 - .4 Sequence work of related Sections.
 - .5 Coordinate lines, levels, and coursing with other affected Subcontractors.
 - .6 Review manufacturer's installation instructions.
 - .7 Review masonry cutting tools, methods, and temporary barriers and review Owner's safety and protection requirements from dust during cutting operations.
 - .8 Review warranty requirements.
- .2 Sequencing: sequence with other work in accordance with Section 01 32 00 - Construction Progress Documentation. Comply with manufacturer's written recommendations for sequencing construction operations.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit the following information submittals as work progresses:
 - .1 Test and Evaluation Reports:
 - .1 Submit certified test reports in accordance with Section [01 29 83 - Payment Procedures for Testing Laboratory Services].
 - .2 Test reports to certify compliance of masonry units with specified performance characteristics and physical properties.
 - .3 Submit data for masonry units, in addition to requirements set out in referenced CSA and ASTM Standards, indicating initial rates of absorption.
 - .2 Manufacturers' Instructions: Indicate special storage and handling requirements, installation instructions and sequence, and cleaning procedures. Keep a copy onsite during installation.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Assemble mock-up in accordance with Section 01 43 00 - Quality Assurance.
 - .2 Assemble panel of exterior masonry wall construction 1200 x 1800 mm, demonstrating masonry unit colours, colour blending of masonry units where units are subject to colour variations and textures, use of reinforcement, connectors, ties, through-wall flashing, weep holes, tooling of joints, coursing, pointing, mortar, joint sealant, and installation tolerances.
 - .1 Consultant will require a minimum 48 hours to review the mock-up.
 - .3 Mock-up used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
 - .4 Start work only upon receipt of written acceptance of mock-up by Consultant.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements, CAN/CSA-A179, and CAN/CSA-A371.
- .2 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address
- .4 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location, and in accordance with manufacturer's recommendations in clean, dry well-ventilated area.
 - .2 Store and protect material packages from nicks, scratches, and blemishes.
 - .3 Keep materials dry until use, except where wetting of bricks or blocks is specified.
 - .4 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.
 - .5 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

1.8 SITE CONDITIONS

- .1 Ambient Conditions: Assemble and install components when temperatures are above 4 °C.
 - .1 Cold weather protection and construction requirements: To CAN/CSA-A371, and:
 - .1 Dry materials to be maintained in sealed mortar silo prior to mixing.
 - .2 Heat water to 70°C maximum prior to mixing mortar.
 - .3 Maintain temperature of mortar between 4 °C and 50 °C until batch is used or becomes stable.
 - .4 Protect mortar from rain and snow.
 - .5 Mortar must be used and placed in its final position within 2 hours of mixing.
 - .6 Maintain temperature of masonry above 0 °C for a minimum of 3 days after mortar is installed.
 - .7 Keep all units completely free from ice and frost. Do not use admixtures or antifreezes in mortar.

- .8 When work is not in progress, tops of all masonry to be covered with non-staining weatherproof covers. Covers to be at least 600 mm wider than masonry elements and shall be well secured against displacement.
- .9 Preheat unheated wall sections in enclosure to above 10 °C for a minimum 72 hours before applying mortar.
- .2 Maintain dry beds for masonry and use dry masonry units only. Do not wet masonry units.
- .3 Hot Weather Requirements: To CAN/CSA-A371
 - .1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.
 - .2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.
- .4 Spray mortar surface at intervals and keep moist for maximum of 3 days after installation.

1.9 WARRANTY

- .1 For work in this Section, 12 months warranty period is extended to 60 months.

Part 2 Products

2.1 MATERIALS

- .1 Masonry materials are specified in the following Sections:
 - .1 Section 04 22 00 – Concrete Unit Masonry
 - .2 Section 04 05 13 - Masonry Mortaring and Grouting
 - .3 Section 04 05 23 - Masonry Accessories
 - .4 Section 04 05 19 - Masonry Anchorage and Reinforcing
 - .5 Section 07 92 00 – Joint Sealants
 - .6 Section 04 43 13.13 - Anchored Stone Masonry Veneer

Part 3 Execution

3.1 EXAMINATION

- .1 Examine conditions, substrates and work to receive work of this Section.
- .2 Verification of Conditions: Perform in accordance with Section 01 71 00 – Examination and Preparation.
 - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions before installation.
 - .2 Site conditions are acceptable, can be maintained, and areas are ready to receive work.
 - .3 Built-in items are in proper location, and ready for roughing into masonry work.
 - .4 Examine openings to receive masonry infill units. Verify opening sizes, locations, and that openings are square, plumb, and ready to receive work.
 - .5 Commencing installation means acceptance of in place substrates.

3.2 PREPARATION

- .1 Surface Preparation: Prepare surface in accordance with Section 01 71 00 - Examination and Preparation and manufacturer's written recommendations.
- .2 Establish and protect lines, levels, and coursing.
- .3 Protect adjacent materials from damage and disfiguration.

3.3 CONSTRUCTION

- .1 Exposed masonry:
 - .1 Remove chipped, cracked, and otherwise damaged units, in accordance with CAN/CSA-A165, in exposed masonry and replace with undamaged units.
- .2 Jointing:
 - .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
 - .2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.
 - .3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.
- .3 Cutting:
 - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
- .4 Building-In:
 - .1 Build in items required built into masonry.
 - .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
- .5 Support of loads:
 - .1 Use concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used instead of solid units.
 - .2 Use grout to CAN/CSA-A179 where grout is used instead of solid units
 - .3 Install building paper below voids to be filled with concrete or grout; keep paper 25 mm back from faces of units.
- .6 Provision for movement:
 - .1 Leave 3 mm space below shelf angles.
 - .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .7 Loose steel lintels:
 - .1 Install loose steel lintels. Center over opening width.
- .8 Control joints:
 - .1 Unless otherwise noted, provide expansion joints in block veneer and control joints in masonry walls at follows:
 - .1 Within 3050mm of building corners and bonded wall intersections.
 - .2 At changes in wall heights
 - .3 At changes in wall thickness
 - .4 Above joints in foundations
 - .5 At other points of weakness or high stress concentration
 - .6 At maximum 6100mm spacing, 3050mm for parapets
 - .2 Where concrete masonry units are present as a backup for block veneer, expansion joints in brick should coincide with control joints in concrete block.
 - .3 Control/expansion joints above openings in walls with lintels shall be offset to the end of the lintels. Provide a slip joint under one end of lintel.
- .9 Movement joints:
 - .1 Build-in continuous movement joints as indicated.

3.4 TOLERANCES

- .1 Install masonry to tolerances in CAN/CSA-A371.

3.5 PROTECTION

- .1 Temporary Bracing:
 - .1 Provide temporary bracing and support of masonry work during and after erection until permanent lateral support is in place.
 - .2 Bracing approved by consultant
 - .3 Brace and support masonry walls as necessary to resist wind pressures, lateral forces, and temporary construction loads during construction.
- .2 Moisture Protection:
 - .1 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain until completed and protected by flashing or other permanent construction.
 - .2 Cover completed and partially completed masonry work not otherwise enclosed or sheltered with waterproof covering at end of each Work Day. Secure coverings in position.
- .3 Air Temperature Protection: Protect completed masonry in accordance with CAN/CSA-A371.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
 - .3 CAN/CSA-A371-14, Masonry Construction for Buildings.
 - .4 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.
 - .2 For mortar to remain exposed in finished project, brands of cementitious materials and source of supply of sand shall remain the same for the entire project.
 - .3 Refer to section 04 05 19 for requirements of grout used in reinforced masonry.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect masonry mortar and grout packages from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 SITE CONDITIONS

- .1 Ambient Conditions: maintain materials and surrounding air temperature to:
 - .1 Minimum 10 degrees C prior to, during, and 48 hours after completion of masonry work.
 - .2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.
- .2 Weather Requirements: CAN/CSA-A371 and International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

Part 2 Products

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
- .2 Cement:
 - .1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10) colour.
 - .2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type N and S.
 - .3 Packaged Dry Combined Materials for mortar: to CAN/CSA-A179, Type N and S, using gray colour cement.
- .3 Aggregate: supplied by one supplier.
 - .1 Use aggregate passing 1.18mm sieve where 6mm thick joints or less are indicated.
 - .2 Fine Aggregate: to CAN/CSA-A179, natural sand.
- .4 Mortar and grout: CAN/CSA-A179.
- .5 Water: clean and potable.
- .6 Lime:
 - .1 Hydrated Lime: to CAN/CSA-A179, Type S.

2.2 COLOUR ADDITIVES

- .1 Use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample. Admixtures approved prior to use. Use in accordance with specific manufacturer's recommendations.

2.3 MORTAR MIXES

- .1 Mortar for exterior masonry above grade:
 - .1 Load Bearing: type S based on proportion specifications.
 - .2 Non-Load Bearing: N based on proportion specifications.
- .2 Mortar for interior masonry:
 - .1 Load Bearing: type S based on proportion specifications.
 - .2 Non-Load Bearing: N based on proportion specifications.
- .3 Mortar for Parapet walls, chimneys, unprotected walls: type S based on proportion specifications
- .4 Pointing Mortar: CAN/CSA-A179, Type N using property specification with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
- .5 Parging Mortar: type to CAN/CSA-A179
- .6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on proportion specifications,

2.4 MORTAR MIXING

- .1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to within 1% accuracy.
- .2 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use
- .3 Maintain sand uniformly damp immediately before mixing process.
- .4 Add mortar colour and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.
- .5 Using anti-freeze compounds including calcium chloride or chloride based compounds is prohibited.
- .6 Adding air entraining admixture to mortar mix is prohibited.
- .7 Use a batch type mixer in accordance with CAN/CSA-A179
- .8 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.
- .9 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.
- .10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

2.5 GROUT MIXES

- .1 Bond Beams: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2 or mixed in accordance with CAN/CSA-A179 fine.
- .2 Lintels: grout mix 10 to 12.5 MPa strength at 28 days; 200-250 mm slump; premixed type in accordance with CSA A23.1/A23.2 or mixed in accordance with CAN/CSA-A179 fine.
- .3 Grout: Minimum compressive strength of 10 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179

2.6 GROUT MIXING

- .1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed
- .2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179 fine grout.
- .3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- .4 Using calcium chloride or chloride based admixtures is prohibited.

2.7 MIX TESTS

- .1 Testing Mortar Mix:
 - .1 Test mortar to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for mortar based on property specification. Test during construction for:
 - .1 Compressive strength.
 - .2 Consistency.
 - .3 Mortar aggregate ratio.
 - .4 Sand/cement ratio.
 - .5 Water content and water/cement ratio.
 - .6 Air content.
 - .7 Splitting tensile strength.
- .2 Testing Grout Mix:
 - .1 Test grout to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA-A179, for grout based on property specification. Test prior to construction and during construction for:
 - .1 Compressive strength.
 - .2 Sand/cement ratio.

- .3 Water content and water/cement ratio.
- .4 Slump.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- .2 Request inspection of spaces to be grouted.

3.2 PREPARATION

- .1 Plug clean-out holes with masonry units. Brace masonry for wet grout pressure.

3.3 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise
- .2 Apply parging in uniform coating not less than 10 mm thick , where indicated.

3.5 MIXING

- .1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes. Mixing by hand pre-approved by Consultant.
- .2 Clean mixing boards and mechanical mixing machine between batches.
- .3 Mortar: weaker than units it is binding.
- .4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

3.6 MORTAR PLACEMENT

- .1 Install mortar to manufacturer's instructions.
- .2 Install mortar to requirements of CAN/CSA-A179
- .3 Remove excess mortar from grout spaces.

3.7 GROUT PLACEMENT

- .1 Install grout in accordance with manufacturer's instructions.
- .2 Install grout in accordance with CAN/CSA-A179
- .3 Work grout into masonry cores and cavities to eliminate voids.
- .4 Installing grout in lifts greater than 400 mm, without consolidating grout by rodding is prohibited.
- .5 Displacing reinforcement while placing grout is prohibited.

3.8 FIELD QUALITY CONTROL

- .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:
 - .1 Test and evaluate mortar during construction in accordance with CAN/CSA-A179
 - .2 Test and evaluate grout during construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Clean masonry with low pressure clean water and soft natural bristle brush.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.10 PROTECTION

- .1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 73 13 - Cultured Stone Masonry

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel
 - .2 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
 - .3 ASTM A641/A641M-(R2014), Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- .2 CSA Group (CSA):
 - .1 CSA A23.1/A23.2-14 (R2015), Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry
 - .3 CAN/CSA-A370-14, Connectors for Masonry
 - .4 CAN/CSA-A371-14, Masonry Construction for Buildings
 - .5 CSA G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement
 - .6 CSA S304-14(R2015), Design of Masonry Structures
 - .7 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for anchorage and reinforcing materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance and requirements of Section 04 05 00 - Common Work Results for Masonry.

1.5 SITE MEASUREMENTS

- .1 Make site measurements necessary for proper fit of members.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect anchorage and reinforcing materials from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Bar reinforcement: Steel to CAN/CSA-A371 and CSA G30.18, Grade [400].
- .2 Connectors: to CAN/CSA-A370 and CSA S304.1.
- .3 Corrosion protection: to CSA S304.1, [galvanized] to CSA S304.1 and CAN/CSA-A370.
- .4 Fasteners: installed post-construction:
 - .1 Bolts and Screws: size and type to suit application, locate where indicated.
 - .2 Nails: case-hardened cut or spiral nails, size and type to suit fastening application.
 - .3 Powder-Driven Fasteners: pin styles and lengths to suit fastening application in accordance with manufacturers use, load and hold recommendations.
 - .4 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.
- .5 Ties: hot dip galvanized to CAN/CSA-A370 Table 5.2 steel finish.
 - .1 Adjustable Unit Ties: to CAN/CSA-A370: proprietary type ties, type, style and size to suit application in accordance with manufacturer's recommendations.
 - .2 Joint Reinforcement Ties: CSA A371 with corrosion protection to CSA S304 and CSA A370:
 - .1 Single Wythe Joint Reinforcement: truss type:
 - .1 Steel wire, hot dip galvanized: to ASTM A641, Class 3 1 after fabrication.
- .6 Anchors: to CAN/CSA-A370:
 - .1 Conventional Anchors: type steel bolts with bent bar anchors, sized to suit application.
- .7 Conventional Bolts:
 - .1 Bolts: to ASTM A36, bar stock shop threaded, bent bar anchors, [L] shaped.
 - .2 Plate anchors: steel to ASTM A36, weld square of circular steel plate perpendicular to axis of steel bar threaded on opposite end.
 - .3 Through bolt rods: to ASTM A307 threaded rod or threaded ASTM A36 bar stock.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by Reinforcing Steel Institute of Canada.
- .2 Fabricate connectors in accordance with CAN/CSA-A370.
- .3 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.
- .4 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.
- .5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

- .1 Upon request, provide Consultant with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum [5] weeks prior to commencing reinforcement work.

- .2 Upon request inform Consultant of proposed source of supplied material.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions remedied and after receipt of written approval to proceed from Consultant.

3.3 PREPARATION

- .1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.4 INSTALLATION

- .1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing concrete, grout or mortar, obtain Consultant's approval of placement of reinforcement and connectors.
- .3 Supply and install additional reinforcement to masonry as indicated.

3.5 BONDING AND TYING

- .1 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC), CSA S304.1, CAN/CSA-A371 and as indicated.
- .2 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371.
 - .1 Bond walls of two or more wythes using metal connectors in accordance with CAN/CSA-A371 and as indicated.
 - .2 Install horizontal joint reinforcement 400 mm on centre.
 - .3 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.
 - .4 Place joint reinforcement continuous in first and second joint below top of walls.
 - .5 Lap joint reinforcement ends minimum 150 mm.
 - .6 Connect stack bonded unit joint corners and intersections with strap anchors 400 mm on centre.

3.6 REINFORCED LINTELS AND BOND BEAMS

- .1 Reinforce masonry beams, masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA-A371, and CAN/CSA-A179.
- .3 Support and position reinforcing bars in accordance with CAN/CSA-A371.

3.7 GROUTING

- .1 Grout masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.8 ANCHORS

- .1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371 as indicated.

3.9 LATERAL SUPPORT AND ANCHORAGE

- .1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.10 MOVEMENT JOINTS

- .1 Reinforcement not continuous across movement joints unless otherwise indicated.

3.11 FIELD BENDING

- .1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.
- .2 When field bending authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars and connectors with cracks or splits.

3.12 SITE QUALITY CONTROL

- .1 Site inspections in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Obtain Consultant approval of placement of reinforcement and connectors, prior to placing mortar or grout.

3.13 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.14 CLEANING

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 73 13 - Cultured Stone Masonry

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness
 - .2 ASTM A 653/A 653M zinc coated steel.
- .2 CSA Group (CSA):
 - .1 CAN/CSA-A371-14, Masonry Construction for Buildings
 - .2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate on drawings:
 - .1 Flashing, installation details, sizes, spacing, location and quantities of fasteners.
- .4 Samples:
 - .1 Submit 2 samples of masonry accessories as follows:
 - .1 Flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Manufacturer's Instructions: submit manufacturer's instructions

1.5 SITE MEASUREMENTS

- .1 Make site measurements necessary to ensure proper fit of members.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect masonry accessories from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Movement joint filler: purpose-made elastomer durometer hardness to ASTM D2240 of size and shape indicated
 - .1 Material type: closed cell neoprene.
- .2 Lap adhesive: recommended by masonry flashing manufacturer.
- .3 Weep hole vents: purpose-made PVC, colour to match masonry.
- .4 Mechanical fasteners: recommended by flashing manufacturer to suit project requirements.
- .5 Flexible Membrane Flashing: Self adhered membrane consisting of a 1.2 mm (40 mLs) thick SBS rubberized asphalt compound, integrally laminated to a cross-laminated polyethylene film, over metal flashing.
- .6 Primer: as recommended by manufacturer.
- .7 Metal Flashing: Zinc coated steel, 0.61 thickness, commercial quality to ASTM A 653/A 653M with Z275 designated Zinc coating.
- .8 Mortar Net: open mesh to collect and suspend mortar droppings consisting of 90% open weave mesh in trapezoidal configuration connected by continuous bottom strip 75 mm high with insect barrier fabric attached to the face of the mortar net material. Mortar net shall be 254 mm high by 25 mm thick.
- .9 Pre-cast concrete sill with drip edge: As shown in Drawings, with minimum 4% slope away from wall/window. Lengths as indicated on drawing, with maximum continuous lengths.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 EXAMINATION

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

3.3 INSTALLATION: MATERIALS

- .1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.
- .2 Lap adhesive: apply adhesive to flashing lap joints.
- .3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.
- .4 Reglets: install reglets at locations indicated on drawings.
- .5 Brick vents: install brick vents at locations indicated on drawings.

3.4 INSTALLATION: MOISTURE CONTROL

- .1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.
- .2 Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.
- .3 Grout screens: install purpose made screens in cavities where indicated and as directed, size and shape to suit purpose and function.
- .4 Install one continuous row of mortar net at base of wall in cavity and over all wall openings directly on flashing with dovetail profile facing upward. Butt end together, compress slightly.

3.5 INSTALLATION: FLASHINGS

- .1 Build in flashings in masonry in accordance with CAN/CSA-A371
 - .1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at base of cavity wall and where cavity interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
 - .2 In cavity walls and veneered walls, carry flashings from front edge of exterior masonry, under outer wythe, then up backing minimum 150 mm, and as follows:
 - .1 For masonry backing embed or bond flashing 25 mm in joint.
 - .2 For glass fibre faced sheathing backing, bond to wall using manufacturer's recommended adhesive.
 - .3 Lap joints 150 mm and seal with adhesive.
- .2 Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.
- .3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.6 CLEANING

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 05 13 - Masonry Mortar and Grouting
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .4 Section 04 05 23 - Masonry Accessories

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA):
 - .1 CAN/CSA-A165 Series-04(R2009), CSA Standards on Concrete Masonry Units consists: A165.1, A165.2, A165.3
- .2 South Coast Air Quality Management District (SCAQMD):
 - .1 SCAQMD Rule 1168-05, Adhesive and Sealant Applications

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
 - .1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.
 - .2 Do not use brick tongs to move or handle masonry.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Do not double stack cubes of concrete unit masonry.
 - .3 Cover masonry units with non-staining waterproof membrane covering.
 - .4 Allow air circulation around units.
 - .5 Installation of wet or stained masonry units is prohibited.
 - .6 Keep concrete unit masonry in individual cardboard packaging provided by manufacturer until units are ready to be installed.
 - .7 Store and protect concrete unit masonry from nicks, scratches, and blemishes.
 - .8 Replace defective or damaged materials with new.

- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
- .1 Classification: H/15/A/M.
 - .2 Size: indicated on drawings
 - .3 Special shapes: provide bull-nosed units for exposed corners. Provide purpose-made shapes for lintels, beams and bond beams. Provide additional special shapes as indicated.

2.2 REINFORCEMENT

- .1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

2.3 CONNECTORS

- .1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

2.4 FLASHING

- .1 Flashing: in accordance with Section 04 05 23 - Masonry Accessories.

2.5 MORTAR MIXES

- .1 Mortar and mortar mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

2.6 GROUT MIXES

- .1 Grout and grout mixes in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

2.7 CLEANING COMPOUNDS

- .1 Use low VOC products in compliance with SCAQMD Rule 1168.
- .2 Compatible with substrate and acceptable to masonry manufacturer for use on products.
- .3 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.8 TOLERANCES

- .1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA-A165.1, supplemented as follows:
- .1 Maximum variation between units within specific job lot not to exceed 2 mm.
 - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
 - .3 Out of square tolerance not to exceed 2 mm.
- .2 Tolerances for architectural concrete masonry units in accordance with CAN/CSA-A165.1, supplemented as follows:
- .1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.
 - .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

- .3 Out of square tolerance not to exceed 2 mm.
- .4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

Part 3 Execution

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

- .1 Concrete block units:
 - .1 Bond: running.
 - .2 Coursing height: 200 mm for one block and one joint.
 - .3 Jointing: concave where exposed or where paint or other finish coating is specified.
- .2 Special Shapes:
 - .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.
 - .2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
 - .3 End bearing: not less than 200 mm as indicated on drawings.
 - .4 Install special site cut shaped units.

3.4 REINFORCEMENT

- .1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.5 CONNECTORS

- .1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.6 FLASHING

- .1 Install flashings: in accordance with Section 04 05 23 - Masonry Accessories.

3.7 MORTAR PLACEMENT

- .1 Place mortar in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

3.8 GROUT PLACEMENT

- .1 Place grout in accordance with Section 04 05 13 - Masonry Mortar and Grouting.

3.9 CONSTRUCTION

- .1 Cull out masonry units, in accordance with CAN/CSA-A165 and range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.
- .2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.
- .3 Construct masonry walls using running bond unless otherwise noted.
- .4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.
- .5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.
- .6 Install movement joints and keep free of mortar where indicated.
- .7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.
- .8 Solid Units: apply mortar over entire vertical and horizontal surfaces. Avoid bridging of airspace between brick veneer and backup wall with mortar.
- .9 Ensure compacted head joints. Use full or face-shell joint as indicated.
- .10 Tamp units firmly into place.
- .11 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.
- .12 Tool exposed joints concave weathered/raked for interior work; strike concealed joints flush.
- .13 After mortar has achieved initial set up, tool joints.
- .14 Do not interrupt bond below or above openings.

3.10 REPAIR/RESTORATION

- .1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.11 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Standard Concrete Unit Masonry:
 - .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.12 PROTECTION

- .1 Brace and protect concrete unit masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 05 13 - Masonry Mortar and Grout
- .3 Section 04 05 19 - Masonry Anchorage and Reinforcing
- .4 Section 04 05 23 - Masonry Accessories
- .5 Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A82/A82M, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
 - .2 ASTM A153/A153M, Standard Specification for Zinc Coated (Hot Dip) on Iron and Steel Hardware
 - .3 ASTM C73, Standard Specification for Calcium Silicate Brick (Sand-Lime Brick)
 - .4 ASTM C97, Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
 - .5 ASTM C99, Standard Test Method for Modulus of Rupture of Dimension Stone
 - .6 ASTM C144, Standard Specification for Aggregate for Masonry Mortar
 - .7 ASTM C150, Standard Specification for Portland Cement
 - .8 ASTM C170, Standard Test Method for Compressive Strength of Dimension Stone
 - .9 ASTM C270, Standard Specification for Mortar for Unit Masonry
- .2 CSA Group (CSA):
 - .1 CAN/CSA A179, Mortar and Grout for Unit Masonry
 - .2 CAN/CSA A370, Connectors for Masonry
 - .3 CAN/CSA A371, Masonry Construction for Buildings
 - .4 CAN/CSA-A3000, Cementitious Materials Compendium
- .3 International Masonry Industry (IMI):
 - .1 All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction
- .4 South Coast Air Quality Management District (SCAQMD), California State:
 - .1 SCAQMD Rule 1168-A, Adhesive and Sealant Applications

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Manufacturer's Instructions:
 - .1 Provide manufacturer's installation instructions in accordance with Section 04 05 10 - Common Work Results for Masonry.
- .4 Shop Drawings:
 - .1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Indicate stone patterns, coursing, bond ratio, and arrangement of joints.
 - .3 Indicate desired finish to stone surface.
 - .4 Show details of anchors, specify installation procedures.
- .5 Samples:

- .1 Provide unit samples in accordance with Section 04 05 10 - Common Work Results for Masonry.
- .2 Provide certificates in accordance with Section 04 05 10 - Common Work Results for Masonry
- .3 Test and Evaluation Reports: provide certified test reports in accordance with Section 04 05 10 - Common Work Results for Masonry.

1.4 QUALITY ASSURANCE

- .1 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 43 00 - Quality Assurance and to requirement of Section 04 05 10 - Common Work Results for Masonry, supplemented as follows:
 - .1 Construct mock-up panel of exterior stone construction 1200 x 1800 mm, to illustrate building stone bonding, mortar joints and movement control joints.
 - .2 Perform test cleaning on mock-up to ensure desired result as per article 3.14 Cleaning.
 - .3 If approved by Consultant, mock-up may remain as part of finished Work
- .2 Delivery, Storage, and Handling:
 - .1 Deliver, store and handle stone veneer masonry cladding in accordance with Section 04 05 10 - Common Work Results for Masonry, supplemented as follows:
 - .1 Stack units on timbers or platforms at least 75 mm above grade.
 - .2 Place polyethylene or plastic film between wood and other finished surfaces of units when stored for extended periods of time.
 - .3 Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.5 AMBIENT CONDITIONS

- .1 Meet or exceed requirements of CAN/CSA A371.
 - .1 Maintain mortar temperature between 5 and 50 degrees C until used.
- .2 Maintain materials and surrounding air temperature to minimum 10 degrees C prior to and 48 hours after completion of masonry work.
- .3 Cold Weather Requirements: IMI - All Weather Council: Recommended Practices and Specifications for Cold Weather Masonry Construction.

Part 2 Products

2.1 MORTAR MATERIALS

- .1 Mortar: to Section 04 05 12 - Masonry Mortar and Grout.
- .2 Portland Cement: to CAN/CSA-A3000, Type [GU].
- .3 Hydrated Lime: to ASTM C207, Type SA.
- .4 Mortar Aggregate: to CAN/CSA A179, standard masonry type; clean, dry, protected against dampness, freezing, and foreign matter.
- .5 Colour Pigment: natural oxide pigment.
- .6 Water: potable, clean and free of deleterious amounts of acids, alkalies or organic materials.

2.2 MANUFACTURED UNITS

- .1 Cultured Stone Units: to ASTM C73 calcium silicate, Grade SW, solid units that have been pressure formed and autoclaved, finished on exposed faces; 90mm thick, with mixed heights and lengths as per manufacturer's standard modular sizes: Minimum of 10 different sizes, with minimum of three different heights.

- .1 Texture: Tumbled finish on exposed faces and ends.
- .2 Unit to consist of minimum 50% recycled content, as verified by a third-party.
- .3 Acceptable Products:
 - .1 Brampton Brick Artiste 2; Colour: "Picasso"
 - .2 No alternates will be accepted.
- .2 Mortar: 1:1:6 Portland cement-hydrated lime-sand mix, as specified in Section 04 15 12 - Masonry Mortar and Grout.
- .3 Grout: 45 MPa at 28 days, as specified in Section 04 15 12 - Masonry Mortar and Grout.
- .4 Wall Ties and anchorage: As specified in Section 04 05 19 - Masonry Anchorage and Reinforcing.
- .5 Joint sealant and backer rod: As specified in Section 07 92 10 - Joint Sealing.
- .6 Flashing, vents, and masonry accessories: as specified in Section 04 05 23 - Masonry Accessories.

2.3 MORTAR MIXING

- .1 Thoroughly mix mortar ingredients in proper quantities needed for immediate use to requirements of CAN/CSA A179.
- .2 Add mortar colour and admixtures to requirements of manufacturer's instructions.
- .3 Provide uniformity of mix and colouration.
- .4 Start masonry work only after mortar is tested and approved by Consultant.
- .5 Take representative samples for testing consistency of strength and colour according to CAN/CSA A179.
- .6 Use mortar within 2 hours after mixing at temperatures of 26 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that site conditions are ready to receive Work.
- .2 Inspect materials for fit and finish prior to installation. Do not set unacceptable units.
- .3 Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

- .1 Supply metal anchors and connectors to Section 04 05 19 - Masonry Anchorage and Reinforcing for placement. Direct correct placement.
- .2 Verify items provided by other sections of work are properly sized and located.

3.3 INSTALLATION/TOLERANCES

- .1 To CAN/CSA A371 unless noted below.
- .2 Variation in alignment from unit to adjacent unit: 1.5 mm maximum.
- .3 Variation of mortar joint thickness: 3 mm every metre.

3.4 CUTTING OF BUILDING STONE

- .1 Cut building stone with wet-saw.
- .2 Pre-soak units using clean water prior to cutting.
- .3 Clean cut units using stiff fibre brush and clean water. Allow units to surface dry prior to placement.
- .4 Finish cut edges to match face when exposed in wall.

3.5 COURSING

- .1 Place building stone to lines and levels indicated.

- .2 Lay units in random bond.
- .3 Lay building stone units to bond ratio as approved during shop drawing review.
- .4 Make vertical and horizontal joints equal and of uniform thickness.
- .5 Maintain mortar joint thickness of 10 mm.
- .6 Tool joints when thumb print hard to a concave finish.

3.6 PLACING AND BONDING

- .1 Lay building stone in full bed of mortar, properly jointed with other Work. Buttering corners of joints, and deep or excessive furrowing of mortar joints and is not permitted.
- .2 Fully bond intersections, and external corners.
- .3 Do not adjust building stone units after laying. Where resetting of units is required, remove, clean units and reset in new mortar.

3.7 REINFORCING

- .1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.8 CAVITY WALL

- .1 Install weep hole vents in veneer at 610 mm on centre horizontally above through-wall flashing, and at bottom of walls.
- .2 Install vents at [top of cavity space] at same spacing as weep holes.

3.9 CONNECTORS

- .1 Embed wall ties in masonry back-up or attached to wall sheathing for veneer at maximum 407 mm on centre vertically and 610 mm on centre horizontally. Place at maximum 75 mm on centre each way around perimeter of openings, within 305 mm of openings.
- .2 Reinforce joint corners and intersections with strap anchors 407 mm on centre.

3.10 FLASHING

- .1 Extend flashing through veneer, turn up and bed into mortar joint of masonry or seal into sheathing over steel stud framed back-up.
- .2 Lap end joints and seal watertight.
- .3 Install flashing over foundation walls supporting stone, over lintels built into masonry and above roof flashing.

3.11 END DAMS

- .1 Install end dams at longitudinal ends of flashing over lintels, at column abutments, adjacent to building expansion joints, or other flashing interruptions.
- .2 Extend end of flashing beyond opening to accommodate prefabricated end dam or alternately extend flashing 100 mm beyond opening and turn up the end to form end dam.
- .3 Install end dam in heavy bed of mastic, compatible with flashing materials.

3.12 LINTELS

- .1 Install loose steel lintels as scheduled.
- .2 Provide minimum 200 mm bearing at each side of openings.

3.13 MOVEMENT EXPANSION JOINTS

- .1 Do not continue horizontal joint reinforcing across movement/expansion joints.

- .2 Form movement/expansion joints by leaving head joints between stacked units void of mortar, ready for application of bond breaker and joint sealant.
- .3 Size joint in accordance with Section 07 92 10 - Joint Sealants for sealant performance.

3.14 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Clean building stone as Work progresses. Allow mortar droppings on masonry to partially dry then remove by means of brushing with stiff fibre brush.
- .3 Use alternative cleaning solutions and methods for difficult to clean building stone only after consultation with building stone manufacturer.
- .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 00 - Construction/Demolition Waste Management and Disposal.

3.15 PROTECTION

- .1 Protect building stone from damage resulting from subsequent construction operations.
- .2 Use protection materials and methods which will not stain or damage building stone units.
- .3 Remove protection materials upon Substantial Performance of Work, or when risk of damage is no longer present.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals
- .2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA):
 - .1 Handbook of the Canadian Institute of Steel Construction
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel
- .3 CSA Group (CSA):
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles
 - .3 CAN/CSA-S16-14, Limit States Design of Steel Structures
 - .4 CAN/CSA-S136-16, North American Specifications for the Design of Cold Formed Steel Structural Members
 - .5 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel
 - .6 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding
 - .7 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings
 - .8 CSA W59-18, Welded Steel Construction (Metal Arc Welding)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Erection drawings:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
- .4 Fabrication drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Province of Ontario, Canada.
- .5 Fabricator Reports:

- .1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.
 - .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Ontario, Canada for non standard connections.

2.2 MATERIALS

- .1 Structural Steel: To CSA-G40.20/G40.21 as indicated and CAN/CSA-S136.
- .2 Anchor Bolts: To CSA-G40.20/G40.21, Grade A307W.
- .3 Bolts, nuts and washers: to ASTM A325M
- .4 Welding Materials: To CSA W59 and certified by Canadian Welding Bureau.
- .5 Shop Paint Primer: To CISC/CPMA2-75 solvent reducible alkyd, grey.
- .6 Hot Dip Galvanizing: Galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².

2.3 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by where indicated.
- .3 Provide holes in top flanges attachment of wood nailers.

2.4 SHOP PAINTING

- .1 Clean, prepare surfaces, and shop prime structural steel in accordance with CAN/CSA-S16 CAN/CSA-S136 except where members to be encased in concrete.

- .2 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .4 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .5 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 GENERAL

- .1 Structural Steel Work: In accordance with CAN/CSA-S16.
- .2 Welding: in accordance with CSA W59
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components

3.2 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Consultant for direction before commencing fabrication.

3.3 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.
- .2 Site cutting or altering structural members: to approval of Consultant.
- .3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.4 SITE QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Consultant.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Consultant.
- .3 Submit test reports to Consultant within 1 week of completion of inspection.
- .4 Owner will pay costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .5 Test shear studs in accordance with CSA W59

3.5 SITE PAINTING

- .1 Paint in accordance with Section 09 91 13 - Interior Painting.
 - .1 Touch-up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
- .2 Waste Management: Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 ASTM A53/A53M Standard specification for pipe, steel, black and hot-dipped, zinc-coated, welded and seamless
- .2 ASTM A307 Standard specification for carbon steel bolts, studs, and threaded rod 60,000 PSI tensile strength
- .3 CSA W48 Filler metals and allied materials for metal arc welding
- .4 CSA W59 Welded steel construction
- .5 CSA W59.2 Welded aluminum construction
- .6 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .7 CSA-S16, Design of Steel Structures.
- .8 CAN/CGSB-1.181, Ready-Mixed, Organic Zinc-Rich Coating.
- .9 CAN/CGSB-1.40

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada where indicated.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.3 INFORMATIONAL SUBMITTALS

- .1 Section 01 33 00: Submission procedures.

Part 2 Products**2.1 MATERIALS - STEEL**

- .1 Steel Sections and Plates: CSA-G40.20/G40.21, Grade 300W.
- .2 Steel Pipe: ASTM A53/A53M, Standard Weight.
- .3 Welding Materials: Type required for materials being welded.
- .4 Welding Electrodes: to CSA-W48 Series.
- .5 Bolts and anchor bolts: to ASTM A 307
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .7 Maximize % recycled content.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating to CAN/CSA-G164.
- .2 Shop coat primer: to CAN/CGSB-1.40.
- .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.5 SHOP PAINTING

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

2.6 ANGLE LINTELS

- .1 Fabricated from CSA G40.21, Grade 350W, size and location as shown, width to be not less than 25mm less than width of wall and extend 200mm beyond opening at each end. Unless otherwise shown, fabricate lintels in block walls of steel sections.
- .2 Weld or bolt back-to-back angles to profiles as indicated.
- .3 Finish: shop painted.

2.7 MASONRY LATERAL SUPPORT ANCHORS

- .1 Supply only to Division 04, Masonry for installation, all horizontal lateral support anchors at top of non-load bearing masonry walls.
- .2 Refer to Structural drawings for size and spacing of required support anchors. Provide drilled holes as required for anchorage.
- .3 Galvanized finish for all exterior wall and unheated and high humidity locations, including washrooms, janitor rooms and mechanical rooms.

2.8 STEEL LADDERS

- .1 Fabricate complete with steel stiffeners, rungs, angle rails, bent plate straps, or angle brackets. Ladder in elevator pit shall extend 1220 mm above finish floor.
- .2 Prime paint finish for interior, for finish painting by Section 09 91 23 - Painting.

2.9 COUNTER SUPPORTS

- .1 Provide cantilevered supports for vanity counters. Construct supports of 38 x 38 x 6 steel angles as detailed.
- .2 Provide all drill holes required for concealed anchorage of counters and for anchoring to building structure.
- .3 Prime paint finish for interior, for finish painting by Section 09 91 23 - Painting.

2.10 BOLLARDS

- .1 Supply 2400 long 150 mm dia. steel cassettes for mounting and filling with concrete.
- .2 Apply zinc rich primer to bollards.

2.11 OVERHEAD DOOR FRAMES

- .1 Supply 6 mm formed steel overhead door frames as detailed.

- .2 Provide welded slots for masonry anchors @ 600 mm o.c.
- .3 Temporarily brace in place, remove following masonry installations.

2.12 METAL FLOOR GRATING

- .1 Supply and install Galvanized metal for grating complete with perimeter angle and anchor as detailed on drawings.

2.13 METAL BENCH SUPPORTS

- .1 Fabricate bench stands with 25 mm HSS heavy walled tubing as detailed. All corners to be mitered. All open ends of HSS to receive cont. welded caps. Grind all edges smooth.
- .2 Prime paint finish for interior, for finish painting by Section 09 91 23 - Painting.

2.14 STAINLESS STEEL SUN CONTROL DEVICE PLATES

- .1 Fabricate stainless steel plates for the connection of suspended control device to steel columns.
- .2 Fabricate to the Sun Control Device Manufacturer's standards.
- .3 Refer to Section 10 71 13 - Sun Control Devices

Part 3 Execution

3.1 EXAMINATION

- .1 Section 01 71 00: Verify existing conditions before starting work.
- .2 Verify that field conditions are acceptable and are ready to receive work.
- .3 Verify dimensions, tolerances, and method of attachment with other work.

3.2 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Provide components for building by other sections in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16, or weld.
- .7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 CSA A123.3 Asphalt saturated organic roofing felt
- .2 CSA B111, Wire Nails, Spikes and Staples.
- .3 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 CSA O80 SERIES Wood preservation
- .5 CSA O141 Canadian standard lumber
- .6 CSA O151 Canadian softwood plywood
- .7 CSA O325 Construction sheathing
- .8 CAN/CSA-Z809-08, Sustainable Forest Management.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board and FSC.
- .2 Plywood, OSB and wood based composite panels in accordance with CSA, FSC and ANSI standards.
- .3 Plywood, OSB and wood based composite panel construction sheathing identification: by grademark in accordance with applicable CSA Standards

1.4 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products**2.1 MATERIALS**

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 CAN/CSA-Z809 or FSC or SFI certified.
- .2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 Board sizes: "Standard" or better grade.
 - .2 Dimension sizes: "Standard" light framing or better grade.
 - .3 Post and timbers sizes: "Standard" or better grade.
- .3 Panel Materials:

- .1 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.
- .3 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.
- .4 Pressure Treated Lumber: Garbage enclosure panels, all curbs, parapets and blocking around windows shall be S-P-F- No. 2 Factory Treated with preservative to CSA 080. All pressure treated wood on Garbage enclosure to be brown in colour instead of green.

2.2 ACCESSORIES

- .1 Fasteners: to CAN/CSA-G164, for exterior work and interior highly humid areas. Fasteners to be compatible with pressure- treated wood.
- .2 Nails, spikes and staples: to CSA B111.
- .3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.
- .5 Transition membrane: self adhering membrane compatible with system products on project.
 - .1 Acceptable product: Henry Blueskin Butyl Flash or Soprema Sopraseal Stick 1100 TC.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Comply with requirements of National Building Code of Canada (NBC), supplemented by the following paragraphs.
- .2 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding and other work as required.
- .3 Align and plumb faces of furring and blocking to tolerance of 1:600.
- .4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .6 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.
- .7 Install sleepers as indicated.
- .8 Use caution when working with particle board. Use dust collectors and high quality respirator masks.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .10 Countersink bolts where necessary to provide clearance for other work.
- .11 Install transition membrane to areas indicated on drawings.

3.3 CLEANING

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/BHMA A156.9-2010, Cabinet Hardware.
 - .2 ANSI/BHMA A156.11-2014, Cabinet Locks.
 - .3 ANSI A208.1-09, Particleboard.
 - .4 ANSI/HPVA HP-1-10, Standard for Hardwood and Decorative Plywood.
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
 - .1 Architectural Woodwork Standards (AWMAC AWS), 2014.
- .3 ASTM International (ASTM)
 - .1 ASTM F1667-13 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
- .5 CSA Group (CSA)
 - .1 CSA O121-08(R2013), Douglas Fir Plywood.
 - .2 CSA O151-14, Canadian Softwood Plywood.
- .6 National Electrical Manufacturers Association (NEMA)
 - .1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

1.2 PREINSTALLATION MEETING

- .1 Before enclosing framing, convene a meeting of contractor, casework fabricator, casework installer, framing subcontractor and Consultant.
 - .1 Review locations of backing required for casework installation as shown on shop drawings and as necessary for installation.
 - .2 Review method of attachment for backing to wall system.
 - .3 Review coordination with other affected sections.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Hardware List:
 - .1 Submit hardware list cross-referenced to specifications.
 - .2 Include manufacturer's specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.
- .3 Shop Drawings:
 - .1 Prepare and submit shop drawings in accordance with AWMAC AWS and as follows.
 - .2 Submit electronic copy of shop drawings for review in accordance with requirements of Division 01.
 - .3 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .4 Indicate materials, thicknesses, finishes and hardware.
 - .5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
 - .6 Show location on casework elevations of backing required in supporting structure for attachment of casework.
 - .7 Indicate AWMAC AWS quality grade where different from predominant grade specified.

- .8 Include color schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.
- .4 Samples:
 - .1 Prepare and submit samples in accordance with AWMAC AWS and as follows.
 - .2 Apply sample finishes to specified substrate or core material minimum 300 x 300 mm to match [designer] sample. For veneers with transparent finish submit three samples to illustrate range and colour of grain expected.
 - .3 Submit duplicate samples of laminated plastic for each specified colour selection.
 - .4 Submit duplicate samples of laminated plastic joints, edging, cutouts and post-formed profiles.

1.4 QUALITY ASSURANCE

- .1 Perform Work of this Section by single architectural wood casework fabricator with minimum 5 years of current architectural casework production experience and having completed minimum one project in the past 5 years with value within 20% of the cost of the work of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.
- .3 Protect millwork against dampness and damage during and after delivery.
- .4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by AWMAC AWS for location of project.
- .5 Store materials indoors in clean, dry, well-ventilated area.
- .6 Protect architectural woodwork and hardware from nicks, scratches, and blemishes.
- .7 Replace defective or damaged materials with new.
- .8 Waste Management: for packaging and materials, in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 QUALITY GRADE

- .1 Provide all materials and perform all fabrication in accordance with AWMAC AWS Custom Grade and as follows, except where specified otherwise:
- .2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.2 LUMBER

- .1 Softwood and Hardwood Lumber: Sound lumber to specified AWMAC AWS quality grade requirements, kiln-dried to moisture content recommended by AWMAC AWS for location of the Work
- .2 Machine stress-rated lumber is acceptable for all purposes.

2.3 PANEL MATERIALS

- .1 Interior mat-formed wood particleboard: to ANSI/NPA A208.1, industrial grade M-2 or M-3, medium density (640-800 kg/m³), thickness 19 mm unless indicated otherwise.
 - .1 Use moisture resistant grade 2-M-2 or 2-M-3 for countertops and splash-backs to receive plumbing fixtures.

- .2 Douglas fir plywood (DFP): to CSA O121, standard construction
- .3 Hardwood plywood: to ANSI/HPVA HP-1.
- .4 Canadian softwood plywood (CSP): to CSA O151, standard construction
- .5 Hardboard: To CAN/CGSB-11.3

2.4 LAMINATED PLASTIC MATERIALS

- .1 Laminated plastic for flatwork: to NEMA LD3
 - .1 High pressure decorative laminated (HPDL) plastic.
 - .1 Type: GP (general purpose).
 - .2 Horizontal Surfaces: HGS to suit application, 1.2 mm thick.
 - .3 Vertical Surfaces: VGL to suit application, 0.71 mm thick.
 - .4 Colour: as selected by Consultant.
 - .5 Pattern: woodgrain.
 - .6 Finish: satin.
 - .2 Edge finishing for doors, drawer fronts, shelves and false fronts:
 - .1 HPDL to match face.
 - .2 PVC: solid colour to match face, 3 mm thick.
 - .3 Edges dadoed or saw kerfed to take plastic "T" moulding in width and colour to match face.
 - .3 Laminated plastic adhesive:
 - .1 Adhesive: contact adhesive to CAN/CGSB-71.20 and as recommended by manufacturer.

2.5 CASEWORK FABRICATION - GENERAL

- .1 Fabricate casework of specified core and surface finish materials to specified AWMAC AWS quality grade and as detailed
- .2 Set nails and countersink screws apply wood filler to indentations, sand smooth and leave ready to receive finish.
- .3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .4 Shelving to cabinetwork to be adjustable unless otherwise noted.
- .5 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .7 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

2.6 LAMINATED PLASTIC CASEWORK FABRICATION

- .1 Do laminated plastic fabrication in compliance with NEMA LD3, Annex A and specified AWMAC AWS quality grade
- .2 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Keep joints 600 mm from sink cutouts.
- .4 Form shaped profiles and bends as indicated, using post-forming grade laminate to laminate manufacturer's instructions.
- .5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

2.7 CABINET HARDWARE

- .1 Cabinet hardware: to AWMAC AWS quality grade specified and to ANSI/BHMA A156.9, designated by letter B and numeral identifiers as listed below

- .2 Finish:
 - .1 Exposed hardware: brushed nickel.
 - .2 Semi-exposed hardware: Manufacturer's standard finish.
- .3 Shelf standards and supports: 16mm aluminum recessed shelf standards with 12 mm divisions.
 - .1 Clips: bright zinc plated, adjustable height shelf supports.
- .4 Casework door hinges: concealed European style Grade II hinges minimum [120°] opening.
- .5 Pulls: D type, 100 mm wide, 33 mm projection, brushed nickel finish.

2.8 CABINET LOCKS

- .1 Provide locks as shown on elevations.
- .2 Cabinet locks: to ANSI/BHMA A156.11, designated by letter E and numeral identifiers as listed below
 - .1 Door or drawer locks: surface mounted
- .3 Keying: Keyed as scheduled.
 - .1 Stamp keying code numbers on keys and cylinders.

2.9 ACCESSORIES

- .1 Wood screws: type and size to suit application.
- .2 Nails and staples: to CSA B111 and ASTM F1667
- .3 Splines: metal.
- .4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install architectural wood casework in accordance with AWMAC AWS grade for respective items
- .2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.
- .3 Install prefinished millwork at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
- .4 Fasten and anchor millwork securely.
 - .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.
- .5 Countersink mechanical fasteners at exposed and semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.
- .6 Use draw bolts in countertop joints.
- .7 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.
- .8 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

- .9 Apply moisture barrier between wood framing members and masonry or cementitious construction.
- .10 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .11 Make cutouts for inset equipment and fixtures using templates provided.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Clean millwork and cabinet work, inside cupboards [and][drawers] and outside surfaces.
 - .2 Remove excess glue, pencil and ink marks from surfaces.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

3.4 PROTECTION

- .1 Protect millwork and cabinet work from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 46 19 - Metal Siding
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim

1.2 REFERENCE STANDARDS

- .1 Underwriters Laboratories of Canada (ULC):
 - .1 CAN/ULC-701.1:2017, Standard for Thermal Insulation, Polystyrene Boards

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of other Subcontractors adjacent and penetrating board insulation which must be completed before or after insulation work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product literature, and data sheets for each type of board insulation. Include product characteristics, performance criteria, physical sizes, and limitations.

Part 2 Products**2.1 INSULATION**

- .1 Extruded polystyrene (XPS): To CAN/ULC-701, for applications above grade,
 - .1 Type: 3.
 - .2 Compressive strength: Minimum 172 kPa.
 - .3 Board thickness: As indicated on Drawings.
 - .4 Size: 610 x 2440mm.
 - .5 Edges: square.
- .2 Extruded Polystyrene (XPS): To CAN/ULC-701, for applications below grade.
 - .1 Type: 4.
 - .2 Compressive strength: Minimum 172 kPa.
 - .3 Board Thickness: As indicated on Drawings.
 - .4 Size: 610 x 2440mm
 - .5 Edges: shiplapped.
- .3 Extruded Polystyrene (XPS): To CAN/ULC-701, for applications Slab-on-Grade.
 - .1 Type: 4.
 - .2 Compressive strength: Minimum 210 kPa.
 - .3 Board Thickness: As indicated on Drawings.
 - .4 Size: 610 x 2440mm
 - .5 Edges: shiplapped.

2.2 ACCESSORIES

- .1 Mechanical fasteners for foundation walls: impale type, neoprene serrated 50 mm dia. head, length to suit insulation.
- .2 Mechanical fasteners: screw type with plastic washers, length to suit insulation.
- .3 Refer to Section 04 05 19 Masonry Anchorage and Reinforcing for holding of insulation at masonry veneer.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: Verify that conditions of substrate previously installed are clean, dry, smooth, and acceptable for application of board insulation in accordance with manufacturer's instructions.
 - .1 Inspect substrates
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Spray foamfill all gaps for full thickness. Trim flush.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Install insulation in complete major sections of approximate maximum 7 days exposure, maximizing section areas available for simultaneous review. Coordinate simultaneous review times for adjacent sections of air/vapour barrier.
- .8 Any unauthorized covering will be required to be removed for air/vapour barrier examination.

3.4 INSTALLATION - RIGID INSULATION

- .1 Secure insulation boards with clips and disks spacing as recommended by manufacturer.
- .2 Ensure that any holes or gaps have been covered and the air/vapour barrier is complete and continuous.
- .3 Using a sharp edged knife, trim all pieces of insulation to fit flush with adjacent surfaces. Gaps greater than 1/8" are to be filled with similar insulating material.

3.5 INSTALLATION - PERIMETER FOUNDATION INSULATION

- .1 Interior application: Extend boards vertically below slab as indicated
- .2 Under slab application: Extend boards as indicated. Lay boards on level compacted fill.

3.6 CLEANING

- .1 Progress Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 - Board Insulation.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C1320-20, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction
 - .2 ASTM E 492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
 - .3 ASTM E413-16, Classification for Rating Sound Insulation
- .2 CSA Group (CSA):
 - .1 CSA B149 PACKAGE-20, Consists of B149.1, Natural Gas and Propane Installation Code and B149.2, Propane Storage and Handling Code
- .3 Underwriters Laboratories of Canada (ULC):
 - .1 ULC 604, Standard for Factory-Built Type A Chimneys (CAN/ULC-S604-16)
 - .2 ULC 702, Standard for Mineral Fibre Insulation for Buildings (CAN/ULC-S702-15)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Submit manufacturer's instructions, product literature and data sheets for blanket insulation. Include product characteristics, performance criteria, physical sizes, and limitations.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in a clean dry location and in accordance with manufacturer's recommendations.
 - .2 Store and protect blanket insulation from damage
- .4 Packaging Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products**2.1 INSULATION**

- .1 Batt and blanket mineral fibre: Non-combustible, stone wool batt insulation to CAN/ULC-S702.
 - .1 Type: 1.
 - .2 Thermal Resistance: as indicated
 - .3 Thickness: as indicated.
- .2 Fibrous Glass Acoustical Insulation: Un-faced, to ASTM E413 and ASTM E492.
 - .1 Thickness: as indicated on Drawings.

- .2 Acoustic batt insulation to be composed of preformed inorganic fibres and bonded with thermosetting resin to controlled density and thickness conforming to CAN/ULC S702-97.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: Verify that conditions of substrate previously installed are acceptable for blanket insulation application in accordance with manufacturer's instructions.
 - .1 Verify all in wall construction is complete.
 - .2 Visually inspect substrate.
 - .3 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.3 INSULATION INSTALLATION

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CSA B149.1 and CSA B149.2[Type B][and][L] vents.
- .5 Do not enclose insulation until it has been reviewed and is acceptable by Consultant.

3.4 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 ASTM International (ASTM):
 - .1 ASTM E1643-18a, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
 - .2 ASTM E1745-17, Standard Specification for Plastic Water Vapour Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 QUALITY ASSURANCE

- .1 Mock-Ups:
 - .1 Construct mock-ups at each exterior wall, roof, opening head/sill/jamb condition.
 - .2 Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box.
 - .3 Mock-up will be used to judge quality of work, substrate preparation, and material application.
 - .4 Consultant will require minimum 24 hours to review the mock-up.
 - .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store and protect specified materials from damage.
 - .2 Replace defective or damaged materials with new.

Part 2 Products**2.1 SHEET VAPOUR BARRIER**

- .1 Polyethylene film: to CAN/CGSB-51.34, 6 mm thick.
- .2 Underslab Plastic Sheet Vapour Retarder: High density, puncture resistant polyolefin resin sheet in accordance with ASTM E1745 and CAN/CGSB-51.34, and as follows:
 - .1 Acceptable material: Perminator 15 mil by W.R. Meadows.
- .3 Thru Wall Flashing: acceptable product - Bakor TWF or equal.
- .4 Air Barrier: acceptable product - Tyvek HomeWrap or equal.
- .5 Transition membrane: Henry Blueskin Butyl Flash or equal.

2.2 ACCESSORIES

- .1 Fasteners: Provide non-corrosive metal screws, nails, plastic clips and other fasteners as recommended by vapour retarder manufacturer required for complete installation of Work.
- .2 Joint sealing tape: High density, air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 100 mm wide.
- .3 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer.
- .4 Staples: minimum 6 mm leg.
- .5 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Ensure services are installed and inspected before installation of retarder.
- .2 Install sheet vapour retarder on warm side of exterior wall and floor assemblies before installation of gypsum board to form continuous retarder.
- .3 Use sheets of largest practical size to minimize joints.
- .4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.3 EXTERIOR SURFACE OPENINGS

- .1 Cut sheet vapour retarder to form openings and ensure material is lapped and sealed to frame.

3.4 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
 - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .2 Lap sheet over sealant and press into sealant bead.
 - .3 Install staples through lapped sheets at sealant bead into wood substrate.
 - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 LAP JOINT SEALS

- .1 Seal lap joints of sheet vapour barrier as follows:
 - .1 Attach first sheet to substrate.
 - .2 Apply continuous bead of sealant over solid backing at joint.
 - .3 Lap adjoining sheet and press into sealant bead in accordance with manufacturer's requirements.
 - .4 Install staples through lapped sheets at sealant bead into wood substrate.
 - .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.6 ELECTRICAL BOXES

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
 - .1 Install moulded box vapour barrier. Wrap boxes with film sheet providing minimum 300 mm perimeter lap flange.
 - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

3.7 INSTALLATION: UNDERSLAB SHEET VAPOUR BARRIER

- .1 Install vapour barrier in accordance with manufacturer's written instructions and ASTM E1643, and generally as follows:
 - .1 Unroll vapour barrier with the longest dimension parallel to direction of concrete placement.
 - .2 Lap vapour barrier onto face of grade beams.
 - .3 Overlap joints in accordance with manufacturer's requirements.
 - .4 Seal penetrations including pipe and conduit risers in accordance with manufacturer's written instructions.
 - .5 Make no additional penetrations except as required for placing of reinforcing steel and permanent utilities.
- .2 Repair damaged areas by cutting patches of vapour barrier membrane; sized to overlap damaged area, and tape all sides using manufacturer's required tape.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning upon completion.
 - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.
- .3 Waste Management: perform in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 - Board Insulation
- .2 Section 07 62 00 - Sheet Metal Flashing and Trim
- .3 Section 07 92 00 - Joint Sealants

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A653/A653M-18, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM D2369-10- 2015e1, Test Method for Volatile Content of Coatings
 - .3 ASTM D2832- 92(2016), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: Product literature and data sheets for steel siding, including product characteristics, performance criteria, physical sizes, finishes, and limitations.
- .3 Shop drawings:
 - .1 Submit drawings in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, furring, and related work.
- .4 Samples:
 - .1 Samples for initial selection: Representing manufacturer's standard range of available colours, patterns, textures and finishes.
 - .1 Submit samples for:
 - .1 steel siding
 - .2 soffits

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance data:
 - .1 Include, in the operation and maintenance manual, manufacturer's maintenance instructions and recommended cleaning materials and methods.
- .3 Warranty Documentation: submit warranty documents specified.

1.5 QUALITY ASSURANCE

- .1 Mock-ups: Erect in accordance with Section 01 45 00 - Quality Control.
- .2 Provide site mock-up for work of this Section indicating methods and materials, and procedures proposed to achieve final results in accordance with Section 01 45 00 - Quality Control, and to comply with following requirements, using materials indicated for completed work:
 - .1 Build mock-ups in location and of size as directed by Consultant.
 - .2 Obtain Consultant's acceptance of mock-ups before starting construction; mock-up used throughout construction period as standard of acceptance for subsequent work.
 - .3 Mock-up may form part of permanent structure when accepted by Consultant; repair or replace unacceptable mock-ups at no additional cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and:
 - .1 Deliver and store cartons flat and supported along entire length.
 - .2 Store materials off ground, out of weather, in dry place. Provide ventilation. Protect from falling objects and construction activities.
 - .3 Store and protect steel siding from nicks, scratches, and blemishes
 - .4 Replace defective or damaged materials with new.
- .2 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding, and packaging materials as specified in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 SITE CONDITIONS

- .1 Execute work of this Section within environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer.

1.8 WARRANTY

- .1 Manufacturer's warranty: Submit, for Consultant acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

Part 2 Products**2.1 MATERIALS**

- .1 Prefinished metal Siding Type 1: Acceptable Products
 - .1 Vicwest AD300R (22 gauge), Colour: 55174 Deep Grey
 - .2 Agway HF-12F, Colour: QC# 28314 Deep Grey
- .2 Prefinished metal Siding Type 2: Acceptable Products
 - .1 Vicwest Bellara Plank , Classic Woods Finishes (Expressence), colour Mountain Cedar 18-2772.
- .3 Isolation Clips: minimum 1.2 mm thick formed, adjustable, 50mm & 100mm offset as shown in drawings, 150 mm long, stainless steel or alternate: galvanized steel adjustable 50mm & 100mm offset as shown in drawings 150 mm long with thermal isolator attached to clip.
- .4 Girts: minimum 1.2 mm thick formed, 25 mm offset, galvanized steel to ASTM A653.
- .5 Insulation: Section 07 21 13 - Board Insulation.
- .6 Fasteners: galvanized for concealed fastening.
- .7 Steel fascia facings and exposed trim: Thickness, colour and finish to match siding.
- .8 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
- .9 Prefinished Metal Soffit: Vicwest Bellara Plank
 - .1 Metal Sheet: zinc coated (galvanized) sheet steel to ASTM A653/A653 with a minimum metallic coating designation Z275.
 - .2 Preformed metal thickness: 0.59mm (24 gauge) nominal steel thickness.
 - .3 Exposed preformed steel profile:
 - .1 Siding length: 3657.6mm
 - .2 Plank 135
 - .1 Perforated pattern: 3175 mm x 12.7mm @19.05mm. Shop-applied, pre-punched (where indicated on drawings)
 - .2 Non-perforated (where indicated)
 - .4 Colour: Classic Woods Finishes (Expressence), colour Mountain Cedar 18-2772.

2.2 ACCESSORIES

- .1 Exposed flashing and trim: Inside corners, outside corners, cap strips, drip caps, undersill trim, starter strips, and window/door trim as indicated on Drawings and in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
 - .1 Refer to elevations for colours.
- .2

Part 3 Execution

3.1 EXAMINATION

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

3.2 PREPARATION

- .1 Clean surfaces thoroughly before installation.
- .2 Repair substrate flaws or defects before applying siding or soffits.
- .3 Fur surfaces to even plane and free from obstructions.
- .4 Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under project conditions.

3.3 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 INSTALLATION

- .1 Install steel siding and soffits true to line and in accordance with manufacturer's instructions and reviewed shop drawings.
 - .1 Fastener spacing: As recommended by steel siding manufacturer,
 - .2 Attach components in manner not restricting thermal movement.
 - .3 Overlap end joints to shed water from direction of prevailing wind. Overlap distance in accordance with manufacturer's recommendations.
- .2 Install continuous starter strips, inside and outside corners, edgings, drip flashings, cap and sill flashings, and flashings at openings in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
- .3 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- .4 Install soffit and fascia cladding as indicated.
- .5 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.
- .6 Apply sealant at junctions with adjoining work in accordance with Section 07 92 00 - Joint Sealants.

3.5 CLEANING

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

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste management:
 - .1 Manage waste in accordance with Section 01 74 19 - Waste Management and Disposal, and:
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by preformed metal siding installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International Inc:
 - .1 ASTM C1177/C1177M-17, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
 - .2 ASTM D41/D41M-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
 - .3 ASTM D312/D312M-16a, Standard Specification for Asphalt Used in Roofing
- .2 Canadian General Standards Board (CGSB):
 - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
 - .2 CGSB-37-GP-56M-80b, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing
 - .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
 - .4 CAN/CGSB-51.34-M86, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction

1.2 FIELD QUALITY CONTROL

- .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Architect and approved by Owner.
- .2 Include for inspection to CRCA Roof Inspection Guide (alternate production days, half-time) modified as follows:
 - .1 Ensure reports are sent to Architect, Roofing Contractor and General Contractor
- .3 Costs of inspection and testing will be paid by General Contractor under Cash Allowance.

1.3 STORAGE AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt on end.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over work to enable movement of material and other traffic.
- .5 At no time shall the shipping wrap of any of the roofing products be used as the primary weather protection. All products must be protected by tarps.

1.4 IDENTIFICATION AND DELIVERY

- .1 Indicate on containers or wrappings of materials:
 - .1 Manufacturer's name and brand.
 - .2 Compliance with applicable standard.
- .2 Deliver materials in original containers, sealed, with label intact.
- .3 Deliver fasteners in boxes or kegs and keep in protective storage until used. Do not oil or grease fasteners.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Stop work when temperature remains consistently below - 18C, especially when wind chill effect would tend to set bitumen before proper adhesion takes place.
- .2 Use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.6 WARRANTY

- .1 Upon project substantial completion, the Roofing Contractor shall deliver a two (2) year material and workmanship warranty.
- .2 The primary material manufacturer shall issue to the Owner a complete system guarantee against defective workmanship and materials for a period of fifteen (15) years.

1.7 MAINTENANCE

- .1 Arrange for roofing manufacturer to conduct periodic visual inspections of roof surface in year two (2), year five (5), year ten (10) and year fifteen (15) of this warranty. Roofing manufacturer shall provide rooftop visual inspections, preventative maintenance and limited housekeeping services. Roofing manufacturer to provide roof inspection reports based upon regular inspections to Owner corresponding to Maintenance requirements.
- .2 Record noted deficiencies and arrange for their repair under warranty.
- .3 Preventative maintenance to occur at no additional cost to owner and cover all aspects in order to maintain warranty and roof system performance.

1.8 COMPATIBILITY

- .1 Compatibility between components of roofing system is essential. Bituminous adhesives, insulation, felts, and surface coatings, which are to be incorporated into system, must be compatible with each other.
- .2 Provide written declaration that components of roofing system are compatible.

Part 2 Products

2.1 MATERIALS

- .1 Roofing felts:
 - .1 Base Ply: Trilaminate composite felt, nonperforated, asphalt-coated, polyester/fibreglass/polyester reinforced sheet, dusted with fine mineral surfacing on both sides to meet requirements of ASTM D 4601, Type II and following properties: Tensile Strength @-18Deg C (per ASTM D 5147) MD & XMD -31 kN/M; Tear Strength (per ASTM D 4073) MD&XD-1000 N. Basis of Design: BURmastic Composite Felt HT.
 - .2 Membrane felts to ASTM D2178-88A, Glass Fiber, Type IV.
- .2 Asphalt: Type III Asphalt for Constructing built-up roof coverings to CAN/CSA A124.4-04
- .3 Polymer-Modified Asphalt: SEBS-Modified, hot melt, asphalt adhesive, Low Temperature Flex, -8°C, ASTM D3111. Basis of Design: Thermastic 80
- .4 Asphalt primer: ASTM D41
- .5 Adhesives:
 - .1 2 ply felt vapour retarder: asphalt
 - .2 2 ply felt vapour retarder to base layer isocyanurate insulation to top layer isocyanurate insulation: asphalt
 - .3 Cover Board to Isocyanurate insulation: asphalt
 - .4 Base ply to Cover Board: asphalt
 - .5 Membrane felt interply: asphalt
 - .6 Base felt flashing interply: asphalt
 - .7 Flexible flashing sheet: polymer-modified asphalt
 - .8 Floodcoat: polymer-modified asphalt
- .6 Asphalt Mastic: Conform to ASTM D4586 (Non-volatile content: min. 75%; Resistance to Sag-not to exceed 6mm)
- .7 Caulking: 1 part acrylic, high molecular weight polymer, flexible sealant, conform to CAN/CGSB 19.13-M87
- .8 Underlay Board: Glass-faced gypsum board, to ASTM C1177M-08. Thickness:13 mm (1/2 inch). Basis of Design: Dens Deck Prime

- .9 Vapour retarder felt: saturated roofing felts, No. 15 perforated organic felts to CSA-A123.3M. Basis of Design: IKO perforated #15 felt.
- .10 Insulation:
- .1 Base Course and Top Course: ASTM C1289, Type II, Class 1, Grade 2 Polyisocyanurate with asphalt impregnated felt facer, provide minimum two layers of insulation for a total thickness of 152 mm (6.0 inches), 76 mm (3 inches per layer) and an R value of 17.5 per layer and to applicable energy codes if more stringent.
- .2 Cover Board: ASTM C208-72, Asphalt coated high density fiberboard. Thickness: of 13 mm (.5 inches). Basis of Design: BP Esgard
- .3 Pre-engineered Tapered Insulation, Drain Sumps and Crickets: organic faced polyisocyanurate; Drain sumps: 1800 mm x 1800 mm (72 inches x 72 inches), slope 100 mm to 50 mm (4 inches to 2 inches); Scuppers: 900 mm x 1800 mm (36 inches x 72 inches), slope 100 mm to 50 mm (4 inches to 2 inches). Areas of tapered insulation, drain sumps, crickets, equipment crickets: minimum slope 1 ½% as shown on drawings and described on drawing notes; as supplied by Accuplane or Posi-Slope, or approved equal.
- .11 Flashing Plies
- .1 Base Felt Flashing Plies: saturated roofing felts, No. 15 perforated organic felts to CSA-A123.3M
- .2 Flexible flashing sheet: Polyester-reinforced EPDM/SBR, polyester-reinforced membrane; Breaking Strength, to CGSB 37-GP-52M, min. 1200 N; Tear Strength, to CGSB 37-GP-52M, min. 300 N; Low Temperature Flex, to CGSB 37-GP-52M, -40°C. with no cracking. Basis of Design: TRA Sheeting
- .12 Gravel: to ASTM D1863-86. 6 to 12 mm in size well rounded, opaque, non-porous material. Washed and free of fines, moisture and long splinters.
- .13 Polymer-Modified Mastic: Asphalt-compatible, Elongation @ 25°C., min. 900%, to ASTM D412; Recovery from 500% Elongation @ 25°C., min. 80%, to ASTM D412; Low Temperature Flexibility @ -35°C., no cracking, to ASTM D3111. Basis of Design: Polyroof LV.
- .14 Accessories:
- .1 Nails: hot dipped galvanized steel, spiral head, 25mm nailing disc. Minimum 25mm. substrate penetration.
- .2 Flat caps or discs: flat metal 32 mm diameter not less than 0.25 mm thick. Basis of Design: Trufast 75mm Insulation Fastener Plate.
- .3 Mechanical fasteners: as approved by CSA123.21 listing length to suit application. Basis of Design: Trufast #15 EHD.
- .4 Precast Pavers: 600 mm x 600 mm x 50 mm steel wire reinforced precast concrete pavers meeting applicable CSA Standards. Insulation and pavers are to be placed at all access points on the roof (at access doors, top & bottom of ladders) and where indicated on roof plan.
- .5 Reinforcing Mesh: woven glass fibres, conform to ASTM D 146 Grab Tensile
- .6 Reflective aluminum paint: asphalt-compatible, conform to ASTM D 2824 Metallic Aluminum content % exceed 14.5%; Reflectance – Exceed 40%
- .7 Insulated vent pipe sleeve flashing: Spun aluminum base with 75 mm flange. Rubber cap stepped for various projection sizes and ring clamp.
- .8 Extruded polystyrene insulation (pads under pavers), to CAN/CGSB 51.20-M87, type 4. Thickness to be 25 mm.
- .9 Roof Tread: heavy asphaltic pad, fibreglass reinforced, surfaced with granule/sand, thickness: min. 9 mm
- .10 Roof Drain: Copper body, locking cast bonnet with independent clamping ring, Flash-Tite Super-Drain by Lexcor or approved equal. See Mechanical Drawings for size of drains required.

- .11 Miscellaneous Flashing (for protrusions through roof): provide Lexor pre-insulated gooseneck flashings for flexible conduits. Provide specialty sleeves by Lexcor at gas pipes, conduits, guy wires complete with bitumen protection cups.

Part 3 Execution

3.1 PLANT AND EQUIPMENT

- .1 Use only kettles equipped with thermometers or gauges in good working order. Use a separate kettle for the polymer-modified asphalt.
- .2 Locate kettles in safe place outside of building. When locating kettles, give consideration to direction of prevailing winds, building fans and air handling units to minimize possibility of smoke and fumes entering surrounding occupied buildings.
- .3 Maintain continuous supervision while kettles are in operation and provide metal covers for kettles to smother flames in case of fire. Provide suitable fire extinguishers.
- .4 Maintain efficiency of kettles and equipment by frequent cleaning. Remove all carbonized bitumen.
- .5 Use only fiberglass roofing mops.
- .6 Do not leave used roofing mops unattended on roof; store away from building and combustible materials.

3.2 PROTECTION

- .1 Cover walls and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of work.
- .3 Clean off drips and smears of bituminous material.
- .4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.
- .5 Prevent traffic over completed roofing except where required by work above roof level. Comply with precautions deemed necessary by Roofing Inspector. Repair damage caused by non-compliance with Roofing Inspector requirements.
- .6 At end of each day's work or when stoppage occurs due to inclement weather provide protection for completed work and materials out of storage.

3.3 EXAMINATION OF ROOF DECKS

- .1 Examine roof decks and immediately inform the Architect and General Contractor in writing of defects.
- .2 Ensure deck is sloped to drain where indicated on drawings.
- .3 Prior to commencement of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.
 - .2 Curbs have been built.
 - .3 Plywood and lumber nailer plates have been installed to walls and parapets as required.

3.4 ROOFING ASPHALT

- .1 Apply asphalt and polymer-modified asphalt at plus or minus 3⁰ C of EVT indicated on Bill of Lading.
- .2 Maintain asphalt in tanker at or below its FBT indicated.

3.5 UNDERLAY BOARD

- .1 Install underlay board mechanically-fastened to conform with CSA123.21.

3.6 VAPOUR RETARDER

- .1 Install two plies #15 felt fully-bonded with asphalt applied at coverage rate of 1.2 kg/m².
- .2 Allow sufficient vapour retarder to end wrap insulation 100 mm.

3.7 INSULATION & COVER BOARD

- .1 Install base polyisocyanurate insulation with asphalt applied at coverage rate of 1.2 kg/m².
- .2 Lay in regular pattern to provide uniform insulation value over entire roof.
- .3 Install second layer of polyisocyanurate insulation to bottom layer of polyisocyanurate insulation with asphalt applied at coverage rate of 1.2 kg/m².
- .4 Install pre-engineered tapered polyisocyanurate insulation at drains, roof-top equipment and all locations shown on drawings, with asphalt applied at coverage rate of 1.2 kg/m².
- .5 Install fibreboard cover board to second layer of polyisocyanurate insulation with asphalt applied at coverage rate of 1.2 kg/m².
- .6 Butt boards together without gaps. Keep joints free of asphalt.
- .7 At end of each work period mop felt membrane over exposed surfaces and edges of insulation and onto vapour barrier to render watertight. Remove this seal on resumption of work.

3.8 FELTS: APPLICATION METHOD

- .1 Adhere 1 ply of base ply to cover board with asphalt applied at coverage rate of 1.2 kg/m² per ply and in accordance with appropriate CRCA Specification.
- .2 Adhere 3 plies of fibreglass felts to base ply and to each other with asphalt applied at coverage rate of 1.2 kg/m² per ply and in accordance with appropriate CRCA Specification.
- .3 During cold-weather applications, the top surface of the 4th ply shall receive a glaze coating of asphalt applied at a coverage rate of 1.0 kg/m².

3.9 FLASHINGS: GENERAL

- .1 Install two plies of base felt flashing embedded in asphalt and one ply flexible flashing sheet embedded in polymer-modified asphalt at all flashing details including perimeters, expansion joints, curbs, junctions or horizontal and vertical surfaces, roof drains, vents, and other roof mounted appurtenances.
- .2 Ensure surfaces are smooth, clean, and dry. Ensure complete bond and continuity without wrinkles or voids.
- .3 Clean with solvent all metal in contact with bitumen such as flashings, caulking retainers and vents. Dry with clean rags, prime with asphalt primer and allow to dry before incorporating into roof system.
- .4 Top dress all lap edges of flexible flashing sheet with 150 mm reinforcing mesh and polymer-modified mastic.
- .5 Any membrane flashing which is to be left exposed after installation of metal shall be treated with two coats of asphalt-compatible reflective coating applied at a rate of 0.16L/m².

3.10 FLASHING AT ROOF EDGE

- .1 Cut roof membrane flush with top edge of cant strip.
- .2 Install two ply felt flashing in asphalt extending 100 mm beyond toe of cant and 200 mm above top of cant.
- .3 Install flexible flashing sheet in polymer-modified asphalt. Sheet width: sufficient to extend at least 150 mm (6 inches) beyond toe of cant onto roof surface and 50 mm (2 inches) over outside edge, applied continuously. Nail on outside edge with roofing nails 600 mm o.c.

3.11 FLASHING AT VERTICAL SURFACES

- .1 Cut roof membrane flush with top edge of cant strip.
- .2 Install two ply felt flashing in asphalt extending 100 mm beyond toe of cant and 200 mm above top of cant.
- .3 Install flexible flashing sheet in polymer-modified asphalt. Adhere flashing sheet completely to flashing surface, cant and roofing with flashing adhesive.
- .4 Flashing Sheet width: sufficient to extend at least 150 mm (6 inches) beyond toe of cant onto roof surface and 300 mm (13 inches) above top of cant.
- .5 Prior to installation of flashing, install sealing tape to align with top 25 mm (1 inch) of flashing sheet.
- .6 Secure the top of the Flashing Sheet to the vertical plane with a Flashing Termination Bar. Mechanically fasten 300 mm o.c. (12 inches).
- .7 All vertically terminated flashings MUST be concealed by wall waterproofing envelope prior to inclement weather.

3.12 FLASHING VENT STACKS, GAS LINE SUPPORTS AND MISCELLANEOUS FLASHINGS

- .1 Install polyethylene back-up rope between roof deck and vent stack, gas line supports and miscellaneous flashing flanges and caulk joint.
- .2 Embed vent flashing flange in 3 mm thickness of polymer-modified mastic on top of roofing felts.
- .3 Embed 2 plies of organic felt and one ply flashing sheet in heavy coatings of polymer-modified asphalt. Extend plies 100 mm and 200 mm beyond outer edge of flange.
- .4 Insulate voids with loose-fill insulation. Fit rubber caps and secure with ring clamps.

3.13 FLASHING CURBS FOR ROOF-MOUNTED APPARATUS

- .1 Do flashing at curbs for roof-mounted apparatus same as for vertical surfaces except extend flashing sheet embedded in polymer-modified asphalt across top of curb and into the curb opening.
- .2 Minimum height of curbs: 400 mm (16 inches) above roof membrane level.

3.14 FLASHING ROOF DRAINS

- .1 Cut 225 mm (9 inches) diameter opening through new membrane and insulation coinciding with the drain opening.
- .2 Embed drain flange in 3 mm thickness of polymer-modified mastic on top of roofing felts and mechanically fasten to deck, minimum of four fasteners per drain.
- .3 Flashing sheet:
 - .1 Provide 900 mm x 900 mm (36 inches x 36 inches) flashing sheet reinforcement to drain flange.
 - .1 Centre sheeting over drain.
 - .2 Adhere sheeting with continuous application of flashing adhesive.
 - .3 Remove wrinkles/entrapped air.
 - .2 Cut/remove excess sheeting within drain.
 - .3 Seal leading edge of sheet with reinforcing membrane embedded between alternate continuous courses of polymer-modified mastic.
 - .4 Flashing adhesive application rate:
 - .1 1.2 kg per sq. metre
 - .5 Stripping ply adhesive application rate:
 - .1 1 - 1.2 kg per sq. Metre
 - .6 Install clamping ring.
 - .7 Install flow control insert (where required) and drain screen.

3.15 FLASHING ROOF AREA DIVIDER

- .1 Install flashing sheet centred over area divider.

- .2 Install two ply felt flashing in asphalt extending 100 mm beyond toe of cant and 200 mm above top of cant.
- .3 Adhere flashing sheet completely to horizontal and vertical blocking surfaces with polymer-modified asphalt. Press sheeting into adhesive.
- .4 Flashing membrane is to be of sufficient width to extend onto the adjacent roofing a min. 150 mm continuously on both sides of the joint.

3.16 EXPANSION JOINTS

- .1 Install 13 mm plywood to the top of the blocking, securing on one side only.
- .2 Apply foam rubber or 25 mm minimum thickness fibreglass insulation to the top of the plywood.
- .3 Install flashing sheet centred over expansion joint.
- .4 Sheeting width: sufficient to extend onto adjacent roofing 150 mm minimum applied continuously over the entire joint.

3.17 EXPANSION JOINT AT WALL-ROOF JUNCTION

- .1 Fill any open joint with loose insulation.
- .2 Adhere elastomeric sheeting completely to flashing surface, cant and roofing with flashing adhesive. Ensure that the leading edge of the sheeting extends onto the roof surface a distance of 150 mm.
- .3 Membrane is not to be stretched tight and is to be formed with "V" loop at expansion joint.
- .4 Flashing height shall be not less than 200 mm above the finished roof surface.
- .5 Prior to installation of flashing, install sealing tape to align with top 25 mm (1 inch) of flashing sheet.
- .6 Secure the top of the Flashing Sheet to the vertical plane with a Flashing Termination Bar. Mechanically fasten 300 mm o.c. (12 inches).

3.18 GRAVEL SURFACING

- .1 Inspect entire roof area to ensure no wrinkles, buckles, fishmouths or unadhered membrane exist.
- .2 Apply flood of polymer-modified asphalt and gravel surfacing only after placement of roofing felts and membrane flashings.
- .3 Apply flood coat of polymer-modified asphalt at 3.6 kg/m² into which, while hot, embed aggregate at minimum rate of 30 kg/m². Ensure aggregate is dry and temperature of aggregate at time of application is minimum 5°C.
- .4 Apply double pour around all perimeters if roof slopes are less than 1:25.
 - .1 In valleys when control flow drains are used.
 - .2 At roof corners exposed to wind.
 - .3 At corners of penthouses where wind eddies occur.
- .5 Where double pour is required:
 - .1 Remove loose aggregate and
 - .2 Repeat application of bitumen and gravel at same rate and quantity as first application for total aggregate mass of 40 kg/m².

3.19 WALKWAY PLANKS (CONCRETE PAVER)

- .1 Install concrete pavers on top of extruded polystyrene pad at the bottom of down pipes, roof accesses, roof ladders and below scuppers and where indicated. Install roof tread into full mopping of polymer-modified asphalt over top ply of glass felt, prior to application of gravel. Install 25 mm (1 inch) thick extruded polystyrene insulation 600 mm (24 inches) square over roof tread, below paver.

3.20 PIPE SUPPORTS

- .1 Provide 152 mm X 152 mm X 600 mm long pressure treated wood block on concrete pavers on top of extruded polystyrene, on top of roof tread, for gas pipe supports (the same as for walkway planks) for gas lines 150 mm (6 inch) dia. or less. Install roof tread into full mopping of polymer-modified asphalt over top ply of glass felt, prior to application of gravel. Install 25 mm (1 inch) thick extruded polystyrene insulation 600 mm (24 inches) square over roof tread, below paver.
- .2 Install specified support for all gas lines larger than 150 mm (6 inch) diameter.

3.21 CLEANING

- .1 Clean drains, gutters and downspouts of debris, ensuring free drainage.
- .2 Clean adjacent roof surfaces, levels and ground level areas of debris and excess products.
- .3 Rake out gravel to provide neat, even appearance.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 62 00 Sheet Metal Flashing and Trim

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sheet metal roofing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Proof of manufacturer's CCMC listing and listing number.
- .3 Shop Drawings:
 - .1 Submit drawings in accordance with Section 01 33 00 - Submittal Procedures.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products**2.1 ROOF SYSTEM COMPONENTS**

- .1 Thermal Barrier: Glass fibre reinforced gypsum board, 12.7 mm thick.
- .2 Self adhering Air/Vapour Barrier: Acceptable products - IKO Aqua Barrier AVB, Henry Blueskin SA, Soprema Sopraseal Stick 1100TC.
- .3 Clip and Subgirts:
 - .1 Thermally responsive clips to be fabricated from a minimum of 0.91 mm steel, with minimum Z275 galvanized coating. Clips and subgirts designed to accommodate expansion and contraction of the roof sheet.
 - .2 Continuous hat bar and zee clips made from galvanized material, thickness to suit design parameters and to accommodate depth of insulation.
 - .3 Roof Fasteners: To resist wind uplift and sliding snow forces to manufacturer's recommendations.
- .4 Insulation: Extruded polystyrene to CAN/ULC S701.
 - .1 Type 3.
 - .2 Thickness: 178 mm (2 layers 89 rigid insulation).
 - .3 Size: 610 x 2440 mm.
 - .4 Edges: Square.
 - .5 Compressive Strength: ASTM D1621, min. 140 kPa.
- .5 Sheathing: Glass fibre reinforced gypsum board, 12.7 mm thick.
- .6 Waterproof Membrane: Rubberized asphalt roofing underlayment (ice & water shield), applied over entire roof.

- .7 Prefinished Steel Sheet: exposed to exterior.
 - .1 Profile: Vicwest Tradition 150, with I-style ribs at 400 mm spacing or Agway AR 25.
 - .2 Panel: Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having nominal core thickness 0.76 mm.
- .8 Snap Cap: 25 mm high snap caps for full length of roof panel Z275 galvanized (zinc coated) sheet steel conforming to ASTM A653M structural quality Grade 230 having nominal core thickness 0.76 mm. Snap caps to be retained by panel clips. Finish and colour to match roof sheet.

2.2 PANEL FINISHES AND COLOURS

- .1 Colour: Selected by Consultant from manufacturers standard colour range.

2.3 ACCESSORIES

- .1 Flashings: Section 07 62 00 - Sheet Metal Flashings and Trim.
- .2 Closures; Foam and metal closures to suit profiles and to manufacturer's recommendations.
- .3 Isolation coating: alkali resistant bituminous paint.
- .4 Sealant: Section 07 92 00 - Joint Sealants.
- .5 Rubber-asphalt sealing compound: to CAN/CGSB-37.29.

2.4 FABRICATION

- .1 Fabricate roof components to comply with dimensions, profiles gauges and details as shown on the shop drawings, including fascia and soffit panels and all flashings.
- .2 Form individual pieces in longest practical lengths to minimize field lapping of joints. Make allowances for expansion at joints.
- .3 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .4 Apply minimum 0.2 mm dry film thickness coat of plastic cement to both faces of dissimilar metals in contact.
- .5 Protect metals against oxidization by backpainting with isolation coating where indicated.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Thermal Barrier: Install glass fibre reinforced gypsum board, thermal barrier perpendicular to flutes of structural deck. Fasten using manufacturer's recommended fasteners with spacing to suit wind loading.
- .2 Air/Vapour Barrier: Install membrane air/vapour barrier in accordance with manufacturer's recommendations. Lap all joints minimum 150 mm.
- .3 Clip and Subgirts: Attach Tradition clips, hat bar and zee clips using fasteners recommended by manufacturer, to suit the substrate.
- .4 Insulation: Cut and trim insulation neatly to fit spaces. Butt joints tightly. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to

reduce number of joints. Offset both vertical and horizontal joints in multiple layer applications.

- .5 Sheathing: install glass fibre reinforced gypsum board fastened to subgirts.
- .6 Waterproof Membrane: Install waterproof membrane over sheathing in accordance with manufacturers recommendations. Lap all joints minimum 150 mm.
- .7 Roof Panel Installation:
 - .1 Install exterior prefinished roof panels on panel support clips, using manufacturer's recommended installation procedure. Ensure metal roofing sheet side-lap is positively retained by clips, and proper sheet coverage is maintained.
 - .2 Install the snap cap at all sides as shown on the reviewed shop drawings. Mitre snap caps to resist water entry.
 - .3 Provide notched and formed closures, sealed against weather penetration where required.
 - .4 Install flashings as indicated and as shown on reviewed shop drawings. Use concealed fasteners when possible. Exposed fasteners to match colour of roof sheet.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by sheet metal roofing installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 05 00 - Common Work Results for Masonry
- .2 Section 04 73 13 - Cultured Stone Masonry
- .3 Section 07 92 00 - Joint Sealants

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A653/A653M-18, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .2 ASTM A755/A755M-18 Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
 - .3 ASTM D523-14, Standard Test Method for Specular Gloss
- .2 California Air Resources Board (CARB):
 - .1 2007 , Suggested Control Measure (SCM) for Architectural Coatings
- .3 Copper Development Association Inc. (CDA):
- .4 Canadian Roofing Contractors Association (CRCA):
 - .1 CRCA Roofing Reference Manual - Online

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: Product literature and data sheets, including product characteristics, performance criteria, physical sizes, finishes, and limitations.
- .3 Shop drawings:
 - .1 Submit shop drawings for sheet metal fabrications that differ from those indicated on Contract Documents.
 - .2 Show sheet metal thicknesses, flashing dimensions, fastenings, anchorage, expansion joints, and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.

1.4 QUALITY ASSURANCE

- .1 Mock-ups: Erect in accordance with Section 01 45 00 - Quality Control.
 - .1 Include flashings in mock-ups as specified for work of other affected sections.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and:
 - .1 Handle and store flashing materials to prevent creases, buckles, scratches, or other damage.

Part 2 Products**2.1 MATERIALS**

- .1 Galvanized steel sheet: To ASTM A653/A653M, commercial quality, with Z275 designation zinc coating, finished on both sides.
 - .1 Base metal thicknesses: 0.61 mm (26 gauge).

2.2 FABRICATION

- .1 General:
 - .1 Fabricate sheet steel flashings and other sheet steel work in accordance with applicable CRCA 'FL' series details and as indicated.
 - .2 Fabricate straight flashings or trim in maximum 2400 mm lengths, Make allowance for expansion at joints.
 - .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
 - .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
 - .5 Isolation coatings:
 - .1 Apply isolation coatings to metal surfaces to be embedded in concrete or mortar.
- .2 Metal flashings:
 - .1 Flashings, copings, and fascias:
 - .1 Materials: Prefinished steel.
 - .2 Base metal thicknesses: 0.61 mm thick.
- .3 Cap Flashings
 - .1 Form recessed and metal cap flashing of 0.61 mm thick sheet metal to be built-in masonry work for base flashings as detailed.
 - .1 Provide slotted fixing holes and steel/plastic washer fasteners.
- .4 Scuppers: Form to sizes and profiles as indicated on Drawings.
 - .1 Materials: Prefinished steel.
 - .2 Base metal thicknesses: 0.61 mm.
- .5 Gutters and downspouts:
 - .1 Materials: prefinished steel.
 - .2 Base metal thicknesses: 0.61 mm.
 - .3 Profiles:
 - .1 Downspouts: as indicated

2.3 FINISHES

- .1 Prefinished steel sheet:
 - .1 Factory applied two-coat polyvinylidene fluoride (PVDF) resin in accordance with ASTM A755/A755M and AAMA 621.
 - .1 Colour finish on one side, with wash coat on back.
 - .2 Specular gloss: To ASTM D523
 - .3 Exposed coating thickness: dry film coating system thickness minimum 22 micrometers.
 - .4 Colours: As indicated on [Drawings].

2.4 ACCESSORIES

- .1 Isolation coatings: Alkali-resistant bituminous paint.
- .2 Sealants: in accordance with Section 07 92 00 - Joint Sealants, in colour to match flashing finish colour.
- .3 Touch-up paint: As recommended by prefinished material manufacturer.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION: METAL FLASHING

- .1 Install sheet metal work in accordance with CRCA FL series details.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
 - .2 Provide self-adhesive membrane to tie into adjacent assemblies.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
 - .1 Flash joints using S-lock forming tight fit over hook strips, as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Insert metal flashing under cap flashing to form weather tight junction.
- .7 Caulk flashing at cap flashing with sealant.
- .8 Install pans, where shown around items projecting through roof membrane.
- .9 Install fasteners in slots or oversize holes to allow expansion and contraction of flashings, where flashing installed with mechanical fasteners.

3.3 GUTTER AND DOWNSPOUT INSTALLATION

- .1 Install gutters and secure to building at 750 mm on centre with gutter spikes through spacer ferrules.
 - .1 Slope gutters to downspouts as indicated.
- .2 Install downspouts and provide goosenecks back to wall.
 - .1 Secure downspouts to wall with straps at 1800 mm on-centre, provide minimum two straps per downspout.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 51 00 – Built-up Bituminous Roofing

1.2 SUBMITTALS

- .1 Product Data: Submit manufacturer's product data.
- .2 Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- .3 Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 WARRANTY

- .1 Manufacturer Warranty: Manufacturer's standard warranty document, executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the Owner may have under the Contract.
 - .1 Manufacturer's warranty period: 5 years minimum.

1.4 QUALITY ASSURANCE

- .1 Manufacturer: A minimum of 5 years experience manufacturing similar products.
- .2 Installer: A minimum of 2 years experience installing similar products.
- .3 Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.6 WARRANTY

- .1 Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

Part 2 Products**2.1 MANUFACTURER**

- .1 Basis-of-Design Manufacturer: Type E-50TB Roof Hatch by The BILCO Company, or approved alternate.

2.2 ROOF HATCHES

- .1 Furnish and install where indicated on plans metal roof hatch Type E-50TB, size width: 36" (914mm) x length: 36" (914mm). The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- .2 Performance characteristics:
 - .1 Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.

- .2 Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span or 20 psf (97kg/m²) wind uplift.
- .3 Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
- .4 Operation of the cover shall not be affected by temperature.
- .5 Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- .3 Cover: Shall be 11 gauge (2.3mm) aluminum with a 5" (127mm) beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- .4 Cover insulation: Shall be 3" (75mm) thick polyisocyanurate with an R-value = 20.3 (U=0.279 W/m²K), fully covered and protected by an 18 gauge (1mm) aluminum liner.
- .5 Curb: Shall be 12" (305mm) in height and of 11 gauge (2.3mm) aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5-1/2" (140mm) flange with 7/16" (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- .6 Curb insulation: Shall be 3" (75mm) thick polyisocyanurate with an R-value = 20.3 (U=0.279 W/m²K).
- .7 Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
- .8 Hardware
 - .1 Heavy stainless steel pintle hinges shall be provided
 - .2 Cover shall be equipped with a spring latch with interior and exterior turn handles
 - .3 Roof hatch shall be equipped with interior and exterior padlock hasps.
 - .4 The latch strike shall be a stamped component bolted to the curb assembly.
 - .5 Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
 - .6 Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
 - .7 Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- .9 Finishes: Factory finish shall be mill finish aluminum.
- .10 Safety Railing System: Manufacturer's standard safety rail system consisting of nominal 40 mm diameter rails, clamps, fasteners, and all accessories required for a complete installation. Installed so that top of railing is minimum 1070mm above roof surface,
 - .1 Self-closing gate and positive latching system.
 - .2 Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
 - .3 Fabricate joints exposed to weather watertight.
 - .4 Close exposed ends of handrail and railing members with prefabricated end fittings.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- .1 Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
 - .1 Test units for proper function and adjust until proper operation is achieved.
 - .2 Repair finishes damaged during installation.
 - .3 Restore finishes so no evidence remains of corrective work.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Safety Data Sheets (SDS)
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S101-14, Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - .2 CAN/ULC-S102-10, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's product data and include product characteristics, performance criteria, dimensions, finishes, and limitations.
- .3 Quality Assurance Submittals: Submit the following in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Test Reports:
 - .1 Submit product data including certified copies of test reports that verify fireproofing applied to substrate as constructed on the project will meet or exceed the requirements of this specification.
 - .2 Submit test results in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
 - .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
 - .2 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Manufacturer's Instructions: Submit manufacturer's application instructions, special handling criteria, minimum substrate preparation, application sequence, and cleaning warnings.
 - .4 Manufacturer's Site Reports: Submit manufacturer's written reports within 3 days of review, verifying compliance of this Section, as described in SITE QUALITY CONTROL in Part 3 of this Section.
- .4 Sustainable Design Submittals: Submit in accordance with Section 01 35 21 - LEED Requirements.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: Company specializing in spray-applied fireproofing with [five] years documented experience approved by manufacturer.
- .2 Mock-ups: Construct mock-up in accordance with Section 01 43 00 - Quality Assurance.
 - .1 Apply fireproofing to approximately 10 m² area of surfaces of mock-up matching.
 - .2 Mock-up will be used to judge workmanship, substrate preparation, and material application.
 - .3 Locate where directed.
 - .4 Consultant will require a minimum of 24 hours to review the mock-up.
 - .5 Approved mock-up may remain as part of finished work.

- .3 Site Meetings: As part of Manufacturer's Services described under SITE QUALITY CONTROL in Part 3 of this Section, schedule site visits to review the work at the following stages:
 - .1 After delivery and storage of products when preparatory work is complete, but before application begins.
 - .2 During progress of work at 25% , 60% completion.
 - .3 Upon completion of work, after cleaning is completed.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Packing, Delivery, and Handling:
 - .1 Packaging to indicate shelf-life of materials.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver packaged materials in original unopened containers labeled with manufacturer, product name , and ULC markings.
 - .4 Damaged or opened containers will be rejected.
- .3 Storage and Protection:
 - .1 Store materials off ground in a dry, well-ventilated indoor location, and in accordance with manufacturer's recommendations.
 - .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - .3 Damaged or opened containers will be rejected.
 - .4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
 - .5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
 - .6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.
- .4 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 SITE CONDITIONS

- .1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.
- .2 Maintain relative humidity within limits recommended by fireproofing manufacturer.
- .3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.
- .4 In enclosed areas lacking openings for natural ventilation, provide minimum of 4 air exchanges per hour by forced air circulation.

Part 2 Products

2.1 MATERIALS

- .1 Sprayed fireproofing: ULC certified cementitious fireproofing qualified for use in ULC Design and fungus resistant ULC BXUV F906.
- .2 Fireproofing: Minimum dry density and cohesion/adhesion properties as follows:
 - .1 Fireproofing for structural components concealed above ceiling: standard applied dry density of 240 kg/m3 and cohesion/adhesion strength of 9.57 kPa.

- .2 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span.
- .3 Minimum compressive strength: 80 kPa.
- .4 Spray-Applied fireproofing material: not contribute to corrosion of test panels.
- .3 Curing Compound: Type recommended by fireproofing manufacturer, qualified for use in the ULC Design submittal.
- .4 Sealer: Type recommended by fireproofing manufacturer, qualified for use in the ULC Design submittal, designed to prevent surface dusting.
- .1 Colour: White

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Substrate: free of material, which would impair bond.
- .2 Verify that painted substrates are compatible and have suitable bonding characteristics to receive fireproofing.
- .3 Remove incompatible materials.
- .4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.
- .5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.3 APPLICATION

- .1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .1

Location	Rating	ULC Rating
Columns	3/4hr	
Mezzanine Floor	3/4hr	F904

- .2 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.
- .3 Apply fireproofing directly to open web joists without use of expanded lath.
- .4 Surface Finishing: Where indicated [on Drawings][on schedules], apply fireproofing to produce the following finishes:
 - .1 Manufacturer's standard finishes: Finish according to manufacturer's instruction for each finish specified.
 - .2 Spray-Textured Finish: Finish left as spray-applied with no further finishing.
 - .3 Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.
 - .4 Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth the texture and neaten edges.
 - .5 Skip-Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray-applied finish to a smooth texture, without surface markings, and with square edges.
- .5 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.
- .6 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer

3.4 SITE QUALITY CONTROL

- .1 Manufacturer's Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work in handling, installing, applying, protecting and cleaning of Products. Submit manufacturer's site reports as described in SUBMITTALS in Part 1 of this Section.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits to review Work, as directed under QUALITY ASSURANCE in Part 1 of this Section.
- .2 Inspection and Site Tests:
 - .1 Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - .1 Test and inspect as required by the IBC, 1704.10.
 - .2 For reference, utilize AWC I - Inspection Procedure for Field-Applied Sprays Fire-Resistive Materials, Technical Manual 12-A; an annotated guide.
 - .2 Test and inspect completed work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
 - .3 Fireproofing will be considered defective if it does not pass tests and inspections.
 - .1 Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - .2 Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
 - .4 Prepare test and inspection reports.

3.5 PATCHING

- .1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.6 CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Clean surfaces not indicated to receive fireproofing of sprayed material within 24 hours after application.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 National Research Council Canada (NRC):
 - .1 National Building Code of Canada (NBC) 2015
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S115-11, Standard Method of Fire Tests of Firestop Systems

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .1 Submit electronic copy of WHMIS SDS - Safety Data Sheets.
- .3 Shop Drawings:
 - .1 Submit shop drawings showing system design listings for Project including proposed materials, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details to accurately reflect actual job conditions for each product and assembly.
- .4 Quality Assurance Submittals: Submit the following in accordance with Section 01 43 00 - Quality Assurance:
 - .1 Test reports in accordance with CAN/ULC-S101, CAN/ULC-S102, and CAN/ULC-S115.
 - .2 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company person specializing in selection and installation of fire stops with 5 years documented experience approved by manufacturer. Specialty fire stop installer to perform all work of this section
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings, manufacturing date, shelf life expiry date.
- .2 Storage and Protection:
 - .1 Store materials in a well-ventilated, dry indoor location and in accordance with manufacturer's instructions.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
- .2 Use Fire Stop materials from a single manufacturer only for this project. Acceptable Manufacturers:
 - .1 STI Firestop (Specified Firestop Technologies Inc.)
 - .2 Hilti Canada Corporation.
 - .3 3M Canada Inc.
 - .4 Tremco Ltd.
- .3 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .4 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .7 Pillow type fire stopping and smoke seals at openings intended for ease of re-entry such as cables and cable traps.
- .8 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: firestop sealant.
- .9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .12 Sealants for vertical joints: non-sagging.
- .13 Fire caulking installed in areas with exposed or painted structure to be white paintable type.

2.2 MIXING

- .1 For those products requiring mixing before application, comply with fire stopping and smoke seal system manufacturer's instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stop and smoke stop materials to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stop and smoke seal materials and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through-penetrations, poke-through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing per manufacturer's instructions.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Consultant.
- .2 Install floor fire stopping before interior partition erections.
- .3 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 SITE QUALITY CONTROL

- .1 Inspections: Notify Consultant when ready for inspection and before concealing or enclosing fire stop materials and service penetration assemblies.

3.6 CLEANING

- .1 Perform cleaning in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stop and smoke seal materials.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.

- .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
- .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
- .7 Openings and sleeves installed for future use through fire separations.
- .8 Around mechanical and electrical assemblies penetrating fire separations.
- .9 Rigid ducts: greater than 129 cm² : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 ASTM International (ASTM):
 - .1 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants
 - .2 ASTM C1193-16, Standard Guide for Use of Joint Sealants
 - .3 ASTM C1481-12, Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS)
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .3 Submit one electronic copy of WHMIS SDS.
- .3 Samples:
 - .1 Submit one sample of cured samples of exposed sealants for each colour where required to match adjacent material. Each type of material and colour.
- .4 Manufacturer's Instructions:
 - .1 Submit instructions for each type of product.

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements, and:
 - .1 Storage and handling requirements:
 - .1 Store materials off ground in a clean, well-ventilated dry indoor location]and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.
 - .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, with manufacturer's label.
- .2 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

1.5 PROJECT CONDITIONS

- .1 Proceed with installation of joint sealants only when:

- .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
- .2 Joint substrates are dry.
- .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.
- .4 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

Part 2 Products

2.1 SEALANT MATERIALS

- .1 In air handling units and supply air system, use mould-resistant sealants without strong odours or toxic chemicals.
- .2 When low toxicity sealants are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Provide primers in accordance with manufacturer recommendation.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Type S-1: Acrylic latex; one-part, Shore A Hardness of 20,
- .2 Type S-2: Silicone sealant; mould- and mildew-resistant.
 - .1 To ASTM C920, type S; grade NS; class 25; use NT, G, and A.
- .3 Type S-3: Silicone sealant; general construction and air-seal sealant.
 - .1 To ASTM C920, type S; grade NS; class 25; use NT, M, G, A, O.
- .4 Type S-6: Multi-component polyurethane sealant; chemical curing, exterior wall sealant.
 - .1 To ASTM C920, type M; grade NS; class 50; use T, NT, M, A, O.
- .5 Type S-7: Polyurethane sealant, one-component; non-sag, for general construction.
 - .1 To ASTM C920, type S; grade NS; class 25; use NT, M, A, O.
- .6 Type S-13: Polyurethane sealant, one-component; medium-modulus, non-sag, low-VOC, UV stable, to CAN/CGSB-19.24.

2.3 ACCESSORIES

- .1 Preformed compressible and non-compressible back-up materials that are non-staining, compatible with joint substrate, sealants, primers, and other joint fillers, and are acceptable for applications indicated by sealant manufacturer, based on site experience and laboratory testing:
 - .1 High density foam:
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, compatible with sealant and primer, non-adhering to sealant. Size as recommended by manufacturer.
 - .2 Bond breaker tape:
 - .1 Polyethylene bond breaker tape or other tape recommended by sealant manufacturer which will not bond to sealant.

- .2 Bond breakers: Pressure-sensitive plastic tape that will not bond to sealants.
- .3 Joint cleaners: Non-corrosive and non-staining types, compatible with joint forming materials and sealant in accordance with sealant manufacturer's recommendations.
- .4 Primer: Non-staining type in accordance with sealant manufacturer's recommendations.
- .5 Masking tape: Non-absorbent type, non-staining, compatible with joint sealant and joint substrates.

2.4 COLOURS

- .1 Sealant colours: Match colour of adjacent materials where visible, as selected by the Consultant from manufacturer's samples.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of conditions:
 - .1 Verify substrate and project conditions in accordance with Section 01 71 00 - Examination and Preparation, and:
 - .1 Visually inspect substrate.
 - .2 Verify joint surfaces are dry and frost free.
 - .3 Verify substrates are without contaminants capable of interfering with sealant adhesion. Remove contaminants where occurring.
 - .4 Examine joint sizes and conditions to establish acceptable depth to width ratio for installation of backup materials and application of sealants.
 - .5 Verify joint widths are within the limits recommended by joint sealant manufacturer for applications indicated.
 - .6 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

- .1 Surface preparation:
 - .1 Prepare surfaces in accordance with manufacturer's instructions.
 - .2 Clean bonding joint surfaces of harmful contaminants including dust, rust, oil grease, and other matter which may impair adhesion.
 - .3 Do not apply sealants to joint substrates treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

3.3 PRIMING

- .1 Mask adjacent surfaces prior to priming and sealing where necessary to prevent staining.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately applying sealant, except when manufacturer's instructions explicitly state priming is not required.
- .3 Prime porous materials (including wood, masonry, concrete, ceramic or paver tiles, etc.).

3.4 BACKUP MATERIAL INSTALLATION

- .1 Provide backer rod as specified, to limit depth of sealant and to act as bond breaker at back of joint.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.
- .3 Apply paper masking tape to back of joint to act as bond break where depth of joint does not permit the use of backer rod.

- .4 Ensure that no joints are formed which are bonded on adjacent sides where there is any possibility of movement.

3.5 MIXING

- .1 Mix materials in accordance with sealant manufacturer's instructions.

3.6 APPLICATION

- .1 Apply sealants in accordance with ASTM C1193, or ASTM C1481 for EIFS systems, and in accordance with manufacturer's instructions, and:
 - .1 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 For joints where movement is possible, apply backer rod to achieve a joint depth of one half the joint width but not less than 9 mm; for joints larger than 25 mm use a depth of 13 mm.
 - .4 Apply sealant in continuous beads.
 - .5 Apply sealant using gun with proper size nozzle.
 - .6 Fill voids and joints solid.
 - .7 Form sealant surface with a smooth full bead, without from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .8 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .9 Ensure bead is solid, filling entire space between sides and bedding material, exerting sufficient pressure to obtain maximum bond, by allowing sealant to bulge out in advance of nozzle.
 - .10 Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature range.
 - .11 Seal locations where dissimilar materials meet.
- .2 Sealant curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until after curing has completed.

3.7 CLEANING

- .1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately and leave Work neat and clean.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
- .3 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 92 00 – Joint Sealants
- .2 Section 08 71 00 - Door Hardware
- .3 Section 08 80 00 – Glazing
- .4 Section 09 91 00 - Painting

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A653/A653M-18, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating
 - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors
- .3 CSA Group (CSA):
 - .1 CSA G40.20-13 /G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA W59-18, Welded Steel Construction , Includes Errata (2020)
- .4 Canadian Steel Door Manufacturers Association (CSDMA):
 - .1 Recommended Specifications for Commercial Steel Doors and Frames, 2006
 - .2 Recommended Selection and Usage Guide for Commercial Steel Door and Frame Products, 2009
- .5 Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)):
 - .1 AAMA 812-19, Voluntary Practice for Assessment of Frame Deflection When Using One Component Polyurethane Foams for Air-Sealing Rough Openings of Fenestration Installations
- .6 National Fire Protection Association (NFPA):
 - .1 NFPA 80-2013, Standard for Fire Doors and Other Opening Protectives
- .7 Steel Door Institute (SDI):
 - .1 SDI-108-18, Recommended Selection and Usage Guide for Standard Steel Doors
 - .2 SDI-111-09, Recommended Details for Standard Steel Doors, Frames, Accessories and Related Components
 - .3 SDI-122-15, Installation Troubleshooting Guide for Standard Steel Doors and Frames
- .8 Underwriters Laboratories (UL):

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Shop Drawings:
 - .1 For each type of door, indicate material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings,, arrangement of hardware, fire-protection rating, and finishes.
 - .2 For each type of frame, indicate material, core metal thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire-protection rating, and finishes.
 - .3 Include a schedule identifying each unit with door marks and numbers matching numbering on Drawings and door schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products**2.1 MATERIALS**

- .1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement Channels: To CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653/653M, ZF75.

2.2 DOOR CORE MATERIALS

- .1 Stiffened: face sheets, insulated core.

2.3 ADHESIVES

- .1 Polystyrene and Polyurethane Core Adhesive: Heat resistant, epoxy resin based, low viscosity, contact cement.

2.4 ACCESSORIES

- .1 Touch-up Primer: To CAN/CGSB-1.181
 - .1 Maximum VOC limit 50 g/L to GC-03.
- .2 Door Silencers: Single stud rubber/neoprene type
- .3 Metallic Paste Filler: To manufacturer's standard.
- .4 Fire Labels: Metal riveted.
- .5 Sealant: as indicated in Section 07 92 00 - Joint Sealants.
- .6 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .7 Glazing:, as indicated in Section 08 80 00 – Glazing.
- .8 Make provisions for glazing as indicated and provide necessary glazing stops.
 - .1 Design exterior glazing stops to be tamperproof.

2.5 PAINT

- .1 Field paint steel doors and frames in accordance with Section 09 91 23 - Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.6 FABRICATION - FRAMES

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior Frames: 16 gauge thermally broken type construction.
- .4 Interior Frames: 16 gauge welded type frame.
- .5 Blank, reinforce, drill, and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface-mounted hardware.
- .6 Protect mortised cut-outs with steel guard boxes.
- .7 Reinforce frames for surface-mounted hardware.
- .8 Prepare door openings for door silencers:
 - .1 Three silencers on strike jamb for single door openings.
 - .2 Two silencers on heads for double door openings.

- .9 Manufacturer's nameplates on frames and screens are not permitted.
- .10 Conceal fastenings except where exposed fastenings are indicated.
- .11 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .12 Insulate exterior frame components with polyurethane insulation.

2.7 FRAME ANCHORAGE

- .1 Provide concealed anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm, and one additional anchor for each additional 760 mm of height or fraction thereof.

2.8 FRAMES - WELDED TYPE

- .1 Perform welding to CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails, and sills.
- .4 Grind welded joints and corners to flat plane, fill with metallic paste, and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in two temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.9 FABRICATION – DOORS, GENERAL

- .1 Doors: Swing type, flush, with provision for glass and/or louvred openings as indicated.
- .2 Exterior Doors: Insulated hollow steel core construction.
- .3 Interior doors: hollow steel core construction.
- .4 Fabricate doors with longitudinal edges locked seamed, adhesive assisted.
 - .1 Seams: Visible.
- .5 Blank, reinforce, drill, and tap doors for mortised, templated hardware and electronic hardware.
- .6 Factory-prepare 12.7-mm diameter holes and larger on-site at time of hardware installation, except for mounting and through-bolt holes.
- .7 Reinforce doors for surface-mounted hardware where required. Provide flush [PVC][steel] top caps to exterior doors. Provide inverted top and bottom channels to interior doors.
- .8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .9 Provide fire labelled doors for openings requiring fire protection ratings, as scheduled. Test such products in conformance with, listed by a nationally recognized agency having factory inspection services, and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .10 Manufacturer's nameplates on doors are not permitted. Nameplates on hinge edge are acceptable.
- .11 Interior hollow metal doors to have polystyrene core.

2.10 FABRICATION - THERMALLY BROKEN DOORS AND FRAMES

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with a continuous interlocking thermal break.
- .2 Thermal Break: Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

- .3 Fabricate thermally broken frames separating exterior parts from interior parts with a continuous interlocking thermal break.
- .4 Fill frame cavity with low pressure spray-applied polyurethane foam to AAMA 812.
- .5 Insulating core to be polyurethane.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION - GENERAL

- .1 Install doors and frames to CSDMA Standards.
- .2 Install labelled steel fire-rated doors and frames in accordance with NFPA 80 except where specified otherwise.

3.3 INSTALLATION - FRAMES

- .1 Set frames plumb, square, level, and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position until built-in:
 - .1 Provide temporary wood spreaders at third points of frame rebate height to maintain frame width until adjacent building-in work completed.
 - .2 Provide vertical support at centre of head for openings exceeding 1200 mm in width.
 - .3 Remove wood spreaders after frames have been built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Apply sealant at perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of air barrier and vapour retarder.

3.4 INSTALLATION - DOOR

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latchside and head: 1.5 mm.
 - .3 Finished floor, top of carpet, and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.
- .4 Install louvres.

3.5 INSTALLATION - GLAZING

- .1 Install glazing in accordance with Section 08 80 00 - Glazing.

3.6 ADJUSTING

- .1 Use primer to touch-up finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to uniform, smooth finish.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 92 00 - Joint Sealants
- .2 Section 08 71 00 - Door Hardware
- .3 Section 08 80 00 - Glazing
- .4 Section 08 81 00 – Glazing

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C1193-13, Standard Guide for Use of Joint Sealants
 - .2 ASTM E330/E330M-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .2 CSA Group (CSA):
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles
- .3 Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)):
 - .1 AAMA 609/610-15, Cleaning and Maintenance Guide for Architecturally Finished Aluminum
- .4 The Master Painters Institute (MPI):
 - .1 MPI Approved Products List, current edition
- .5 Underwriters Laboratories (UL):
 - .1 UL 2761-2011, Sustainability for Sealants and Caulking Compounds

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for doors and frames and include product characteristics, performance criteria, physical size, finishes, and limitations.
- .3 Shop Drawings:
 - .1 Indicate materials and profiles and include full-size, scaled details of components for each type of door and frame. Indicate:
 - .1 Interior and exterior trim.
 - .2 Connections with adjacent construction, including air and vapour membranes.
 - .3 Connections between combination units.
 - .4 Elevations of units.
 - .5 Core thicknesses of components.
 - .6 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
 - .7 Location of sealants.
 - .8 Each type of door system including location.
 - .9 Arrangement of reinforcing for hardware and joints.
 - .10 Arrangement of hardware and required clearances.

1.4 CLOSEOUT SUBMITTALS

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

- .2 Operation and Maintenance Data: Submit maintenance data for cleaning of aluminum finishes and maintenance of operable hardware, and incorporate into manual.
- .3 Warranty Documentation: Submit manufacturer's warranty documents.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Reports: Submit manufacturer's written reports within three days of review, verifying compliance of work, as described in SITE QUALITY CONTROL in Part 3 of this Section.
- .2 Certifications: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, and criteria and physical requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging with manufacturer's labels.
 - .1 Apply a temporary protective coating to finished surfaces. Use easy to remove, residue-free coatings.
 - .2 Leave protective covering in place until final cleaning of building.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in a clean, well-ventilated area to prevent sagging, bowing, or twisting.
 - .2 Store and protect aluminum doors and frames from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 WARRANTY

- .1 Manufacturer's warranty: Submit, for Consultant acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Design exterior door and frame systems to:
 - .1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.
 - .2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E330/E330M under wind load of 1.2 kPa. Submit certificate of tests performed.
 - .3 Accommodate movement between system and perimeter framing and other adjacent construction, including story drift and deflection from uniformly distributed and concentrated live loads.
 - .4 Accommodate movement between system and perimeter framing components or substrate.
- .2 Glass Thickness and Glass Unit dimensions to limits in accordance with CAN/CGSB-12.20.
- .3 Include continuous air barrier and vapour retarder through door system, primarily in line with inside pane of glass and heel bead of glazing compound.

2.2 MATERIALS

- .1 Aluminum Extrusions: To Aluminum Association alloy AA6063- T5 anodizing quality.
- .2 Sheet Aluminum: To Aluminum Association alloy AA1100 - H14 anodizing quality.
- .3 Steel Reinforcement: To CSA G40.20/G40.21 , grade 300 W.
- .4 Fasteners: finished to match adjacent material.
- .5 Door bumpers: black neoprene.
- .6 Isolation coating: bituminous paint.
- .7 Glazing materials: 08 80 00 - Glazing.
- .8 Sealants: colour selected by Consultant in accordance with Section 07 92 00 - Joint Sealants.
 - .1 Maximum VOC limit: 250 g/L 5% by weight to SCAQMD Rule 1168 UL 2761.

2.3 ALUMINUM DOORS

- .1 Acceptable Products:
 - .1 Exterior Doors thermally broken & insulated:
 - .1 Alumicor Thermaporte 7700, T600A.
 - .2 Kawneer AA425 thermal entrance.
 - .3 Windspec 500 HTP wide stile.
 - .2 Interior Doors:
 - .1 Alumicor Series Canadiana 600A
 - .2 Kawneer Standard entrance 500
 - .3 Windspec Standard commercial 500 widestile
- .2 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .3 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.
- .4 Supply thermally broken doors for exterior.
- .5 Hardware: 08 71 00 - Door Hardware.

2.4 ALUMINUM FRAMES

- .1 Aluminum Frames Exterior Frames - thermally broken and insulated.
 - .1 Acceptable products:
 - .1 Alumicor Flushglaze BF 3400.
 - .2 Kawneer Tri fab 451 UT
 - .3 Windspec 655 series thermally broken.

2.5 FINISHES

- .1 Aluminum Finishes:
 - .1 Clear Anodic Finish: To AAMA 611 :
 - .1 to designation AA-DAF-45M10C21A41 Architectural Class 1.
 - .2 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1.
- .2 Steel Finishes:
 - .1 Finish steel clips and reinforcing steel with zinc coating to CAN/CSA-G164.

2.6 FABRICATION

- .1 Doors and framing by same manufacturer.
- .2 Fabricate doors and frames to profiles and maximum face sizes as indicated. Provide minimum 22mm bite for insulating glazed units.
- .3 Provide structural steel reinforcement as required.
- .4 Fit joints tightly and secure mechanically.
- .5 Conceal fastenings.

- .6 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Doors Hardware and as per manufacturer's instructions.
- .7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

Part 3 Execution

3.1 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Set frames plumb, square, and level at correct elevation in alignment with adjacent work and without warp or racking.
- .3 Anchor frames securely and rigidly.
- .4 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.
- .5 Adjust door components to ensure smooth operation.
- .6 Make allowances for deflection of building structure to ensure structural loads are not transmitted to frames.
- .7 Glaze aluminum doors and frames in accordance with Section 08 80 00 - Glazing.
- .8 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.
- .9 Apply sealants in accordance ASTM C1193 and Section 07 92 00 - Joint Sealants.

3.2 CLEANING

- .1 Progress Cleaning: Clean doors, frames, and glazing in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave work area clean at the end of each day
 - .2 Clean aluminum components in accordance with AAMA 609/610.
 - .3 Clean as soon as possible after installation to remove construction debris and dirt.
 - .4 Clean aluminum with damp rag and manufacturer recommended non-abrasive cleaner.
 - .5 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .3 Clean glass and glazing materials with approved non-abrasive cleaner.
- .4 Final Cleaning: Perform in accordance with Section 01 74 00 - Cleaning.
- .5 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by aluminum door and frame installation.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 609/610- 09, Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for coiling counter doors and hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate each type of coiling counter door, arrangement of hardware, operating mechanism and required clearances.

1.3 CLOSEOUT SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 WARRANTY

- .1 Provide manufacturers two (2) year limited warranty.

Part 2 Products**2.1 COILING COUNTER DOORS**

- .1 Rivet continuous end locks to slat ends.
- .2 Assemble coiling counter door curtain of flat galvanized steel interlocking slat sections.
- .3 Provide bottom bar of steel angles.
- .4 Form guides of metal sections of 5 mm minimum thickness for between jambs and face wall installation.
- .5 Counterbalance: Helical torsion spring type. Counterbalance shall be housed in a steel tube or pipe barrel.

- .6 Support counterbalance assembly on 5 mm minimum thickness steel plate brackets, forming end enclosures.
- .7 Enclose counter balance assembly with galvanized steel sheet formed hood.
- .8 Attach to hood sheet metal flame and smoke baffle to drop in place automatically when activated.
- .9 Equip coiling doors for locking from inside with cylinder locks for master keyed cylinder.
- .10 Finish: powder coated, colour selected by Consultant from manufacturers standard colour range.
- .11 Sizes as indicated.

2.2 OPERATION

- .1 Equip coiling counter doors for operation by:
 - .1 Crank operator with removable hand crank.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install coiling counter door in accordance with manufacturers' printed instructions.
- .2 Install master keyed cylinders.
- .3 Adjust operable parts for correct function and smooth operation.

3.3 SITE QUALITY CONTROL

- .1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its product s, and submit written reports in acceptable format to verify compliance of Work with Contract.
- .2 Manufacturer's site services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of its product s, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
 - .2 Submit manufacturer's site services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Perform cleaning of aluminum components in accordance with: AAMA 609
 - .3 Clean aluminum with damp rag and approved non-abrasive cleaner in accordance with manufacturer's instructions.
 - .4 Remove traces of primer, caulking; clean doors and frames.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by coil counter door installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 08 80 00 Glazing.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A1008/A1008M-13, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
- .2 CSA Group (CSA):
 - .1 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles
- .3 Environmental Choice Program (ECP):
 - .1 CCD-016-97, Thermal Insulation

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Shop Drawings: Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, required clearances and electrical connections.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for overhead door hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

Part 2 Products**2.1 MATERIALS**

- .1 Galvanized steel sheet: commercial quality Z275 zinc coating.
- .2 Steel sheet: commercial quality to ASTM A 1008/A 1008M.
- .3 Cable: multi-strand galvanized steel aircraft cable,

2.2 DOORS

- .1 Sectional door assembly: metal/foam/metal sandwich panel and ship lap design.
- .2 Unit to meet the following:
 - .1 Panel thickness 51 mm.
 - .2 Exterior steel 20 gauges, 0.912 mm.
 - .3 End stiled 16 gauge, 1.519 mm.
 - .4 Springs: high cycles.
 - .5 Insulation: Polystyrene
 - .6 Thermal value R 17.
 - .7 High use package.
 - .8 Glazing: full view aluminum sash with insulated double strength glass. Two rows of panels as per elevations. Refer drawings for location.
- .3 Finish and Colour: factory finished with two coats baked-on polyester.
 - .1 Colour: As selected by Consultant from manufacturer's standard colour range.

2.3 HEAVY DUTY INDUSTRIAL HARDWARE

- .1 Track: standard high vertical lift low head room hardware with 75 mm size 2.28 mm core thickness galvanized steel track.
- .2 Track Supports: 2.3 mm core thickness continuous galvanized steel angle track supports.
- .3 Spring counter balance: heavy duty oil tempered torsion spring with manufacturers standard brackets.
 - .1 Drum: 133 mm diameter die cast aluminum.
 - .2 Shaft: 32 mm diameter solid steel.
- .4 Top roller carrier: galvanized Steel 2.28 mm thick adjustable.
- .5 Rollers: full floating grease packed hardened steel, ball bearing 75 mm diameter solid steel tire.
- .6 Roller brackets: adjustable, minimum 2.5 mm galvanized steel.
- .7 Hinges: heavy duty, 2.28 mm thick galvanized stainless steel as recommended by manufacturer.
- .8 Cable: 4 mm diameter galvanized steel aircraft cable.

2.4 STANDARD DUTY INDUSTRIAL HARDWARE

- .1 Track: standard high vertical lift low headroom hardware with 75 mm size minimum 2.28 mm core thickness galvanized steel track.
- .2 Track Supports: 2.3 mm core thickness continuous galvanized steel angle track supports.
- .3 Spring counter balance: heavy duty oil tempered torsion spring with manufacturers standard brackets.
 - .1 Drum: 133 mm diameter die cast aluminum.
 - .2 Shaft: 32 mm diameter solid steel.
- .4 Top roller carrier: galvanized steel minimum 2.28 mm thick adjustable.
- .5 Rollers: full floating, grease packed hardened steel, ball bearing minimum 75 mm diameter, stamped tire.
- .6 Roller brackets: adjustable, galvanized steel, minimum 2.5 mm thick.
- .7 Hinges: standard duty industrial 2.28 mm thick galvanized stainless steel as recommended by manufacturer.
- .8 Cable: minimum 4 mm diameter galvanized steel aircraft cable.

2.5 ACCESSORIES

- .1 Overhead horizontal track and operator supports: galvanized steel, type and size to suit installation.
- .2 Track guards: 5 mm thick formed sheet 1500 mm high track guards.
- .3 Two horizontal sliding lock bolts on interior.
- .4 Weather stripping.
 - .1 Sills: double contact bulb type full width extruded neoprene weatherstrip.
 - .2 Jambs and head: extruded aluminum and arctic grade vinyl weatherstrip to manufacturer's standard.
- .5 Finish ferrous hardware items with minimum zinc coating of 300 g/m² to CAN/CSA-G164.

2.6 OPERATORS

- .1 Equip doors for operation by:
 - .1 Hand, two handles on inside face of door, and
 - .2 Chain hoist with galvanized steel chain, and
 - .3 Electric operator.
- .2 Cable fail safe device.
 - .1 Able to stop door immediately if cable breaks on door free fall. Braking capacity minimum 500 kg.

2.7 ELECTRICAL OPERATOR

- .1 Electrical jack shaft mounted type operator with built in chain hoist.
- .2 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval.
- .3 Power supply:
 - .1 Motor: 3/4 Hp.
 - .2 Single-phase, 60 Hz
- .4 Controller units with integral motor reversing starter, solenoid operated brake, including relays as applicable.
- .5 Operation:
 - .1 Remote pushbutton stations:
 - .1 Interior: surface mounted adjacent to left side of each door, with "OPEN-STOP-CLOSE" designations on pushbuttons. Key operation with key required to be in "ON" position for buttons to operate.
 - .2 Exterior: single operation push button on exterior adjacent to left side of each of door. Push button to be functional only when interior key control is in "ON" position.
- .6 Safety switch: combination roll rubber with limit switches for full length of bottom rail of bottom section of door, to reverse door to open position when coming in contact with object on closing cycle.
- .7 Power-off switch: Keyed interior cut-off switch to disconnect power to operator, for improved security.
- .8 For jack shaft operators:
 - .1 Provide floor level disconnect device to allow for manual operation in event of power failure.
 - .2 Equip Operator with:
 - .1 Electrical interlock switch to disconnect power to operator when in manual operation.
 - .2 Built-in chain hoist for manual operation in event of power failure.
- .9 Door speed: 300 mm per second.
- .10 Mounting brackets: galvanized steel, size and gauge to suit conditions.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

- .1 Install doors and hardware in accordance with manufacturer's instructions.
- .2 Rigidly support rail and operator and secure to supporting structure.
- .3 Touch-up steel doors with primer where galvanized finish damaged during fabrication.
- .4 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.
- .5 Adjust weatherstripping to form a weather tight seal.
- .6 Adjust doors for smooth operation.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Remove traces of primer; clean doors and frames.
 - .2 Clean glass and glazing materials with approved non-abrasive cleaner.

- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 22 00 – Concrete Unit Masonry
- .2 Section 05 50 00 - Metal Fabrications
- .3 Section 07 26 00 - Vapour Retarders
- .4 Section 07 27 00.01 – Air Barriers – Descriptive or Proprietary
- .5 Section 07 27 00.02 – Air Barriers – Performance
- .6 Section 07 62 00 - Sheet Metal Flashing and Trim
- .7 Section 07 84 00 - Firestopping
- .8 Section 07 92 00 - Joint Sealants
- .9 Section 08 11 16 – Aluminum Doors and Frames
- .10 Section 08 50 00 - Windows
- .11 Section 08 80 00 - Glazing

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - .2 ASTM B209/B209M-21a, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .3 ASTM B221-21, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .4 ASTM B221M-21, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
 - .5 ASTM E283-04, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - .6 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference
 - .7 ASTM E331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference
 - .8 ASTM E1105-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings
- .3 Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)):
 - .1 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: Product literature and data sheets, including product characteristics, performance criteria, physical sizes, finishes, and limitations.
- .3 Shop Drawings:
 - .1 Signed and sealed by a qualified professional in accordance with Section 01 43 00 – Quality Assurance.
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

- .3 Show system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details, anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint locations and details, and site welding required.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance data:
 - .1 Include, in the operation and maintenance manual, manufacturer's maintenance instructions and recommended cleaning materials and methods.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Handle work of this Section in accordance with AAMA CW-10.
 - .2 Store materials in accordance with manufacturer's recommendations.
 - .3 Store and protect glazed aluminum curtain wall components from nicks, scratches, deformation, and damages.
 - .4 Protect prefinished aluminum surfaces. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - .5 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 AMBIENT CONDITIONS

- .1 Install sealants when ambient and surface temperature is above 5°C minimum.
- .2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

1.7 WARRANTY

- .1 Contractor hereby warrants that glazed aluminum curtain wall will function as specified or 60 months.

Part 2 Products

2.1 GLAZED ALUMINUM CURTAIN WALLS

- .1 Description:
 - .1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections, shop fabricated, factory prefinished, vision glass; related flashings, anchorage and attachment devices.
 - .2 Assembled system to permit re-glazing of individual glass (and infill panel) units from exterior without requiring removal of structural mullion sections.
 - .3 All system components by same manufacturer.
- .2 Performance/design criteria:
 - .1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with National Building Code of Canada (NBC) and as measured to AAMA CW 11, ASTM E 330.
 - .2 Design and size components to withstand specified seismic loads and sway displacement.

- .3 Limit mullion deflection to flexure limit of glass with full recovery of glazing materials.
- .4 Design glass unit dimensions and glass thicknesses to limits established in CAN/CGSB-12.20.
- .5 Design systems to accommodate the following without damage to components or deterioration of seals:
 - .1 Movement within system.
 - .2 Movement between system and perimeter framing components.
 - .3 Dynamic loading and release of loads.
 - .4 Deflection of structural support framing.
 - .5 Shortening of building concrete structural columns.
 - .6 Creep of concrete structural members.
- .6 Limit air infiltration through assembly to 0.0003 m³/s/m² of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501 ASTM E283.
- .7 Vapour seal with interior atmospheric pressure of 25 mm sp, 22°C, 40% relative humidity: no failure.
- .8 Water Penetration Resistance: No leakage when tested to AAMA501, ASTM E331, ASTM E1105.
- .9 Design system to allow for expansion and contraction within system components when temperature range is 95 °C over 12-hour period without causing detrimental affect to system components.
- .10 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
- .11 Maintain continuous air barrier and vapour retarder throughout assemblies, primarily in line with inside panes of glass and heel beads of glazing compound.
 - .1 Position thermal insulation on exterior surface of air barrier and vapour retarder.
- .12 Design assemblies to prevent vibration harmonics, wind whistles, and noises caused by thermal movement transmitted to other building elements.

2.2 MATERIALS

- .1 Extruded aluminum: to ASTM B221.
- .2 Sheet aluminum: to ASTM B209.
- .3 Anchors: 3-way adjustable hot-dip galvanized cast iron.
- .4 Fasteners: stainless steel, finish to match curtain wall.
- .5 Glazing: Section 08 80 00.
- .6 Sealant: section 07 92 00 and as recommended by manufacturer.
- .7 Insulating foam air barrier: one component low expansion polyurethane foam.

2.3 COMPONENTS

- .1 Acceptable products: Alumicor 2600 ThermaWall or equal by Kawneer or Windspec.
- .2 Mullion profile:
 - .1 Vertical members: 168.3 x 63.5 mm nominal dimension.
 - .2 Horizontal members: 168.3 x 63.5 mm nominal dimension.
 - .3 Thermally broken with interior tubular section insulated from exterior pressure plate.
 - .4 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass and infill panels.
 - .5 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.
 - .6 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

- .3 Flashings: 0.8 mm thick aluminum, finish to match curtain wall mullion sections where exposed, secured with concealed fastening method.
- .4 Spandrel Panels (GL-3): Clear anodized aluminum interior and exterior faces with insulated core. Spandrel panels by window manufacturer to coordinate with specified framing system.
- .5 Operators: Alumicor UniVent (or equal) Top-Hung Projecting Out (THPO) awning windows where shown in elevations.
- .6 Hardware
 - .1 Stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.
 - .2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in close position.
- .7 Screens: to ASTM E1748 SMA 1201R on ventilating portion of windows.
 - .1 Type: aluminum
 - .2 Fasteners: tamper proof
 - .3 Screen Frames: aluminum colour to match window frames
 - .4 Mount screen frames for interior replacement.

2.4 FABRICATION

- .1 Fabricate system components with minimum clearances and shim spacing around assembly perimeters while allowing installation and dynamic movement of perimeter seals.
- .2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- .3 Prepare components to receive anchor devices. Install anchors.
- .4 Install fasteners and attachments to ensure concealment from view.
- .5 Reinforce framing members for external imposed loads.
- .6 Visible manufacturer's identification labels are not permitted.

2.5 FINISHES

- .1 Finish Coatings: Clear anodized finish.
- .2 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.
- .3 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
- .4 Concealed steel items: galvanized to ASTM A 123 to 600 gm/m² primed with iron oxide paint.
- .5 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Verify substrate and project conditions in accordance with Section 01 71 00 – Examination and Preparation, and:
 - .1 Visually inspect substrate.
 - .2 Verify dimensions, tolerances, and method of attachment with other work.
 - .3 Verify wall openings and adjoining vapour retarder and air barrier materials are ready to receive work of this section.
 - .4 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Install curtain wall and sloped glazing system in accordance with manufacturer's instructions
- .2 Anchor to building structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to site welds and adjacent surfaces.
- .4 Align assemblies plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .5 Provide thermal isolation where components penetrate or disrupt building insulation.
- .6 Install sill flashings.
- .7 Coordinate attachment and seal of perimeter air barrier and vapour retarder materials.
- .8 Apply foam insulation in shim spaces to fill all gaps at perimeter of framing using manufacturers approved applicator and in accordance with manufacturers instructions to maintain continuity of thermal barrier. Cut back or tool foam to allow for finish caulking.
- .9 Install glass in accordance with Section 08 80 00 - Glazing.
- .10 Install perimeter sealant to method required to achieve performance criteria.

3.3 TOLERANCES

- .1 Maximum variation from plumb: 1.5 mm/m non-cumulative, or 13 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Maximum sealant space between curtain walls and adjacent construction: 13 mm.

3.4 SITE QUALITY CONTROL

- .1 Manufacturer Services:
 - .1 Provide manufacturer's site services consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions and warranty requirements.
 - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 CLEANING

- .1 Progress Cleaning: Clean frames and glazing in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove temporary protective material from prefinished aluminum surfaces.
 - .3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
 - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 92 00 - Joint Sealants
- .2 Section 08 80 00 - Glazing

1.2 REFERENCE STANDARDS

- .1 Aluminum Association (AA):
 - .1 AA DAF 45-03, Designation System for Aluminum Finishes
- .2 ASTM International (ASTM):
 - .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products
 - .2 ASTM E1748-95, Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System
- .3 CSA Group (CSA):
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights
- .4 Screen Manufacturers Association (SMA):
 - .1 SMA 1201R-2012 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, product literature and data sheets for windows and Include product characteristics, performance criteria, physical sizes, finishes and limitations.
- .3 Shop Drawings:
 - .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, elevations of unit, anchorage details, description of related components and exposed finishes, fasteners, and sealants. Indicate location of manufacturer's nameplates.
 - .2 Indicate locations, dimensions, openings and requirements of related work.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Submit maintenance data for windows and incorporate into manual.
- .3 Warranty Documentation: Submit manufacturer's warranty documents.

1.5 QUALITY ASSURANCE

- .1 Test and Evaluation Reports:
 - .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
 - .2 Test reports that reference the NAFS include, on the first page, a summary of the results including, at minimum:
 - .1 Product manufacturer.
 - .2 Type of product.
 - .3 Model number/series number.
 - .4 Primary product designation.

- .5 Secondary product designation.
 - .1 Positive design pressure.
 - .2 Negative design pressure.
 - .3 Water penetration resistance test pressure.
 - .4 Canadian air infiltration and exfiltration levels.
 - .6 Test completion date.
- .3 Report to contain the following information:
 - .1 Test dates.
 - .2 Report preparation dates.
 - .3 Test information retention period.
 - .4 Location of testing facilities.
 - .5 Full description of test samples, including:
 - .1 Anodized finish.
 - .2 Condensation resistance.
 - .3 Sash strength and stiffness - projecting.
 - .4 Forced entry resistance.
 - .5 Mullian deflection - combination and composite windows.
 - .6 Complete description of amendments, as applicable.
 - .7 Conclusion.
 - .8 Drawings signed by the testing laboratory, if provided.
- .2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-Up:
 - .1 Provide site mock-up for work of this Section indicating methods and materials, and procedures proposed to achieve final results in accordance with Section 01 45 00 - Quality Control, and to comply with following requirements, using materials indicated for completed work:
 - .1 Build mock-up of size as directed by Consultant.
 - .2 Obtain Consultant's acceptance of mock-ups before starting construction; mock-up used throughout construction period as standard of acceptance for subsequent work.
 - .3 Mock-up may form part of permanent structure when accepted; repair or replace unacceptable mock-ups at no additional cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials and in accordance with manufacturer's recommendations.
 - .2 Store and protect windows from nicks, scratches, and damages.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 WARRANTY

- .1 Manufacturer's warranty: Submit for Consultant acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

Part 2 Products

2.1 MATERIALS

- .1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:
- .2 Windows by same manufacturer. Acceptable products: Alumicor RainBlade 1970 or equal by Kawneer or Windspec.
- .3 Frame depth 134 mm.
- .4 Operable vents: THPO awning where shown in elevation drawings. Univent 1350 by Alumicor, or equal by Kawneer or Windspec.
 - .1 Hardware:
 - .1 Locks: provide operating sash with spring loading locking device to provide automatic locking in closed position.
 - .2 Cam handle with pole ring, sash pole and pole hangar.
- .5 Sash: aluminum thermally broken.
- .6 Main frame: aluminum thermally broken.
- .7 Glass: in accordance with Section 08 80 00 - Glazing.
- .8 Screens: to ASTM E1748 SMA 1201R on ventilating portion of windows.
 - .1 Type: aluminum.
 - .2 Fasteners: tamper proof.
 - .3 Screen frames: aluminum colour to match window frames.
 - .4 Mount screen frames for interior replacement.
- .9 Exterior sills: aluminum of type and size as detailed or to suit job conditions; minimum 3 mm thick.
- .10 Isolation coating: alkali resistant bituminous paint.
- .11 Sealants: 07 92 00.
- .12 Insulating foam air barrier: one component low expansion polyurethane foam.

2.2 WINDOW TYPE AND CLASSIFICATION

- .1 Product types:
 - .1 Operable Window - Top-hung projecting out (THPO) awning windows where shown in elevations.
 - .2 FW- Fixed window.
- .2 Classification rating: to AAMA/WDMA/CSA 101/I.S.2/A440.
 - .1 Primary designation:
 - .1 Performance classes: CW.
 - .2 Performance categories: 30.
 - .2 Secondary designation:
 - .1 Positive design pressure: 960Pa.
 - .2 Negative design pressure: -960Pa.
 - .3 Water penetration resistance test pressure: 220 Pa.
 - .4 Canadian air infiltration and exfiltration levels: A2
 - .3 Surface condensation control: compliant with standard CAN/CSA-A440.2/A440.3.
 - .4 Forced Entry: F2.

2.3 FABRICATION

- .1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 and as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less, and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
- .3 Face dimensions detailed maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement with shop coat primer to [MPI #79] 380 g/m² zinc coating to ASTM A123/A123M.

2.4 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 - .1 Black anodized finish.

2.5 ISOLATION COATING

- .1 In accordance with manufacturer's recommendations for surface conditions.
- .2 Isolate aluminum from following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

2.6 GLAZING

- .1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.7 HARDWARE

- .1 Hardware: stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.
- .2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

2.8 AIR BARRIER AND VAPOUR RETARDER

- .1 Equip window frames with installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
 - .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
 - .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: Verify conditions of substrates previously installed are acceptable for beginning product installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate. Inform Consultant of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

- .1 Window installation:
 - .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - .2 Arrange components to prevent variation in colour.
- .2 Sill installation:
 - .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
 - .2 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.
 - .3 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

- .3 Apply foam insulation in shim spaces to fill manufacturers approved applicator and in accordance with manufacturers instructions to maintain continuity of thermal barrier. Cut back or tool foam to allow for finish caulking.
- .4 Sealant: Comply with requirements of Section 07 92 00 - Joint Sealants for sealants to be installed during installation of windows and screens.
 - .1 Seal joints between windows and windowsills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Seal between sill upstand and window-frame. Seal butt joints in continuous sills.

3.3 SITE QUALITY CONTROL

- .1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
- .2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

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

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by window installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 11 13 - Hollow Metal Doors and Frames
- .2 Section 08 11 16 - Aluminum Doors and Frames

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA):
 - .1 ANSI/BHMA A156.1- 2016, Butts and Hinges
 - .2 ANSI/BHMA A156.3- 2020, Exit Devices
 - .3 ANSI/BHMA A156.4- 2019, Door Controls - Closers
 - .4 ANSI/BHMA A156.5- 2020, Cylinders and Input Devices for Locks
 - .5 ANSI/BHMA A156.6- 2015, Architectural Door Trim
 - .6 ANSI/BHMA A156.8- 2015, Door Controls - Overhead Stops and Holders
 - .7 ANSI/BHMA A156.10- 2017, Power Operated Pedestrian Doors
 - .8 ANSI/BHMA A156.12- 2018, Interconnected Locks
 - .9 ANSI/BHMA A156.13- 2017, Mortise Locks and Latches
 - .10 ANSI/BHMA A156.18- 2020, Materials and Finishes
 - .11 ANSI/BHMA A156.19- 2019, Power Assist and Low Energy Power Operated Doors
- .2 Canadian Steel Door Manufacturers' Association (CSDMA):
 - .1 CSDMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
- .3 CSA Group (CSA):
 - .1 CSA B651- 18, Accessible Design for the Built Environment
- .4 ULC-S132-93 (R2001) Emergency exit and emergency fire exit hardware.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Hardware List:
 - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
 - .3 Refer to Cash Allowance.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .4 Furnish other sections with two (2) complete sets of hardware templates for related fabricating and installation.
- .5 Submit for owner review and comments two (2) key schedules listing the door number, hardware heading or item, lock function and the key group.
- .6 Wiring Diagrams:
 - .1 Co-ordinate with related trades, meet with the owner and security provider and submit a written description of the functional use (mode of operation) of electrical hardware products specified. Include operation for ingress, egress, fire alarm, and after hours use where applicable. Include door and frame elevations showing the location of each item of electrical hardware to be installed, mode of operation including a diagram showing number and size of conductors. Indicate on elevation drawing items provided by related trades, include for back boxes, and

120V power sources. Provide point to point drawings showing terminal connections necessary for a complete installation.

- .7 Closeout Submittals:
 - .1 Provide operation and maintenance data for door closers, locksets, door holders electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .8 Submit Warranty.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors: certified by a Canadian Certification Organization accredited by the Standards Council of Canada.
 - .2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .2 Storage and Protection:
 - .1 Store finishing hardware in locked, clean and dry area.
- .3 Where required, package items of hardware separately for delivery to other fabricators for their installation.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials: Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .1 Tools: Supply two sets of wrenches/installation tool for locks/passage/privacy, door closers, locksets, and fire exit hardware.

1.8 WARRANTY

- .1 Contractor hereby warrants materials and installation for the following:
 - .1 All hardware: three (3) years supply and install.

Part 2 Products

2.1 DOOR HARDWARE

- .1 Use products from only one manufacturer for similar items.
- .2 Locks and Latches:
 - .1 Locks and latches: to ANSI/BHMA A156.13, mortise lock sets, designed for function as stated in Hardware Schedule.
 - .2 Latch bolts to be anti friction with separate latch guard.

- .3 ULC labels and 19mm throw for all fire rated doors.
- .4 Auxiliary dead bolts to have hardened steel pin inserts.
- .5 Where lever trim is required, trim to have concealed through bolt mounting and the lever is to be solid cast or forged material with a return to the door face.
- .6 Finished as stated in Hardware Schedule.
- .7 Acceptable Manufacturers:
 - .1 Corbin.
 - .2 Yale.
 - .3 Sargent.
 - .4 Schlage.
 - .5 Stanley/Best.
- .3 Butts and hinges:
 - .1 Butts and Hinges: To ANSI/BHMA A156.1, three knuckle concealed bearing. Exterior out swing doors must be non-ferrous and have non-removable pins (NRP).
 - .2 Acceptable Manufacturers:
 - .1 Hager.
 - .2 McKinney.
 - .3 Stanley.
 - .4 Ives.
- .4 Exit Devices: To ANSI/BHMA A156.3 and ULC S132-93
 - .1 Low profile push pad style. Outside trim to have the same trim design as the locksets.
 - .2 Furnish all devices in dull chrome plated finish.
 - .3 Exit hardware must have the correct life safety or fire rated labels attached to the active case.
 - .4 Ensure that the actuating push pad covers 1/2 of the door opening.
 - .5 Exit devices installed on exterior doors to have dead latching bolts which ensure tamper proof security.
 - .6 Where pairs of doors are indicated, have two (2) vertical rod exit devices. Ensure that no over lapping astragal is used by the door manufacturer.
 - .7 Acceptable Manufacturers:
 - .1 Yale
 - .2 Corbin
 - .3 Sargent
 - .4 Von Duprin
- .5 Door Closers and Accessories:
 - .1 Door controls (closers): To ANSI/BHMA A156.4.
 - .2 To have full adjustment features including back check, general speed, and latch speed control.
 - .3 All interior door closers to have reduced opening force spring power of 22N as required by the barrier free codes.
 - .4 Surface mounted door closers are to be located on the room side of the door whenever possible.
 - .5 Provide all mounting plates for door closers required to mount on special door and frame conditions. Check all door and frame details from related trades to ensure dimensions have not changed and hardware will not conflict with window lite kits.
 - .6 Where listed, door closers are to have full body covers to match the project finishes.
 - .7 Acceptable Manufacturers:
 - .1 LCN.
- .6 Door stops and holders:

- .1 Wall stops are only to be used on proper wall conditions such as block or masonry. Supply floor stops with sufficient height to suit the floor condition or undercut of doors.
- .2 Overhead stops and holders to be surface mounted unless there is a conflict with door closers or other hardware. Provide door stays with friction action in locations that do not have door closers. Install overhead stops and holders for 90 DEG stop unless otherwise specified.
- .3 Acceptable Manufacturers:
 - .1 Rixson.
 - .2 Sargent.
 - .3 Glynn-Johnson.
 - .4 Hager.
- .7 Door Operators:
 - .1 Power-operated pedestrian doors: To ANSI/BHMA A156.10
 - .2 Door operators will be supplied and installed as listed. Electro-mechanical operator, powered by 1/4 hp motor. Power Transmission has only one moving part, ensuring superior reliability and low overall maintenance. Operator is non-handed to insure maximum versatility in adapting to varying field conditions. The operator housing provides a seal against dust, dirt and moisture.
 - .3 A self-contained, solid state integrated circuit controls the operation and switching of the swing power operator. The electronic control provides low voltage power supply for all means of actuation. No external or auxiliary low voltage power source will be allowed. The controls include time delay (5 to 30 seconds) for normal cycle.
 - .4 Interfaced with the transmission system is a DC shunt-wound permanent magnet motor with sealed ball bearings. System operates from 120 VAC-60 cycle-1 phase power supply. Operator is mounted in the header case housing using vibration isolators to maintain quiet operation.
 - .5 Acceptable Products:
 - .1 Operator: Entrematic, HA-8 x cast motor c/w 3 Amp power supply. Finish: 689.
 - .2 Actuator touch: (LCN 8370-836T).
 - .3 Surface Box: BEA, 10BOX45SQSM. Finish: BL.
- .8 Architectural Door Trim: To ANSI/BHMA A156.6, as listed in Hardware Schedule.
 - .1 All kickplates, push plates, and bumper plates must have all sides beveled and corners rounded to ensure there are no sharp edges. Supply plates with tape mounting or if screws are listed, with counter sunk screw holes. The plates will be .050 thick unless listed otherwise. Size to suit door width. Kickplate will be door width less 35 mm for single door and less 25 mm for pairs of doors.
 - .2 When push plates are listed with door pulls, install the push plate to conceal the through bolt.
 - .3 Pulls to be supplied with back to back (BTB) or through bolt mounting.
 - .4 All escutcheon plates to have a three digit room number engraved. Numbers to be 19mm high, Helvetica Medium, filled black.
 - .5 Acceptable Manufacturers:
 - .1 Hager.
 - .2 CBH.
 - .3 Standard.
- .9 Door seals:
 - .1 Perimeter seals to be supplied to fully cover all gaps between the door, frame, and floor condition to seal against weather, sound, or smoke.
 - .2 Frame gasketing to be closed cell neoprene. The extruded housing to have a rib to prevent distortion during installation. Aluminum frames to be equipped with felt inserts by the frame supplier.

- .3 Door bottoms will be heavy duty and have an adjustment screw to ensure proper contact with the floor. Supply the correct drop insert for carpet where required.
- .4 Supply thermally broken thresholds for all exterior door openings.
- .5 Acceptable Manufacturers:
 - .1 KN Crowder
 - .2 Pemko
 - .3 Trimco

2.2 FASTENINGS

- .1 Use only fasteners provided by the manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Match exposed fastening devices to finish of hardware.
- .4 Use fasteners compatible with the material they are used in.

2.3 KEYING

- .1 All keyed locksets shall be keyed differently. Master keyed to Owner's request.
- .2 Provide keys in duplicate for every lock of the Work.
- .3 Provide 3 master keys for each master key or grand master key group.
- .4 Stamp keying code numbers on keys and cylinders.

Part 3 Execution

3.1 INSTALLATION

- .1 Manufacturer's Instructions: Comply with manufacturer's recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Provide door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Provide manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.
- .5 Use only manufacturer's supplied fasteners.
 - .1 Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.2 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.
- .3 Remove protective material from hardware items where present.

- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 ASTM International (ASTM):
 - .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets
 - .2 ASTM D2240-15e1, Standard Test Method for Rubber Property - Durometer Hardness
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-12.1-2017, Safety Glazing
 - .2 CAN/CGSB-12.2-M 91, Flat, Clear Sheet Glass
 - .3 CAN/CGSB-12.3-M 91, Flat, Clear Float Glass
 - .4 CAN/CGSB-12.8-2017, Insulating Glass Units
 - .5 CAN/CGSB-12.10-M 76, Glass, Light and Heat Reflecting
- .3 Flat Glass Manufacturers Association (FGMA).
 - .1 FGMA Glazing Manual - 1997.

1.2 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures

1.3 AMBIENT CONDITIONS

- .1 Ambient Requirements:
 - .1 Install glazing when ambient temperature is 10 °C minimum. Maintain ventilated environment for 24 hours after application.

Part 2 Products**2.1 MATERIALS**

- .1 GL2 Fire Rated Glazing (FRG):
 - .1 45 min Fire Protective glazing. Clear for use in rated doors and HM fire rated frames. Glass shall be ULC listed and conform to ULC CAN 4-S104 and ULC 4-S106. Impact Safety tested to CAN/CGSB 12.1. Include correct glazing tape and setting blocks to ULC product listing. Approved Brands: Super Clear 45-HS, Pilkington Pyrostop 45, Fireswiss 45.
- .2 GL3 Insulating Glass Units (light tint):
 - .1 Insulating glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
 - .1 Glass: to CAN/CGSB-12.3 CAN/CGSB-12.1 CAN/CGSB-12.2 CAN/CGSB-12.10.
 - .2 Glass thickness: 6 mm (1/4") tempered glass inner and 6mm tempered outer light with neutral grey tint shading.
 - .3 Inter-cavity space thickness: 13 mm (1/2") with low conductivity spacers.
 - .4 Glass coating: Low E 180, LOF/Pilkington Energy Advantage Low E or Solarban 60. Low E on surface 2.
 - .5 Inert gas fill: argon.
 - .6 max SHGC 0.30.
 - .7 Min VLT 50
- .3 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.2 ACCESSORIES

- .1 Setting blocks: neoprene, Shore A durometer hardness to ASTM D2240, to suit glazing method, glass lite weight and area.
- .2 Spacer shims: neoprene, Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; size; black colour.
- .4 Glazing clips: manufacturer's standard type.
- .5 Lock-strip gaskets: to ASTM C542.
- .6 ULC Listed accessories for fire rated glazing.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 EXAMINATION

- .1 Verification of Conditions: Verify conditions of substrates previously installed are acceptable for beginning glazing installation in accordance with manufacturer's instructions.
 - .1 Verify that openings for glazing are correctly sized and within tolerance.
 - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

- .1 Perform work in accordance with FGMA Glazing Manual IGMAC for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of lite or unit.
- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
 - .2 Remove traces of primer and sealants.
 - .3 Remove glazing materials from finish surfaces.
 - .4 Remove labels after work is complete.

- .5 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.6 PROTECTION

- .1 After installation, mark each lite with an "X" by using removable plastic tape or paste.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM C475/C475M-17, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
 - .2 ASTM C514-14, Standard Specification for Nails for the Application of Gypsum Board
 - .3 ASTM C840-16, Standard Specification for Application and Finishing of Gypsum Board
 - .4 ASTM C1002-14, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
 - .5 ASTM C1047-19, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
 - .6 ASTM C1280-13, Standard Specification for Application of Gypsum Sheathing
- .2 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
- .3 South Coast Air Quality Management District (SCAQMD):

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address and applicable standard designation.
- .3 Exercise care in unloading gypsum board materials shipment to prevent damage.
- .4 Storage and Handling Requirements in accordance with ASTM C 840-16:
 - .1 Store gypsum board assemblies materials level flat off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
 - .3 Protect gypsum board from direct exposure to rain, snow, sunlight, or other excessive weather conditions.
 - .4 Protect ready mix joint compounds from freezing, exposure to extreme heat and direct sunlight.
 - .5 Protect from weather, elements and damage from construction operations.
 - .6 Handle gypsum boards to prevent damage to edges, ends or surfaces.
 - .7 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.3 AMBIENT CONDITIONS

- .1 Maintain temperature 10 °C minimum, 21 °C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, clean, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products

2.1 MATERIALS

- .1 Exterior sheathing: Fibreglass mat reinforced gypsum sheathing, 16 mm thick, 1220 mm wide x maximum practical length.
- .2 Standard board: to ASTM C1396/C1396M-14 regular, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .3 Abuse resistant board: to ASTM C1396/C1396M-14, Type X, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.
- .4 Gypsum shaftliner sheathing board: to ASTM C1396/C1396M-14, and C1658, Type X, 25.4 mm thick, 1200 mm wide x maximum practical length.
- .5 Metal furring runners, hangers, tie wires, inserts, and anchors.
- .6 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .7 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .8 C-H shaped steel studs to requirements of ULC W452 System A 64 mm steel stud 0.46 base metal thickness galvanized steel 1-hour.
- .9 J shaped runner 64 mm deep with unequal legs to ULC W452 System A 1 hour 0.56 base metal thickness galvanized steel.
- .10 Nails: to ASTM C514-14
- .11 Steel drill screws: to ASTM C1002-14
- .12 Stud adhesive: to CAN/CGSB-71.25.
- .13 Laminating compound: as recommended by manufacturer, asbestos-free.
- .14 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, 0.5 mm base thickness, perforated flanges, one piece length per location.
- .15 Sealants: in accordance with Section 07 92 00 - Joint Sealants.
- .16 Joint compound: to ASTM C475, asbestos-free

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assemblies installation in accordance with manufacturer's written instructions.
 - .1 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840-16 except where specified otherwise
- .2 Do application of gypsum sheathing to ASTM C1280-13a
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840-16 except where specified otherwise
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.
- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

- .10 Install wall furring for gypsum board wall finishes to ASTM C840-16, except where specified otherwise
- .11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .13 Erect drywall resilient furring transversely across studs or channels, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.
- .14 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single layer gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840-16
 - .2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.
- .3 Exterior Soffits and Ceilings: install exterior gypsum board perpendicular to supports; stagger end joints over supports. Install with 6 mm gap where boards abut other work.
- .4 Apply water-resistant gypsum board adjacent to slop sinks in janitors closets. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.
- .5 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, in partitions where perimeter sealed with acoustic sealant.
- .6 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .7 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .8 Install gypsum board with face side out.
- .9 Do not install damaged or damp boards.
- .10 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm (6") on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
- .6 Provide continuous polyethylene dust barrier behind and across control joints.
- .7 Locate control joints where indicated and at approximate 10 m spacing on long corridor runs, at approximate 15 m spacing on ceilings.

- .8 Install control joints straight and true.
- .9 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.
- .10 Splice corners and intersections together and secure to each member with 3 screws.
- .11 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .12 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .13 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 4: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
- .14 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .15 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board, invisible after surface finish is completed.
- .16 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .17 Completed installation smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 CLEANING

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

3.6 SCHEDULES

- .1 Construct fire rated assemblies where indicated on drawings.
 - .1 1 hour shaftwall ULC W452.
 - .2 1 hour wall ULC W407.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM C645-14e1, Standard Specification for Nonstructural Steel Framing Members.
 - .2 ASTM A653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - .3 ASTM C754-15, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C645, 152 and 92, 64 mm stud size, roll formed from 0.91 mm thickness hot dipped zinc-coated (galvanized) steel sheet in accordance with ASTM A653, Z180, for screw attachment of gypsum board.
 - .1 Knock-out service holes at 460 mm centres.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, and as follows:
 - .1 Slotted Deflection Track for Fire Separations: Premanufactured slotted top runner with 63 mm down standing legs and having 6 mm wide x 38 mm high slots spaced at 25 mm on centre along length of runner; tested and certified for use in fire rated wall construction.
 - .2 Deep Leg Deflection Track: Top runner having 76 mm down standing legs; maintaining 25 mm minimum deflection space.
 - .3 Base Runner: Bottom track with 33 mm upstanding legs.
- .3 Furring Channels: Commercial steel sheet in accordance with ASTM A653, Z180, hot dipped zinc-coated (galvanized), as follows:
 - .1 Hat Shaped, Rigid Furring Channels: ASTM C645, 0.75 mm thickness x 22 mm deep

- .2 Resilient Furring Channels: 0.46 mm thickness x 13 mm deep members designed to reduce sound transmission having asymmetrical face attached to single flange by a slotted leg (web).
- .4 Curving Tracks: Commercial steel sheet with ASTM A653, Z180, hot dipped zinc-coated (galvanized), complete with flexible sliding straps to allow for curvature indicated on drawings; width to suit framing, and as follows:
 - .1 Width: 92 mm.
 - .2 Minimum base metal thickness: 0.75 mm.
- .5 Metal channel stiffener: to suit stud size, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .6 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .7 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.

Part 3 Execution

3.1 EXAMINATION

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

3.2 ERECTION

- .1 Erect partitions in accordance with framing requirements of ASTM C754
- .2 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
- .3 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .4 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
 - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .5 Erect metal studding to tolerance of 1:1000.
- .6 Attach studs to track using screws.
- .7 Co-ordinate simultaneous erection of studs with installation of service lines. Align web openings when erecting studs.
- .8 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .9 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
 - .1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
- .10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
 - .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
 - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

- .13 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .14 Install plywood backing, flush with face of studs, where indicated on drawings and when necessary to support components of other trades.
- .15 Extend partitions to ceiling height except where noted otherwise on drawings.
- .16 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
- .17 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .18 Install insulating strip under studs and tracks around perimeter of sound control partitions.
- .19 Curved Partition Tracks:
 - .1 Cut top and bottom track (runners) through leg and web at 50 mm intervals for arc length. In cutting lengths of track, allow for uncut straight lengths minimum 300 mm at ends of arcs. Shape curving tracks to profiles indicated on drawings in accordance with manufacturer's instructions.
 - .2 Bend track to uniform curve and locate straight lengths so they form a true tangent to arcs.
 - .3 Support outside (cut) leg of track by clinching steel sheet strip, 25 mm high, by thickness of track metal, to inside of cut legs using metal lock fasteners.
 - .4 Begin and end arc with a stud and space intermediate studs equally along arcs at stud spacing recommended in writing by gypsum board manufacturer for radii indicated. On straight lengths of minimum 2 studs at ends of arcs, place studs at 150 mm on centre.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

Part 1 General**1.1 SUMMARY**

- .1 Section includes:
 - .1 Materials and application of acoustical units for direct application or for application and installation within a suspended ceiling.
 - .2 Acoustical Suspension system.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM C635/C635M-13a, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .3 ASTM E1264-14, Standard Classification for Acoustical Ceiling Products.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

1.3 COORDINATION

- .1 Do not begin erection of ceiling suspension system until work above ceiling has been inspected by Consultant.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Samples:
 - .1 Submit duplicate 100 mm x 100 mm samples of each type of acoustical unit.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
 - .1 Protect on site stored or installed absorptive material from moisture damage.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse, recycling or disposal in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .2 Divert unused metal materials from landfill to metal recycling facility.
 - .3 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 EXTRA MATERIALS

- .1 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project.
- .2 Ensure extra materials are from same production run as installed materials.
- .3 Clearly identify each type of acoustic unit, including colour and texture.

- .4 Deliver to Owner, upon completion of the work of this section.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Design Requirements:
 - .1 Maximum deflection: 1/360th of span to ASTM C635/ASTM C635M deflection test.

2.2 ACOUSTICAL CEILING SUSPENSION

- .1 Suspension system to ASTM C 635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel mill finished.
- .3 Suspension system: Heavy duty two directional exposed tee bar grid system:
 - .1 Two directional exposed tee bar 610 mm x 1220mm grid.
 - .2 Acceptable product: Donn DX/DXL by CGC or approved equal.
- .4 Exposed tee bar grid components: shop painted satin sheen white. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
- .5 Hanger wire: galvanized soft annealed steel wire:
 - .1 3.6 mm diameter for access tile ceilings.
- .6 Accessories: splices, clips, wire ties, retainers and wall moulding flush and preformed corner cover, to complement suspension system components, as recommended by system manufacturer.

2.3 ACOUSTICAL CEILING PANELS

- .1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1-M89 ASTM E 1264-98.
 - .1 610mm x 1220mm x 16mm (24" x 48" x 5/8"), square edge, white.
 - .1 Acceptable product:
 - .1 Radar ClimaPlus by CGC or approved equal.

Part 3 Execution

3.1 SUSPENSION SYSTEM INSTALLATION

- .1 Comply with manufacturer's written installation instructions and recommendations, including product technical bulletins, product carton installation instructions, and data sheets.
- .2 Install suspension system in accordance with accepted shop drawings, Certification Organizations tested design requirements and ASTM C636/C636M except where specified otherwise.
- .3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.
- .4 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width, also refer to reflected ceiling plan.
- .5 Finished ceiling system to be square with adjoining walls and level within 1:1000.
- .6 Secure hangers system to existing structural steel.
- .7 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
- .8 Ensure suspension system is coordinated with location of related components.
- .9 Install wall moulding to provide correct ceiling height.

- .10 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles and speakers.
- .11 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .12 Interlock cross member to main runner to provide rigid assembly.
- .13 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
- .14 Install perimeter trim.
- .15 Install preformed corner cover to all bullnosed block corners.

3.2 ACOUSTICAL CEILING PANEL INSTALLATION

- .1 Install acoustical panels and tiles in ceiling suspension system in accordance with manufacturer's instructions and as indicated.
- .2 Install acoustical units as indicated on reflected ceiling plan.
- .3 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.
- .4 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.3 CLEANING

- .1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 09 65 16 Resilient Sheet Flooring
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 06 10 53 - Miscellaneous Rough Carpentry
- .4 Section 08 71 00 - Door Hardware

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM F1303-04, Standard Specification for Sheet Vinyl Floor Covering with Backing
 - .2 ASTM F1861-21, Standard Specification for Resilient Wall Base
- .2 National Floor Covering Association of Canada (NFCA):
 - .1 NFCA Floor Covering Reference Manual

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit the following action submittals before starting work of this Section:
 - .1 Product Data: Product literature and data sheets, including product characteristics, performance criteria, physical sizes, finishes, and limitations.
 - .2 Selection Samples: Full range of samples for each Product specified, representing available colours, patterns, textures, profiles, and finishes.
- .3 Samples:
 - .1 Submit duplicate 300 x 300 mm sample pieces of sheet material.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials: Supply extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 - Closeout Submittals, and as follows:
 - .1 Provide the equivalent of 3% of total floor area of each colour, pattern and type flooring material required for project for maintenance use.
 - .2 Extra materials one piece and from same production run as installed materials.
 - .3 Identify each roll of sheet flooring and each container of adhesive.
 - .4 Deliver to Consultant, upon completion of the work of this section.
 - .5 Store where directed by Consultant.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in a clean dry location, and in accordance with manufacturer's recommendations in well-ventilated area.
 - .2 Protect adhesives, fillers, and sealants from freezing.
 - .3 Store and protect materials from nicks, scratches, and blemishes.
 - .4 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

Part 2 Products

2.1 RESILIENT SHEET FLOORING MATERIALS

- .1 Sheet Vinyl with Backing: To ASTM F1303.
 - .1 Type: Homogeneous.
 - .2 Grade: 1 - Commercial.
 - .3 Backing Class: A - Fibrous (non-asbestos formulated).
 - .4 Colour: As selected by Consultant.
 - .5 Thickness: 2.0 mm nominal.
 - .6 Slip resistance:
 - .1 0.53 wet, when tested to ASTM C1028.
 - .2 0.73 dry, when tested to ASTM C1028.
 - .7 Acceptable Manufacturers:
 - .1 Mohawk Group
 - .2 Tarkett
 - .3 Polyfloor

2.2 RESILIENT BASE MATERIALS

- .1 Resilient Base: To ASTM F1861.
 - .1 Type: Rubber.
 - .2 Style: Cove.
 - .3 Height: 101.6 mm nominal.
 - .4 Lengths: manufactured in standard lengths minimum 2400 mm long.
 - .5 Colour: As selected by Consultant.
 - .1 Use same dye lot for entire Project.

2.3 ACCESSORIES

- .1 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
- .2 Sub-floor Filler and Leveler: as recommended by sheet flooring manufacturer.
- .3 Metal Transition and Edge Strips: In accordance with CSA B651 for height and slope, extruded aluminum, smooth, mill finish, with lip to extend under sheet flooring, shoulder flush with top of adjacent floor finish.
- .4 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: Verify that substrate conditions are clean, free of cracks, ridges, depressions, scale, foreign materials, and acceptable for resilient sheet flooring installation in accordance with manufacturer's instructions.
 - .1 Visually inspect substrate.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions are remedied.

- .2 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.2 PREPARATION

- .1 Remove subfloor ridges and bumps.
- .2 Clean floor.
- .3 Fill low spots, cracks, joints, holes and other defects with sub-floor filler. Trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler is dry and cured.
- .4 Prepare concrete slab to resilient flooring manufacturer's recommendations.

3.3 INSTALLATION - FLOORING

- .1 Provide high ventilation rate maximizing outside air during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside.
- .2 Apply adhesive uniformly using manufacturer's recommended trowel. Do not spread more adhesive than can be covered by sheet flooring before initial set takes place.
- .3 Lay flooring to produce a minimum number of seams. Border widths shall be a minimum 1/3 the width of full material.
- .4 Heat weld seams of linoleum sheet flooring in accordance with manufacturer's printed instructions.
- .5 As installation progresses, and after installation roll sheet flooring with a minimum 45 -kg roller, or other weight where indicated in manufacturer's installation recommendations, for full adhesion and to expel air bubbles.
- .6 As installation progresses, and after installation roll sheet flooring as recommended by manufacturer.
- .7 Cut flooring neatly around fixed objects.
- .8 Install feature strips and floor markings where indicated. Fit joints tightly.
- .9 Install flooring in pan type floor access covers. Maintain continuity of floor pattern.
- .10 Install sheet flooring continuously in areas which will be under built-in furniture.
- .11 Install sheet flooring continuously through areas to receive movable type partitions without interrupting floor pattern.
- .12 Terminate flooring under centreline of door, in openings where adjacent floor finish materials or colours are dissimilar.
- .13 Install metal edge strips at unprotected and exposed edges where sheet flooring terminates.

3.4 INSTALLATION - BASE

- .1 Lay out resilient base to keep the number of joints at a minimum.
- .2 Clean substrate and apply one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set resilient base against wall and floor surfaces tightly by using 3-kg hand roller.
- .5 Install straight and level, to variation of 1:1000.
- .6 Scribe, cut, and fit wall base to door frames and other obstructions. Install premoulded end pieces at flush door frames.
- .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.
- .8 Provide straight (toeless) type base where floor finish is carpet, cove type base elsewhere.
- .9 Install toeless type base before installation of carpet on floors.
- .10 Heat weld base in accordance with manufacturer's printed instructions.

3.5 PROTECTION

- .1 Protect new floors from time of final set of adhesive until final inspection.
- .2 Prohibit traffic on floor for a minimum of 48 hours after installation.

- .3 Use only water-based coating for linoleum.
- .4 Protect flooring from abrasions, indentations and other damages from subsequent operations and placement of equipment, during remainder of construction.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 09 65 16 Resilient Sheet Flooring
- .2 Section 03 30 00 - Cast-in-Place Concrete
- .3 Section 06 10 53 - Miscellaneous Rough Carpentry
- .4 Section 08 71 00 - Door Hardware

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM):
 - .1 ASTM F1066-04, Standard Specification for Vinyl Composition Floor Tile

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit the following action submittals before starting work of this section:
 - .1 Product data: Product literature and data sheets for installed products, including product characteristics, performance criteria, physical sizes, finishes,, and limitations.
 - .2 Shop drawings:
 - .3 Selection samples: Full range of samples, for each product specified, including edge strips, reducer strips, and transition strips, representing available colours, patterns, textures, profiles, and finishes.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide 10% of each colour, pattern and type flooring material required for this project for maintenance use.
 - .3 Extra materials from same production run as installed materials.
 - .4 Identify each container of floor tile and each container of adhesive.
 - .5 Deliver to Consultant, upon completion of the work of this section.
 - .6 Store where directed by Consultant.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Perform in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location, in accordance with manufacturer's recommendations, and in clean, temperature controlled, well-ventilated area.
 - .2 Store and protect resilient tile flooring from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.

1.6 SITE CONDITIONS

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20°C for 48 hours before, during and for 48 hours after installation.

Part 2 Products

2.1 RESILIENT TILE FLOORING MATERIALS

- .1 Luxury Vinyl Tile: To ASTM F1066.
 - .1 Acceptable Manufacturers:
 - .1 Polyfloor
 - .2 Interface
 - .3 Mohawk Group
 - .2 Size: 200 mm x 1000 mm nominal.
 - .3 Colours: selected by consultant.
- .2 Resilient base: Section 09 65 16.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: Verify that conditions of substrate previously installed are acceptable for resilient tile flooring installation in accordance with manufacturer's instructions.
 - .1 Visually inspect substrate.
 - .2 Report defective conditions affecting installation to Consultant in writing immediately upon discovery and before beginning installation.
 - .3 Proceed with installation only after defective surfaces and conditions have been remedied.
- .2 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer.

3.2 PREPARATION

- .1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
- .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .3 Prepare concrete to flooring manufacturer's printed instructions.

3.3 INSTALLATION - RESILIENT TILE

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside.
- .2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .3 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .4 As installation progresses, and after installation, roll flooring in 2 directions with 45 kg minimum roller to ensure full adhesion.
- .5 Install flooring to pattern indicated.
- .6 Cut resilient tile and fit neatly around fixed objects.
- .7 Install feature strips and floor markings where indicated. Fit joints tightly.
- .8 Install flooring in pan type floor access covers. Maintain floor pattern.
- .9 Install resilient tile flooring through areas to receive movable type partitions without interrupting floor pattern.

- .10 Terminate flooring at centreline of door, in openings where adjacent floor finish material or colour are dissimilar.
- .11 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.4 CLEANING

- .1 Progress Cleaning: Perform in accordance with Section 01 74 00 - Cleaning. Remove excess adhesive before cured.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.
 - .1 Clean flooring and base surfaces to flooring manufacturer's printed instructions.
- .3 Remove excess adhesive from floor, base and wall surfaces without damage.
- .4 Clean, seal and wax floor and base surface to flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.
- .5 Waste Management: Perform in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

- .1 Protect new floors from time of final set of adhesive until final inspection.
- .2 Prohibit traffic on resilient tile flooring for a minimum 48 hours after installation.
- .3 Protect new floors after initial waxing until final inspection.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 04 22 00 - Concrete Unit Masonry
- .2 Section 05 50 00 - Metal Fabrications
- .3 Section 08 11 13 - Hollow Metal Doors and Frames
- .4 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

- .1 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.3 QUALITY ASSURANCE

- .1 Qualifications: Contractor: minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Conform to latest MPI requirements for interior painting and repainting work including preparation and priming.
- .3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.
- .4 Standard of Acceptance:
 - .1 Walls: No defects visible from a distance of 1000 mm at 90° to surface.
 - .2 Ceilings: No defects visible from floor at 45° to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data for each paint and coating product to be used.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Pack, ship, handle and unload materials in accordance with Section 01 61 00 - Common Product Requirements and manufacturer's written instructions.
- .2 Acceptance at site:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged, opened and rejected materials from site.
- .4 Storage and Protection:
 - .1 Store materials and supplies away from heat generating devices.
 - .2 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

- .6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

1.6 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
- .1 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .2 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Perform painting work when maximum moisture content of the substrate is below:
- .1 Allow new concrete and masonry to cure minimum of 28 days.
- .2 15 % for wood.
- .3 12 % for plaster and gypsum board.
- .2 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
- .3 Surface and Environmental Conditions:
- .1 Apply paint finish in areas where dust is no longer being generated by related construction operations.
- .2 Apply paint when previous coat of paint is dry or adequately cured.

Part 2 Products

2.1 MATERIALS

- .1 Supply paint materials for paint systems from single manufacturer.
- .1 Acceptable Manufacturers: Sherwin Williams, PPG, Dulux, Benjamin Moore or approved alternate.
- .2 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing and as recommended by manufacturer.
- .3 Provide paint products meeting MPI "Environmentally Friendly" E1, E2 E3 ratings based on VOC (EPA Method 24) content levels.
- .4 Colours:
- .1 Consultant will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon on selection of a maximum of three base colours and three accent colours. All other painting and patch painting shall match existing.
- .5 Mixing and tinting:
- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.
- .6 Gloss/sheen ratings:
- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:
- .1

Gloss Level-Category	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish	Max. 5	Max. 10
Gloss Level 2 - Velvet	Max.10	10 to 35
Gloss Level 3 - Eggshell	10 to 25	10 to 35
Gloss Level 4 - Satin	20 to 35	min. 35

Gloss Level 5 - Semi-Gloss	35 to 70	
Gloss Level 6 - Gloss	70 to 85	
Gloss Level 7 - High Gloss	More than 85	

- .2 Gloss level ratings of painted surfaces as specified herein and as noted on Finish Schedule.
- .7 Exterior painting:
 - .1 Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metal:
 - .1 EXT 5.1C W.B. Light Industrial Coating (over alkyd metal primer), G6 finish.
 - .2 Galvanized Metal: high contact/high traffic areas (doors, frames, railings and handrails, etc.):
 - .1 EXT 5.3J W.B. Light Industrial Coating (over w.b. galvanized primer), G6 finish.
- .8 Interior painting:
 - .1 Structural Steel and Metal Fabrications: columns, beams, and miscellaneous metal:
 - .1 INT 5.1RR High Performance Architectural Latex (over alkyd primer), G2 finish.
 - .2 Exposed steel joists, exposed steel decking and exposed ductwork:
 - .1 INT 5.1Z W.B. Dry Fall.
 - .3 Bare Galvanized Metal: (doors, frames, misc. steel, railings and handrails, etc.):
 - .1 INT 5.3K W.B. Light Industrial Coating (over w.b. galvanized primer), G5 finish.
 - .1 After priming, let dry and cure fully for 48 hours then test for adhesion before top-coating.
 - .4 Dressed Lumber: doors, door and window frames, casings, mouldings, etc.:
 - .1 INT 6.3K Polyurethan Varnish, G6 finish.
 - .5 Bare Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock" type material, and textured finishes:
 - .1 INT 9.2M Institutional Low Odor/VOC (over w.b. primer sealer, low VOC), G3 finish.
 - .1 After priming, let dry and cure fully for 48 hours then test for adhesion before top-coating.
 - .6 Bare Concrete Masonry Units:
 - .1 INT 4.2D High Performance Architectural Latex (over latex block filler), G3 finish.
 - .1 After priming, let dry and cure fully for 48 hours then test for adhesion before top-coating.

Part 3 Execution

3.1 GENERAL

- .1 Perform preparation and operations for painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.3 PREPARATION

- .1 Protection of in-place conditions:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Consultant.
 - .3 Clean and prepare surfaces in accordance with SSPC and MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations. Refer to SSPC and MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with Eco TSP as recommended by manufacturer to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
 - .8 Lightly sand all existing painted surfaces specified to be re-painted.
 - .4 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
 - .5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between application of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
 - .6 Touch up of shop primers with primer as specified.

3.4 APPLICATION

- .1 Painting of rooms to include but not limited to walls, radiation covers, doors, frames, window and door trim, base boards, unfinished shelving and other materials which are secured to walls.
- .2 Use method of application approved by Consultant. Apply paint by brush or roller. Conform to manufacturer's application instructions unless specified otherwise..
- .3 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

- .5 Remove runs, sags and brush marks from finished work and repaint.
- .4 Apply coats of paint in continuous film of uniform thickness.
 - .1 Repaint thin spots or bare areas before next coat of paint is applied.
- .5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .8 Finish closets and alcoves as specified for adjoining rooms.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
- .10 **Prime all surfaces and apply 3 finish coats.**

3.5 FIELD QUALITY CONTROL

- .1 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).
- .2 ASTM International
 - .1 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.
- .4 CSA Group (CSA)
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
- .5 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual-current edition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings clearly indicating anchorage and fastening requirements, elevations of each sign, wording and any pictograms required, materials and finishes.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products**2.1 DESIGN CRITERIA**

- .1 Sign supports to be capable of withstanding the combination of following loads:
 - .1 Wind loads in any direction on signboards and on sign supports.
 - .2 Dead load of signboards and sign supports.
 - .3 Ice load on face of signboards and around surface of structural members.

2.2 MATERIALS

- .1 Sign supports:
 - .1 Steel posts: to CSA G40.21, flanged "U" shaped in cross section, measuring 65 mm wide x 30 mm deep. Metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M.
 - .2 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- .2 Signboards:
 - .1 Aluminum sheet: to ASTM B209M, precut to required dimensions
 - .1 Thickness for signboards up to 750 mm wide: 1.6 mm minimum.
 - .2 Thickness for signboards 750-1200 mm wide: 2.1 mm minimum.
 - .2 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
 - .3 Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.
 - .4 Clear varnish protective coat: MPI-EXT 6.4H.

2.3 FABRICATION

- .1 Supports:
 - .1 Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted
 - .2 Welds to be of same strength as adjacent member or casting.
 - .3 Reinforce in area of electrical hand holes to equal strength of full section member.
 - .4 Remove sharp edges and burrs.
- .2 Signboards:
 - .1 Aluminum blanks:
 - .1 Degrease, etch and bonderize with chemical conversion coating.
 - .2 Clean surfaces with xylene thinner. Dry.
 - .3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
 - .4 For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with MPI-EXT 5.4A.
 - .2 Reflective background sheeting and lettering:
 - .1 Cut and apply in accordance with manufacturer's instructions.
 - .2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
 - .3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.
 - .4 Reflective signboard faces may be prepared using silk screen transparent ink.
 - .3 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.
 - .4 Protect finished signboard faces with one coat of clear varnish.
- .3 Schedule: refer to drawings for types and locations.

Part 3 Execution

3.1 INSTALLATION

- .1 Sign support:

- .1 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports.
- .2 Close open aluminum tubes and posts with aluminum cap. Cut oblong holes in shoe bases to drain condensation. Install aluminum bolt cover on each base plate restraining nut.
- .3 Erect posts plumb and square to details as indicated.
- .4 Single channel steel posts:
 - .1 Drive to required depth without damage to posts.
 - .2 If rock or concrete is encountered, drill hole to required depth and set post in sand.
 - .3 In finished concrete surfaces, backfill with concrete or grout. Protect from adverse conditions until cured.
- .2 Signboard:
 - .1 Fasten signboards to supporting posts and brackets as indicated.
 - .2 Use strapping with crimped or bolted connections where signs fastened to utility poles.

3.2 CORRECTING DEFECTS

- .1 Correct defects, identified by Consultant, in sign message, consistency of reflectivity, colour or installation.

3.3 CLEANING

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

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

Part 1 General**1.1 RELATED DOCUMENTS**

- .1 Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specifications Sections apply to this Section.

1.2 SUMMARY

- .1 This Section includes the following:
 - .1 Manually operated, paired panel operable partitions.

1.3 QUALITY ASSURANCE

- .1 Installer Qualifications: An experienced installer who is certified in writing by the partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- .2 Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
- .3 Preparation of the opening to conform to the criteria set forth per ASTM E557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

1.4 SUBMITTALS

- .1 Product Data:
 - .1 Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
- .2 Shop Drawings:
 - .1 Show location and extent of operable partitions. Include plans, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- .3 Setting Drawings:
 - .1 Show imbedded items and cutouts required in other work, including support beam punching template.
- .4 Samples:
 - .1 Color samples demonstrating full range of finishes for Consultant selection. Verification samples will be available in same thickness and material indicated for the work.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- .2 Storage and Handling Requirements:
 - .1 Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.6 WARRANTY

- .1 Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- .2 Partition Warranty period: Two (2) years from date of shipment.
- .3 Suspension System Warranty: Five (5) years from date of shipment.

Part 2 Products

2.1 MANUFACTURERS, PRODUCTS, AND OPERATIONS

- .1 Products: Provide the following product:
 - .1 Acousti-Seal Encore - Paired Panel: Manually operated paired panel operable partition by Modernfold Inc.
 - .2 Manufacturers: Subject to compliance with requirements, provide products by the following approved alternates on the proviso it meets all requirements and/or specifications as per 2.1.1.1:
 - .1 Corflex/Hufcor Inc.
 - .2 Moderco Inc.
 - .3 Panelfold Inc.

2.2 OPERATIONS

- .1 Acousti-Seal Encore - Paired Panel: Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals and automatic top seals.
- .2 Final Closure: Horizontally expanding panel edge with removable crank.

2.3 PANEL CONSTRUCTION

- .1 Nominal 4.25-inch(108 mm) thick panels in manufacturer's standard 51-inch (1295 mm) widths. All panel horizontal and vertical framing members fabricated from minimum 16-gauge formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- .2 Panel skin to be:
 - .1 Roll-formed steel wrapping around panel edge. Panel skins to be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction minimum 54 STC.
- .3 Hinges for Panels, Closure Panels, Pass Doors, and Pocket Doors to be:
 - .1 Full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
- .4 Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at all panel joints.
- .5 Panel Weights:
 - .1 54 STC - 9.5 lbs / square foot.

2.4 PANEL FINISH

- .1 Panel finish to be factory applied, Class "A" rated material. Finish to be:
 - .1 Reinforced vinyl with woven backing weighing not less than 21 ounces (595 grams) per lineal yard.
- .2 Panel Trim: Exposed panel trim of one consistent colour. Colour as selected by Consultant from manufacturers standard range.

2.5 SOUND SEALS

- .1 Vertical Interlocking Sound Seals between panels: Aluminum astragals, with tongue and groove configuration in each panel edge. Rigid plastic astragals are not acceptable.
- .2 Horizontal Top Seals to be Modernfold SureSet™ automatic operable top seals, manually operated top seals not required or permitted.
- .3 Horizontal bottom floor seals to be Modernfold Sureset™ bottom seal:
 - .1 Modernfold SM2 Bottom Seal. Manually activated seals providing nominal 2" (51 mm) operating clearance with an operating range of + 0.50" (13 mm) to -1.50" (38 mm). Seal to be operable from panel edge or face. Extended seal to exert nominal 120 pounds (265 kg) downward force to the floor throughout operating range.

2.6 SUSPENSION SYSTEM

- .1 Suspension System
 - .1 Suspension Tracks: Minimum 11-gauge, 0.12-inch (3.04 mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 0.38-inch (10 mm) diameter threaded rods. Aluminum track is not acceptable.
 - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
 - .2 Carriers: One all-steel trolley with steel tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.

2.7 ACCESSORIES

- .1 1. Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc., with same construction, finish, and appearance as the adjacent panels.
 - .1 Pocket Door configuration to be manually operated: Type III double doors hinged to a jamb on each side and closing in the center. One of the door panels is equipped with a smaller hinged panel that folds back when the operable partition is extended into the pocket.

Part 3 Execution

3.1 INSTALLATION

- .1 General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
- .2 Install operable partitions and accessories after finishing operations, including painting have been completed.
- .3 Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- .4 Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

- .1 Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- .2 Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

- .1 Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

- .1 Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

- .1 Demonstrate proper operation and maintenance procedures to Owner's representative.
- .2 Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM B456-03, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - .3 ASTM A653/A653M-09, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
 - .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
 - .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .3 CSA Group (CSA)
 - .1 CAN/CSA-B651-04, Accessible Design for the Built Environment.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Tools:
 - .1 Provide special tools required for assembly, disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
 - .2 Deliver special tools to Consultant.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials [off ground][indoors][in dry location] and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect [toilet and bathroom accessories from nicks, scratches, and blemishes].
- .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.
- .2 Stainless steel sheet metal: to ASTM A167, Type 304.
- .3 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.
- .4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

- .1 Toilet paper dispenser (TPD): Supplied by Owner, installed by this Contract.
- .2 Paper towel dispenser (PTD): Supplied by Owner, installed by this Contract.
- .3 Soap dispenser (SDP): Supplied by Owner, installed by this Contract.
- .4 Sanitary Napkin Disposal (SND): Supplied by Owner, installed by this Contract.
- .5 Grab bars (GB): 32 mm diameter x 1.6 mm wall tubing of stainless steel, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN.
 - .1 Sizes as indicated.
- .6 Coat hook (CH): stainless steel with 75 mm projection.
- .7 Waste receptacle (WSR): Supplied by Owner.
- .8 Mirror (MR): wall mounted unit concealed hanger, fixed framed mirror 6 mm, stainless steel frame. Size: 1220 mm high and 600 mm wide. Mirror type 3B laminated CAN/CGSB 12.5-M86.
- .9 Shelf (SH): surface mounted, 125 deep, 400 wide, stainless steel.
- .10 Janitor shelf (JNSH): Surface mounted shelf 330 mm deep, 660 mm wide, stainless steel with three anti slip mop holders and four hooks.

2.3 FABRICATION

- .1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
- .2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .3 Brake form sheet metal work with 1.5 mm radius bends.
- .4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .5 Back paint components where contact is made with building finishes to prevent electrolysis.
- .6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CAN/CSA-G164
- .7 Shop assemble components and package complete with anchors and fittings.
- .8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .9 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

- .1 Chrome and nickel plating: to ASTM B456, satin finish.
- .2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Consultant.
- .3 Manufacturer's or brand names on face of units not acceptable.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.
- .2 Inform Consultant of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied

3.2 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
 - .3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
 - .4 Toilet and shower compartments: use male to female through bolts.
- .2 Install grab bars on built-in anchors provided by bar manufacturer.
- .3 Use tamper proof screws/bolts for fasteners.
- .4 Fill units with necessary supplies shortly before final acceptance of building.
- .5 Install mirrors in accordance with Section 08 80 00 - Glazing.

3.3 ADJUSTING

- .1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

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

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.6 SCHEDULE

- .1 Locate accessories where indicated on drawings. Exact locations determined by Consultant.
- .2 Install Owner supplied components where indicated on drawings. Exact locations determined by Consultant.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 National Fire Protection Association (NFPA):
 - .1 NFPA 10-2013, Standard for Portable Fire Extinguishers
- .2 ULC Standards (ULC):
 - .1 CAN/ULC-S508-02, Standard for the Rating and Fire Testing of Fire Extinguishers

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings.
- .4 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Manufacturers: Provide all extinguisher cabinets of the same type from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

1.5 SITE CONDITIONS

- .1 Ambient Conditions: Install portable fire extinguishers after indoor temperatures are maintained within manufacturer's recommended range.

Part 2 Products**2.1 DESCRIPTION**

- .1 Regulatory Requirements: Provide portable fire extinguishers that are listed and labelled in accordance with National Fire Code 2020, and conform to CAN/ULC-S508.
- .2 Portable fire extinguishers and extinguisher cabinets marked in accordance with recommendations of NFPA 10 and CAN/ULC-S508 including the following:
 - .1 Listing and labeling organization of extinguisher.
 - .2 Protect category, type of extinguisher.
 - .3 Extinguisher classification.
 - .4 Performance and fire test standards of extinguisher.

2.2 PORTABLE FIRE EXTINGUISHERS

- .1 Multi-Purpose Dry Chemical Extinguishers:
 - .1 Cartridge operated type or Stored pressure rechargeable type with hose and shut-off nozzle, ULC labelled for A, B and C class protection.
 - .1 Sizes as indicated.
- .2 Kitchen Extinguishers (Class K)
 - .1 Cartridge operated type or Stored pressure rechargeable type ULC labelled for K class protection.
 - .1 Size 6.0 litres or as indicated.

2.3 CABINETS

- .1 Semi-recessed and surface mounted types as indicated, constructed of 1.6 mm thick steel, 180 degrees opening door of 2.5 mm thick steel with latching device.
- .2 Cabinet to maintain fire resistive rating of construction in which they occur.
- .3 Cabinet Door: with 5 mm full clear glass panel.
- .4 Finish:
 - .1 Tub: prime coated.
 - .2 Door and frame: white.

2.4 IDENTIFICATION

- .1 Identify extinguishers in accordance with recommendations of ANSI/NFPA 10.
- .2 Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for future service dates on tag/label.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install or mount extinguishers in cabinets or on brackets as indicated in accordance with NFPA 10.
- .2 Install fire safety blankets as indicated.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Show locker configurations, elevations of groups of lockers, metal thicknesses, factory fabricating and site assembly methods, assembled banks of lockers, trims, doors, handles, locking methods, ventilation and perforation details, and finishes.

Part 2 Products

2.1 METAL LOCKERS

- .1 Lockers: Provide individual lockers.
 - .1 Configurations:
 - .1 Tiers: Two.
 - .2 Height: 1830 mm.
 - .3 Depth: 455 mm.
 - .4 13 mm High Density Polyethylene (HDPE) with homogeneous colour and matte finish texture.
 - .5 Tops: Sloped.
 - .6 Doors: one-piece construction, with continuous piano hinge.
 - .7 Door handle: recessed stainless steel.
 - .8 Colour as selected by Consultant from manufacturers standard colour range.
- .2 Accessories:
 - .1 Locking system: padlocks supplied by Owner.
 - .2 Options: shelf, sloped tops, louvred vented doors, end panels, trim fillers, number plates, and 2 coat hooks per locker.

Part 3 Execution

3.1 INSTALLATION

- .1 Assemble and install lockers in accordance with manufacturer's instructions.
- .2 Securely fasten lockers to ground and nailing strips.
- .3 Install wall trim around recessed locker banks.
- .4 Install finished end panels to exposed ends of locker banks.
- .5 Install number plates

3.2 ADJUSTING

- .1 Adjust metal lockers for correct function and operation in accordance with manufacturer's instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 05 50 00 - Metal Fabrication.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM B 211 - 03 Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
 - .2 ASTM B 209 - 10 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .2 Aluminum Association Designation System for Aluminum Finishes.
 - .1 DAF 45 2003 Designation System for Aluminum Finishes.
- .3 CaGBC LEED Canada for New Construction and Major Renovations, 2009 Green Building Rating System.

1.3 SUBMITTALS

- .1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions: Submit manufacturer's installation instructions.
- .3 Submit shop drawings for the system. Show anchorage, details and connections for all the component parts.
 - .1 Drawings to include elevations, sections and specific details for each unit, condition.
 - .2 Submit shop drawings bearing stamp of a qualified professional engineer registered in the province of Ontario, Canada.
- .4 Samples: Submit one sample minimum 610mm long of each material to be utilized at each Sunshade with appropriate finish.
- .5 Warranty: Provide written warranty to the Owner, that all screen products will be free of defective materials or workmanship for a period of one year from date of installation.
- .6 Performance requirements: Design sunshade components to accommodate local requirements for snow and wind loading, as well as earthquake loads.
- .7 Provide engineering calculations for the sunshade system and mounting hardware, prepared by an engineer registered in the province of Ontario.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 LEED Requirements.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

2 PRODUCTS

2.1 MATERIALS

- .1 Aluminum Extrusions: ASTM B 211, Alloy 6063-T5.
- .2 Fasteners: Fasteners shall be aluminum or stainless steel. Provide types, gauges and lengths to suit unit installation conditions.
- .3 Anchors and Inserts: Use stainless steel inserts for installation as required for corrosion resistance.

2.2 FABRICATION

- .1 Provide fixed Sunshades and accessories of design, material, sizes, depth, arrangement, and thickness as indicated.
- .2 Include supports, anchorage, and accessories required for complete assembly.

2.3 SUNSHADE CONSTRUCTION

- .1 Components: All fascia, blades and outrigger components to be 6063-T5 aluminum alloy.
 - .1 Wall brackets to be fabricated from aluminum and are designed to receive and anchor the outrigger to the substructure. Include all mounting hardware.
 - .2 Outriggers shall be a single, 152mm flat plate 6.35mm thick as indicated.
 - .3 Diagonal Support: 2" diameter aluminum tube.
 - .4 Blades to be 152 mm high, long span extruded aluminum airfoil design. Blades to be factory assembled to outriggers using stainless steel, type F, thread cutting screws through internal screw slots in blades. Welding is not acceptable. Blades are to be mechanically secured to allow for replacement in case of damage. Fasteners to be hex head.
 - .5 Mounting Bracket: Aluminum mounting bracket, by sunshade manufacturer to connect to stainless steel plate. All fasteners mounting to structure to be designed and supplied by sunshade manufacturers. Fasteners to be stainless steel 300 series.

2.4 FINISHES

- .1 General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory. Protect finishes on exposed surfaces prior to shipment. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process. Provide colour as indicated or, if not otherwise indicated, as selected by Architect.
- .2 Provide colour from manufacturers standard or premium range, as selected by Consultant.
- .3 100% Fluoropolymer Resin Powder Coat System complying with AAMA-260505 standards for gloss and colour retention. Finish thickness to be 1.5 to 3.0 mils.
 - .1 Finish to allow zero VOC's to be emitted into facility of application or at job site.
 - .2 Finish to adhere to a 4H Hardness rating.
 - .3 Furnish manufacturer's twenty (20) year warranty for finish gloss and colour retention.

3 Execution

3.1 ERECTION

- .1 Comply with manufacturer's instructions and recommendations for installation of the work.
- .2 Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated and fitted to the structure.
- .3 Anchor Sunscreen to building substructure as indicated on architectural drawings.
- .4 Erection Tolerances:
 - .1 Variation from level: 3mm maximum in any column-to-column space or 6.0m runs, non-cumulative.
 - .2 Offsets in end-to-end or edge-to-edge alignment of consecutive members 0.8mm.
- .5 Corners: Miter sun control fascia assembly at outside corner as shown on drawings.

- .6 Cut and trim component parts during erection only with the approval of the manufacturer or fabricator, and in accordance with his recommendations. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly as directed.
- .7 Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.
- .8 Set units' level, plumb and true to line, with uniform joints

3.2 CLEANING

- .1 Remove protective material from prefinished aluminum surfaces.
- .2 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

END OF SECTION

Appendix A

