# BID DOCUMENTS & SPECIFICATIONS

**For Tender, Permit & Construction**

# CASTLE Lab

**for**

## Queen's University
## RFQ No. Q-2023-031-EL

**VOLUME I**

**Date:** **May 11, 2023**
**Project Nº** **21075**

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## 1. GENERAL

1.1 The Standard Construction Document for Stipulated Price Contract CCDC 2-2008 consisting of the Agreement between Owner and Contractor, Definitions, the General Conditions Articles GC 1.1 to GC12.3 inclusive, CCDC 40 Rules for Mediation and Arbitration of Construction Disputes, and CCDC 41CCDC Insurance Requirements, together with these Supplementary General Conditions are hereby confirmed as comprising part of the Contract Documents for the Work.

## 2. DEFINITIONS

2.1 Revise Item 19. Subcontractor by changing the item title to Sub-Contractor and Sub-Sub-Contractor and add a new sentence;

‘A *Sub-Sub-Contractor* is a person or entity having a direct contract with a *Sub-Contractor* to perform a part or parts of the *Work* at the *Place of the Work*’

2.2 Revise Item 22. Supplier by inserting after the word ‘Contractor’ the words ‘Sub-Contractor or Sub-Sub-Contractor’

2.3 Add the following to `Definitions' of CCDC 2:

27. Wherever the words `indicated', `designated', `shown', `noted', `listed', or similar words or phrases are used in the Specification they shall be understood, unless the context otherwise provides, to mean that material or item referred to is `indicated', `designated', `shown,', or `noted', on the Drawings.

28. Wherever the words `approved', `satisfactory', `as directed', `submit', `permitted', `inspected', or similar words or phrases are used in the Specification they shall be understood, unless the context otherwise provides to mean that material or item referred to shall be `approved by', `satisfactory to', `as directed by', `submitted to', `permitted by', or `inspected by' the Consultant.

29. The terms `Sub-Contractor ' and `this Contractor' used in the Specification covering the Work of the various trades shall mean the person or firm to whom that particular portion of the Work has been let or sublet.

30. The term `Inspection Engineer', `Inspection & Testing Company' used in the Specification covering the Work under the various trades, shall mean the person or firm, respectively, appointed by the Consultant to carry out the Inspection & Testing Work specified.

31. The term "Notice of Change" is a written description of a proposed change to the Work which requests a quotation from the Contractor.

## 3. CONTRACT DOCUMENTS

3.1 Add paragraph GC1.1.7.5 as follows:

1.1.7.5 Where conflict occurs in or between Specifications and Drawings or with codes applicable to the Work, the maximum condition shall govern and the Tender or Bid Price shall be based on whichever indicates the greater cost. The Contractor to obtain clarification of the conflict prior to the commencement of the Work.

3.2 Add paragraph GC1.1.7.6 as follows:

1.1.7.6 In case of conflict between the General Conditions and the Supplementary Conditions, the General Conditions shall be amended but only to the extent necessary to make the provisions of the Supplementary Conditions effective.

3.3 Delete Article GC1.1.8 and substitute as follows:

1.1.8 In addition to the signed sets of *Contract Documents* required for the Owner/Contractor Agreement the *Consultant* will furnish the General Contractor with up to 15 sets of the working *Drawings* and *Specifications* and up to 10 copies of each scale or full-size detail drawing. The General Contractor shall be responsible for cost of any additional prints and *Specifications* that he may require.

3.4 Add the following to the end of paragraph GC 1.1.6:

1.1.6 …The *Specifications* are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the *Contract Documents* will be construed to place responsibility on the *Owner* or the *Consultant* to settle dispute among the *Subcontractors* and *Suppliers* with respect to such divisions.

## 4. LAW OF THE CONTRACT

4.1 Delete Article GC 1.2.1 and substitute as follows:

1.2.1 The law of the *Place of the Work* shall govern the *Work* and the interpretation of the *Contract*.

## 5. ROLE OF THE CONSULTANT

5.1 Delete Article GC2.2.7 in its entirety and substitute the following:

2.2.7 The Consultant will be, in the first instance the interpreter of the requirements of the Contract Documents.

5.2 Add the following to Article GC2.2:

2.2.19 The *Consultant* shall not be required to decide on questions arising under agreements or contracts between the Contractor, his *Sub-Contractors*, their *Sub-Sub-Contractor*s, and *Supplier*s.

## 6. REVIEW AND INSPECTION OF THE WORK

6.1 Add the following to Article GC2.3:

2.3.8 The Contractor shall notify the *Consultant* of locations where installation of fixtures, fittings and equipment would interfere with interior treatment and use of building. In such cases detail *Drawings* or instructions exactly locating these items will be issued. If the Contractor claims that any instructions, by *Drawings* or otherwise, involve extra cost under the *Contract* he should give the *Consultant* prior written notice and obtain the *Owner* 's prior written approval in the form of a *Change Order* or *Change Directive*, before proceeding to carry out the *Work*

## 7. DEFECTIVE WORK

7.1 Delete Article GC2.4.3 in its entirety and substitute as follows:

2.4.3 If in the opinion of the *Consultant* it is not expedient to correct defective *Work* or *Work* not performed as provided in the *Contract Documents*, a *Change Order* will be issued to deduct from the amount otherwise due to the Contractor, the difference in value between the *Work* as performed and that called for by the *Contract Documents*.

## 8. DOCUMENT REVIEW

8.1 Delete Article GC3.4.1 in its entirety and substitute as follows;

3.4.1 During the bidding period the Contractor thoroughly reviewed the Instructions to Bidders, Bid Form, General Conditions, Supplementary Conditions, *Specifications* and *Drawings* listed in the Agreement, Article A-3 *Contract Documents,* and the included Addenda and accepted and agreed to the same as forming part and parcel of the *Contract* for construction of the *Work* in the *Place of the Work.*

3.4.2 The Contractor, by submitting a bid, agrees that he carefully examined the site of the proposed *Work*, the existing conditions, and the *Contract Documents*, and further warrants that the bid price includes for provision of materials, equipment, labour and superintendence to complete the *Work.*

3.4.3 During the Bidding Period, where the Contractor found discrepancies, ambiguities, or omissions in the *Drawings* or *Specifications* the *Consultant* was notified, and written instructions to Bidders in the form of Addenda were issued to resolve these matters.

3.4.4 During construction the Contractor shall report promptly to the *Consultant* any subsequently discovered discrepancies, ambiguities, errors, inconsistencies or omissions in the *Contract Documents*, and shall not proceed with the *Work* affected until *Supplemental Instructions* are furnished by the *Consultant*.

## 9. SUPERVISION

9.1 Delete paragraph GC3.6.1 and GC3.6.2substitute as follows:

3.6.1 The Contractor and each major *Sub-Contractor* shall provide supervision of the *Work* and appoint competent representatives and appropriate assistants who shall be in attendance at the *Place of the Work* while *Work* is being performed. The representatives and assistants shall not be changed without approval from the *Consultant*, and upon submission of valid reasons such approval shall not be unreasonably withheld.

3.6.2 The Contractors representative shall represent the Contractor at the *Place of the Work*. Information and instructions provided by the *Consultant* to the Contractors representative shall be deemed to have been received by the Contractor, except with respect to Article A-6 of the Agreement - RECEIPT OF AND ADDRESSES FOR NOTICES IN WRITING. The Contractors representative shall be responsible for prompt transmission of Information and instruction received from the *Consultant* shall be promptly transmitted to *Sub-Contractors*, *Sub-Sub-Contractors* and *Suppliers* involved.

## 10. SUB-CONTRACTOR AND SUPPLIERS

10.1 Add the following to Article GC3.7:

3.7.7 The Specification has generally been divided into trade Sections. It is not thereby intended to recognize, set, or define limits to any trade subcontractor or to restrict the Contractor in letting subcontracts. Neither is the Contractor relieved of responsibility for completion of *Contract* whether or not portions of the *Work* are sublet.

## 11. LABOUR AND PRODUCTS

11.1 Delete paragraph GC3.8.1 and GC3.8.3 and substitute the following:

3.8.1 The Contractor shall provide *Products*, and arrange and pay for labour, tools Construction Equipment, water, heat, light, power, transportation, and other facilities and services for the completion of the *Work* in accordance with the *Contract*.

3.8.3 The Contractor shall maintain good order and discipline among the personnel engaged on the *Work* and shall not allow the employment of anyone not skilled in the tasks assigned.

## 12. SHOP DRAWINGS

12.1 Add the following to the first sentence in Article GC3.10.9
..... and provide written explanation for the deviation, with proposed *Contract Price* adjustment.

12.2 Add the following to Article GC3.10:

3.10.13 *Shop Drawings* shall each be noted with the following information:

Project Name and Number
Manufacturer's and Supplier's Name
Catalogue model number
Name of trade supplying item
Number or designation identifying item on *Drawings* and/or in *Specifications*
Drawing and/or Specification reference

## 13. USE OF THE WORK

13.1 Add the following to Article GC3.11:

3.11.3 The *Owner* shall have the right to enter and occupy the building in whole or in part for the purpose of placing fittings and equipment or for other uses before completion of the *Contract*. Such entry and occupation shall not be considered as acceptance of the *Work* or in any way relieve the *Contractor* from his responsibility to complete the *Contract*.

## 14. FINANCING INFORMATION REQUIRED OF THE OWNER

14.1 Delete Article GC5.1 and subsequent references to this Article in their entirety.

## 15. SUBSTANTIAL PERFORMANCE OF THE WORK

15.1 Delete Article GC5.4.3 in its entirety.

## 16. WITHHOLDING OF PAYMENT

16.1 Add new paragraph GC5.8.2 and GC5.8.3 as follows:

5.8.2 In addition to any rights the *Owner* has pursuant to the Construction Lien Act, if a lien is registered or an action commenced against the *Owner,* the *Owner* may withhold from any money otherwise due to the *Contractor,* the full amount claimed in the lien action plus an additional sum sufficient to satisfy all of the *Owner's* expenses relating to such lien actions, including legal costs. These funds held back shall be released to the *Contractor* upon the full discharge of all liens and dismissal of all actions against the *Owner*.

5.8.3 In addition to above, the Owner will hold back 10%of the contractor amount against Satisfactions submission/acceptance of manuals, training and as built documentation. Until these items are satisfied, this 10% holdback will not be released.

## 17. CHANGE ORDER

17.1 Add new paragraphs GC6.2.3 through GC6.2.6 as follows:

6.2.3 The value of a proposed change in the *Work* shall be determined in one or more of the following methods:

(a) by unit prices set out in the *Contract* or subsequently agreed upon,
(b) by labour and material costs submitted in a detailed quotation.

6.2.4 In the case of changes in the *Work* to be paid for under method (a), the form of presentation of costs and methods of measurement shall be agreed to by the *Consultant* and *Contractor* before proceeding with the change. The *Contractor* shall keep accurate records, as agreed upon, of quantities or costs and present an account of the cost of the change in the *Work,* together with vouchers where applicable.

6.2.5 In the case of changes in the *Work* to be paid for under method (b) detailed quotations to show three components: material costs, labour charges, and fees. Material costs are to be less trade discounts. Labour costs to include burden on wages, such as Canada Pension Plan contributions, Employment Insurance premiums, and include costs for; taxes, and insurance, workplace safety meetings, estimating, as-built *Drawings*, supervision, small tools, warranty labour, and clean up.]

6.2.6 In the case of changes in the Mechanical and Electrical trades *Work* to be paid for under method (b) detailed quotations to show three components: material costs, labour charges, and fees. Material costs are to be less trade discounts. Discount for items taken from Allpriser Catalogue or Electrical Price Guide to be 20%. Labour charges to be based on National Electrical Contractors Association (NECA) Manual of Labor Units (difficult) and Mechanical Contractors Association of America (MCAA) Labor Estimating Manual. Labour costs to include burden on wages, such as Canada Pension Plan contributions, Employment Insurance premiums, and include costs for; taxes, and insurance, workplace safety meetings, estimating, as-built *Drawings,* supervision, small tools, warranty labour, and clean up. Hourly labour rate applicable for changes not to exceed 1.55 times base rate of current union agreement.

Hourly rate for specialists not covered by union agreements, (controls and instrumentation technicians or engineers) not to exceed 1.75 base rate for unionized plumbers and pipe fitters.

6.2.7 The fees allowed for overhead and profit on proposed changes to the *Work* is to include for the *Contractor's* head and site office expense, project manager, assistants, site office and storage facilities, utilities, site security, telephone and facsimile transmission costs. The *Contractor*, the *Sub-Contractor,* or the Sub-Subcontractor is allowed an overhead and profit fee of 15% for *Work* to be performed by his own forces. The *Contractor* is allowed an overhead and profit fee of 10% for *Work* performed by a *Sub-Contractor* and a *Sub-Contractor* is allowed an overhead and profit fee of 10% for *Work* performed by a Sub-Subcontractor.

## 18. LAWS, NOTICES, PERMITS AND FEES

18.1 In Article GC10.2 add the following paragraphs:

10.2.2 Delete the word Building Permit

10.2.2.1 The *Owner* will, if required, submit the *Drawings* and *Specifications*, complete with the necessary forms, to obtain approval from the Factory Inspection Branch of the Ministry of Labour and the Certificates of Approval from the Ministry of Environment and Energy and will pay all costs in connection therewith.

10.2.2.2 The contractor shall obtain and pay for the building permit.

10.2.3.1 Applications for permits requiring *Owner* 's signature shall be submitted before *Work* is commenced.

10.2.6 Inspection Certificates, as follows, shall be submitted before the final certificate will be issued: Electrical Inspection, Plumbing Inspection, Pressure Vessel, Inspection, Piping and Boiler Inspection

10.2.7 Department of Labour certificates shall be renewed, if necessary, to remain in force for the full guarantee period.

## 19. BONDS

19.1 Add the following to Article GC11.2:

11.2.3 The Bidder shall include with his Bid a written agreement to bond from a Bonding Company stating that the Bidder will be covered by a Performance Bond, and a Labour and Materials Payment Bond, each in the amount of 50% of the *Contract Price* if the Bidder is successful in obtaining the *Contract*. This bond coverage will include for cost of *Work* required under warranty, the payment of all legal and *Consultant*'s expenses incurred by the *Owner* in determining the extent of *Work* executed, and the cost of any additional *Work* required as a result of the failure of the *Contractor* to complete the *Work.*

11.2.4 The *Contractor* shall furnish these bonds after receiving written notification, in the form of a letter of intent, from the *Owner*. Bonds shall not be terminated until *Consultant* has been notified in writing of this intention and until there is agreement to such termination.

11.2.5 The *Contractor* is responsible for notifying the surety of any significant changes in the *Contract*. The bond values are to be fixed upon their issue and not altered unless authorized by the *Owner*.

## 20. WARRANTY

20.1 Add the following to Article 12.3:

12.3.7 A letter of warranty covering the above-mentioned correction of defects shall be given to *Owner* at completion of *Work*, but before issue of final certificate. This warranty shall in no way supplant any other warranty of longer period called for on certain equipment or materials.

END OF SECTION

## PART 1 - GENERAL

**1.1 Section Includes**

.1 Connecting to existing services.

.2 Contractor Code of Conduct

**1.2 Existing Services**

.1 Where work requires the shutdown or interruption of any existing services affecting the building and its occupants, notify the Project Manager and Site Manager a minimum of 48 hours prior to work commencing. Any planned or unplanned outages affecting the building may require overtime hours.

.2 Where work involves breaking into or connecting to existing services, carry out all work at times directed by governing authorities and/or Project Manager, with minimum of disturbance to building occupants. Keep duration of interruptions to a minimum.

.3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.4 The Contractor shall fully comply with any policies or procedures of the Owner which are relevant to any activity of the Contractor to be performed under the Contract. The Contractor further agrees that it will use reasonable efforts to inquire from the Owner if such policies or procedures exist for any activity of the Contractor to be performed under the Contract. The Owner agrees that it will use reasonable efforts to communicate to the Contractor policies or procedures it may have relevant to such activities. These policies include: Queen's Harassment and Discrimination Policy: https://www.queensu.ca/secretariat/policies/seate/harassmentdiscrimination-complaint-policy-nd-procedure

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 REFERENCES

.1 Canadian Construction Documents Committee (CCDC)
   .1 CCDC 2-2008, Stipulated Price Contract.

.2 Project Supplementary Conditions

### 1.2 CASH ALLOWANCES

.1 Refer to CCDC 2, GC 4.1.

.2 Include in Contract Price specified cash allowances.

.3 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing Work.

.4 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.5 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.6 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.7 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.8 Prepare schedule jointly with Consultant and Contractor to show when items called for under cash allowances must be authorized by Consultant for ordering purposes so that progress of Work will not be delayed.

.9 Amount of each allowance, as follows:

1.2 CASH ALLOWANCES (Cont'd) .9 (Cont'd)

.1 Include an allowance of $20,000 for hydro incoming service upgrade.

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 Specified Elsewhere**

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Queen's are specified under various sections.

**1.2 Appointment and Payment**

.1 Owner will appoint and pay for services of testing laboratory except for the following items that are part of the contractor's work:
.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 mechanical and electrical equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Tests specified to be carried out by Contractor under the supervision of Engineer.

.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 Queen's to verify acceptability of corrected work.

**1.3 Contractor's Responsibilities**

.1 Provide labour, equipment and facilities to:
.1 Provide access to Work to be inspected and tested.
.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 Queen's sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

1.3 Contractor's Responsibilities (Cont'd)

.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 Queen's.

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 at the call of Queen's.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 5 days in advance of meeting date to Queen's.

.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 5 days after meetings and transmit to meeting participants and, affected parties not in attendance.

.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 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.3 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.4 Agenda to include:
.1 Appointment of official representative of participants in the Work.

1.2 PRECONSTRUCTION MEETING (Cont'd)

.4 (Cont'd)
.2 Schedule of Work:
.3 Schedule of submission of shop drawings, samples, colour chips.
.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities.
.5 Delivery schedule of specified equipment.
.6 Site security.
.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.8 Owner provided products.
.9 Record drawings.
.10 Maintenance manuals.
.11 Take-over procedures, acceptance, warranties.
.12 Monthly progress claims, administrative procedures, hold backs.
.13 Insurances, transcript of policies.
.14 Project Schedule to be updated no less than monthly, indicating baseline schedule and current schedule.

1.3 PROGRESS MEETINGS

.1 During course of Work and weeks prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor and major Subcontractors involved in Work are to be in attendance.

.3 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.

.4 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 Review of Tracking table for RFI's, SI's,CCO's and CO's.
.5 Revision to construction schedule.
.6 Other business.

1.3 PROGRESS MEETINGS (Cont'd)

.5 Minutes of meeting to be accompanied by updated tracking table for RFI's, SI's, CCO's and CO's.

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 Schedule, form, content.

.2 Critical path scheduling.

**1.2 Schedules Required**

.1 Contractor shall submit their Construction Schedule for review within fifteen days after award of contract utilizing the critical path method. This schedule shall be updated monthly with both hard copy and electronic copy forwarded to the Queen's. 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 as follows.
- .1 Site work.
- .2 Concrete work.
- .3 Structural work.
- .4 Mechanical Work.
- .5 Electrical Work.
- .6 Roofing Work.
- .7 Interior Finishes.

.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.

1.2 Schedules Required (Cont'd)

.6 (Cont'd)
.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.

.8 Keep on-site hard copy set of Master Construction documents (drawings & specifications), updated with all changes or modifcations no later than 5 business days of issuance.

.9 Keep on-site hard copies of all Construction related documents, including SI's, RFI responses, CCO's and CO's.

.10 Contractor to provide progress photographs andincorporate into site meeting package, professional photographs are not required.

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 Shop drawings and product data.

.2 Samples.

.3 Certificates and transcripts.

**1.2 Administrative**

.1 Submit to Queen's within 14 days from award submittals listed for review. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Provide a shop drawing tracking document that includes the complete list of shop drawings to be submitted, current status, date of submittal, date of reveiw and approval and any outstanding concerns.

.3 Work affected by submittal shall not proceed until review is complete.

.4 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.5 Where items or information is not produced in SI Metric units converted values are acceptable.

.6 Review submittals prior to submission to Queen's. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

.7 Notify Queen's, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

1.2 Administrative (Cont'd)

.8 Verify field measurements and affected adjacent Work are coordinated.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by Queen's or Consultant's review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Queen's or Consultant's review of submittals.

.11 Keep one reviewed copy of each submission on site.

.12 If a project website or file sharing software is used, Queen's requires full access and downloading rights.

1.3 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 design drawings and specifications.

.3 Allow 10 days for Queen'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 Queen's prior to proceeding with Work.

1.3 Shop Drawings and Product Data (Cont'd)

.5 Make changes in shop drawings as Queen's may require, consistent with Contract Documents. When resubmitting, notify Queen's in writing of any 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 shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field 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 Queen's review, distribute copies.

.9 Submit one paper copy and one electronic (PDF) copy of shop drawings for each requirement requested in specification Sections.

.10 Delete information not applicable to project.

1.3 Shop Drawings and Product Data (Cont'd)

.11 Supplement standard information to provide details applicable to project.

.12 If upon review by Queen's, 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.

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 the nearest fire alarm box or 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 fire is on School Property

.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, address, name or number of building and be prepared to verify the location.

### 1.2 Interior and Exterior Fire Protection and Alarm Systems

.1 Fire protection and alarm system will not be:
- .1 obstructed;
- .2 shut-off; and
- .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.

### 1.3 Fire Extinguishers

.1 Supply fire extinguishers, as necessary, to protect work in progress and contractor's physical plant on site.

### 1.4 Blockage of Roadways

.1 Advise Fire Department of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by Fire Department, erecting of barricades and digging of trenches.

1.5 Smoking Precautions

.1 No smoking on school property at any time as per the Smoke Free Ontario Act.

1.6 Rubbish and Waste Materials

.1 Rubbish and waste materials are to be kept to minimum.

.2 Burning of rubbish is prohibited.

.3 Removal:
.1 Remove all rubbish from work site at end of work day or shift or as directed.

.4 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.

1.7 Hazardous Substances

.1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, will be in accordance with National Fire Code of Canada.

.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 and/or Clarification

.1 Direct any questions or clarification on Fire Safety in addition to above requirements to Fire Department.

1.9 Fire Inspection

.1 Site inspections by Fire Department will be coordinated through Project Manager.

.2 Allow Fire Department unrestricted access to work site.

.3 Co-operate with Fire Department during routine fire safety inspection of work site.

.4 Immediately remedy all unsafe fire situations observed by Fire Department.

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 cad welding.

.2 Fire watches are required during all hot work as described in Para 1.10.1 of this section. 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 Site Manager.

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 Requirements**

.1 Contractor shall obey all restrictions and regulations identified by Queen's University Environment Health and Safety.

**1.2 Fires**

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

**1.3 Disposal of Wastes**

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

**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 Queen's 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 Queen's 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 Queen's 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 Queen's for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner.

1.3 Independent Inspection Agencies (Cont'd)

.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 Queen's 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 Queen's 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 Queen's as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

1.6 Rejected Work (Cont'd)

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Queen's 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 Queen's.

1.7 Reports

.1 Submit electronic 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 Queen's 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.

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 Temporary utilities.

**1.2 Installation and Removal**

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

**1.3 Water Supply**

.1 Queen's will provide continuous supply of potable water for construction use.

.2 Arrange for connection and pay all costs for installation, maintenance and removal.

**1.4 Temporary Heating and Ventilation**

.1 Provide temporary heat and ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.

.2 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.3 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.

1.4 Temporary Heating and Ventilation (Cont'd)

.3 (Cont'd)
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.4 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 Temporary Power and Light

.1 Queen's will pay for 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.

.3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.6 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax and data lines necessary for own use.

1.7 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.

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 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

**1.2 Installation and Removal**

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

**1.3 Scaffolding**

.1 Provide and maintain scaffolding, ramps, lifts and ladders.

**1.4 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 a weight or force that will endanger the Work.

**1.5 Construction Parking**

.1 Parking will be permitted on site, at locations specified by Queen's.

.2 Provide and maintain adequate access to project site.

.3 Use existing roads for access to project site. Make good damage resulting from Contractors' use of roads and site.

1.6 Equipment, Tool and Materials Storage

.1 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities and owner's use of buildings and property.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

1.7 Sanitary Facilities

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

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

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 Barriers.

.2 Environmental Controls.

.3 Fire Routes.

**1.2 Installation and Removal**

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

**1.3 Hoarding**

.1 Erect temporary enclosure using 1.8m high portable fencing around areas of work and below any scaffolding or lifts.

.2 Fencing shall be installed around area of work, and adjusted regularly to minimize interference with owner's occupancy of adjacent spaces, and to keep the public from accessing the construction site.

.3 Contractor shall maintain hoarding throughout construction, and remove at completion of construction or when instructed by Owner.

**1.4 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.

1.5 Window Openings

.1 Ensure that no window opening is left unprotected overnight or during inclement weather. Any temporary closures must be water tight and secure from the exterior. Do not screw into existing building finishes to attach temporary protection.

1.6 Fire Routes

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

1.7 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.

1.8 Protection of Building Finishes

.1 Provide necessary screens, covers, and hoardings.

.2 Be responsible for damage incurred due to lack of or improper protection.

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 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing facilities.

**1.2 Quality**

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with 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 any dispute arise as to quality or fitness of products, decision rests strictly with Queen's 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.

1.2 Quality (Cont'd)

.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 Queen's, will be accepted as an alternative unless specified otherwise.

1.3 Availability

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Queen's 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 Queen's at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Queen's reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling and Protection

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 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.

1.4 Storage, Handling and Protection (Cont'd)

.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 Queen's.

1.5 Transportation

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

1.6 Manufacturer's Instructions

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Queen's in writing, of conflicts between specifications and manufacturer's instructions, so that Queen's may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Queen's to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Queen's if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Queen's reserves right to require dismissal from site, workers deemed incompetent or careless.

1.7 Quality of Work (Cont'd)

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Queen's, whose decision is final.

1.8 Co-Ordination

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 Concealment

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Queen's if there is interference. Install as directed by Queen's.

1.10 Remedial Work

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Queen's of conflicting installation. Install as directed.

1.12 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

1.12 Fastenings (Cont'd)

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 Fastenings - Equipment

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 Protection of Work in Progress

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Queen's.

1.15 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 REFERENCES

.1 Submit to Consultant copies of the following documents, including updates issued:
.1 Health and Safety Program as indicated in paragraph 1.9, 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 Queen's 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 National Building Code of Canada (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 the time of Interim Completion and prior to final payment, provide to the Consultant a letter of Clearance from the Workers' Compensation Board indicating that the Contractor's account is in good standing.

1.2 COMPLIANCE REQUIREMENTS (Cont'd)

.4 (Cont'd)

.1 Should the Contractor be a sole proprietor, provide documented proof in a form acceptable to the Queen's, 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 statues, 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.

1.4 SITE CONTROL AND ACCESS (Cont'd)

.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: Project Name/Description: Contractor Company Name: Project Superintendent's Name/Phone No.:

.4 Secure the work site at all times to protect against unauthorized 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 Consultant with a copy of the filed Notice(s) prior to commencement of the work.

1.6 PERMITS

.1 Obtain permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.

.2 Post all permits, licenses and compliance certificates on work site.

1.7 MEETINGS

.1 Conduct site specific occupational health and safety meetings as required by the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.

.2 Record and post minutes of all meetings in plain view on the work site. Make copies available to Consultant upon request.

1.8 HEALTH AND SAFETY PROGRAM

.1 Contractors are required under Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act to have in place a Health and Safety Program. Compliance requirements for the content, detail and implementation of the program resides with the provincial/territorial authority. For the purpose of this contract the Health and Safety Program shall include a site-specific Health and Safety Plan that acknowledges, assesses and addresses the hazardous substances and/or hazardous conditions known and identified in paragraph 1.7 above, and on-going hazard assessments performed during the progress of work identifying and documenting new or potential health risks and safety hazards not previously known and identified.

.2 Provide one copy of the Health and Safety Program, including COVID-19 related protocols to the Consultant prior to commencement of work on the work site. The copy provided to the Consultant is for the purpose of review against the contract requirements related to the known hazardous substances and/or hazardous conditions. The review is not to be construed to imply approval by the Consultant that the program is complete, accurate and legislatively compliant with the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act, and shall not relieve the Contractor of their legal obligations under such legislation.

1.9 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.

1.10 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.

END OF SECTION

## PART 1 - GENERAL

**1.1 SECTION INCLUDES**

.1 Requirements and limitations for cutting and patching the Work.

**1.2 RELATED SECTIONS**

.1 Individual product Sections: cutting and patching incidental to work of section. Advance notification to other sections required.

**1.3 SUBMITTALS**

.1 Submit written request in advance of cutting or alteration which affects:
.1 Structural integrity of any element of Project.
.2 Integrity of weather-exposed or moisture-resistant elements.
.3 Efficiency, maintenance, or safety of any operational element.
.4 Visual qualities of sight-exposed elements.
.5 Work of Owner or separate contractor.

.2 Include in request:
.1 Identification of Project.
.2 Location and description of affected Work.
.3 Statement on necessity for cutting or alteration.
.4 Description of proposed Work, and products to be used.
.5 Alternatives to cutting and patching.
.6 Effect on Work of Owner or separate contractor.
.7 Written permission of affected separate contractor.
.8 Date and time work will be executed.

**1.4 MATERIALS**

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00.

1.5 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.

1.6 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. required to make work fit properly together and as necessary for the installation of new and existing materials.

.3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.4 Make good any damage resulting from work of this contract.

.5 Tradesmen qualified in the work being cut and patched shall be employed to ensure that works are correctly done.

.6 Core drill holes in areas after being located by the Trade concerned.

1.6 EXECUTION (Cont'd)

.7 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 Queen's.

.8 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.

.9 Coordinate work of all sections, taking into account existing installations to ensure best arrangement of components in available space. For critical locations, consult with Queen's prior to commencing work.

.10 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 Queen's satisfaction.

.11 Core drill holes in concrete floors for piping where not previously sleeved, Do not use mechanical hammers or drills without prior approval in writing.

.12 Any cutting/patching required after completion of new works shall be done by the General Contractor at the Sub-Trade concerned's expense.

.13 Maintain all fire separations. Provide fire stopping at all penetrations in accordance with CAN4-5115.

.14 Uncover Work to install ill-timed Work.

.15 Remove and replace defective and non-conforming Work.

.16 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

1.6 EXECUTION (Cont'd)

.17 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.18 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.19 Restore work with new products in accordance with requirements of Contract Documents.

.20 Fit Work to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.21 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.

.22 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

.23 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

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 Progressive cleaning.

.2 Final cleaning.

### 1.2 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including other than that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Section 01 74 19. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

.7 Dispose of waste materials and debris at designated dumping areas off site.

.8 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

1.2 Project Cleanliness (Cont'd)

.10 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 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 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 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 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.

.7 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.

.8 Clean lighting reflectors, lenses, and other lighting surfaces.

1.3 Final Cleaning (Cont'd)

.9 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

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.

1.3 WASTE COLLECTION AND DISPOSAL (Cont'd)

.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.

.10 Surplus materials such as ceiling tiles & flooring is to be handed over to the Owner as per Product Specification sections. Any surplus that the Owner does not want are to beremoved and disposed of by the Contractor.

END OF SECTION

## PART 1 - GENERAL

**1.1 Section Includes**

.1 Administrative procedures preceding preliminary and final inspections of Work.

**1.2 Inspection and Declaration**

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
.1 Notify Queen's in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
.2 Request Queen's Inspection.

.2 Queen's Inspection: Queen's and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Queen's. If Work is deemed incomplete by Queen's, complete outstanding items and request reinspection.

## 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 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties

**1.2 Submission**

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Queen's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Submit to the Queen's two (2) paper copies plus one PDF copy of operating and maintenance manuals in English.

**1.3 Format**

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

1.3 Format (Cont'd)

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, process flow, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.4 Contents - Each Volume

.1 Table of Contents: provide title of project;
.1 date of submission; names,
.2 addresses, and telephone numbers of Contractor with name of responsible parties;
.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly 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.

1.4 Contents - Each Volume (Cont'd)

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.5 As-builts and Samples

.1 In addition to 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 the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Queen's.

.6 As-built/Record drawings in AutoCAD and PDF formats along with a minimum of 2 sets of hardcopies. As-built/Record drawings should incorporate all change orders, site instructions, construction redline changes etc.

.7 Hard copies of As-built drawings are to be ARCH D (24" x 36") size drawing. Print specifications shall be 8 1/2" x 11".

1.6 Recording Actual Site Conditions

.1 Contractor shall maintain two sets of white prints for record drawing purposes. Record changes and at completion of project submit one marked paper copy, one AutoCad file, and one PDF file to Queen's.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: legibly 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, field test records, required by individual specifications sections.

1.7 Equipment and Systems

.1 Each item of equipment and each system: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. 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. Include regulation, control, stopping, shut-down, and emergency instructions. 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.

1.7 Equipment and Systems (Cont'd)

.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 Include fire alarm verification report.

.16 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.

.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 Storage, Handling and Protection

.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.

1.9 Storage, Handling and Protection (Cont'd)

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Queen's .

1.10 Warranties

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties until time specified for submittal.

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 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

**1.2 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.

**1.3 Quality Control**

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

**1.4 Submittals**

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Consultant's acceptance.

.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.

**1.5 Conditions for Demonstrations**

.1 For training during installation, confirm dates for installation have not changed.

.2 For training after completion of construction ensure:

1.5 Conditions for Demonstrations (Cont'd)

.2 (Cont'd)

.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.

1.6 Preparation

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.7 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 Includes general requirements for commissioning facilities and facility 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 Queen's 3 days prior to beginning of operations.

.3 Accurately record data for each step.

.4 Report 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 Engineer to facilitate spot checks during testing.

.3 Retain possession of instruments and remove at completion of services.

1.7 Preparation (Cont'd)

.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 Section Includes**

.1 The following elements of this project are designated as Architectural Concrete, requiring special products and procedures to achieve the required exposed, finished appearance:
.1 Interior concrete floors, where such floor is to remain exposed (either unfinished or with sealer) as per the room finish schedule.

.2 This section also includes preparation of all areas of concrete floors to receive finishes or remain exposed as scheduled.

.3 The requirements of this section are in addition to the requirements of other sections, and in case of conflict, this section governs.

**1.2 Related Sections**

.1 Section 03 10 00 - Concrete Forming and Accessories.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 30 00 - Cast-in-Place Concrete.

**1.3 References**

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.2 Canadian Standards Association (CSA)
.1 CSA-A23.1-94, Concrete Materials and Methods of Concrete Construction.

**1.4 Performance Requirements**

.1 Product quality and quality of work in accordance with Section 01 61 00 - Common Product Requirements and Section 01 45 00 - Quality Control.

1.4 Performance Requirements (Cont'd)

.2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.

1.5 Product Data

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health and Welfare Canada for concrete floor treatment materials. Indicate VOC content.

.3 Include application instructions for concrete floor treatments.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management And Disposal and the Waste Reduction Workplan.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away for children.

.4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.

.5 Dispose of surplus chemical and finishing materials in accordance with federal, provincial and municipal regulations.

.6 Dispose of waste from stripping of floors in a manner that will not have unfavourable effects on the environment.

1.7 Environmental Requirements

.1 Temporary lighting: .1 Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.

.2 Electrical power:

1.7 Environmental Requirements (Cont'd)

.2 (Cont'd)
.1 Provide sufficient electrical power to operate equipment normally used during construction.

.3 Work area:
.1 Make the work area water tight protected against rain and detrimental weather conditions.

.4 Temperature:
.1 Maintain ambient temperature of not less than 10 C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.

.5 Moisture:
.1 Ensure concrete substrate is within moisture limits prescribed by Sealant manufacturer.

.6 Safety:
.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.

1.8 Protection

.1 Protect architectural concrete finish at all times during construction to prevent oils, dirt, metal, excessive water and other potentially damaging materials from affecting the finished concrete surface. Protection measures listed below shall begin immediately after the concrete slab is poured and throughout construction for the existing slabs:
.1 .1 All hydraulic powered equipment shall be diapered to avoid staining of the concrete.
.2 All vehicle parking shall be prohibited on the finish slab area. If necessary to complete their scope of work, drop cloths shall be placed under vehicles at all times.
.3 No pipe cutting machine shall be used on the finish floor slab.
.4 Steel shall not be placed on the finish slab to avoid rusting.

1.8 Protection (Cont'd)

.1 (Cont'd)

.5 Acids and acidic detergents will not come in contact with slab.

.6 All painters to use drop cloths on the concrete. If paint gets on the concrete, it must be immediately removed.

.7 All trades to be informed that the slab must be protected at all times.

## PART 2 - PRODUCTS

2.1 Sealing Compounds

.1 Surface sealer: to CAN/CGSB-25.20, Type 2 - water based, clear.

.2 Surface sealers may not be manufactured or formulated with aromatic solvents formaldehyde halogenated solvents mercury lead cadmium hexavelant chromium and their compounds.

2.2 Curing Compounds

.1 Select low VOC, water-based, organic-solvent free curing compounds.

2.3 Mixes

.1 Mixing, ratios and application in accordance with manufacturer's instructions.

2.4 Additional Materials

.1 As specified in other Division 03 Sections.

## PART 3 - EXECUTION

3.1 Examination

.1 Verify that concrete surfaces are ready to receive work, and clean and free of debris.

END OF SECTION

## PART 1 - GENERAL

**1.1 RELATED REQUIREMENTS**

.1 Section 04 05 23 - Masonry Accessories.

.2 Section 04 21 13 - Masonry Veneer.

**1.2 REFERENCE STANDARDS**

.1 CSA Group
.1 CAN/CSA-A165 Series-04(R2009), CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
.2 CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.
.3 CAN/CSA-A371-04(R2009), Masonry Construction for Buildings.

.2 International Masonry Industry All-Weather Council (IMIAC)
.1 Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

**1.3 ADMINISTRATIVE REQUIREMENTS**

.1 Pre-installation meetings: Conduct pre-installation meeting one week prior to commencing work of this Section and on-site installations to:
.1 Verify project requirements, including mock-up requirements.
.2 Verify substrate conditions.
.3 Co-ordinate products, installation methods and techniques.
.4 Sequence work of related sections.
.5 Co-ordinate with other building subtrades.
.6 Review manufacturer's installation instructions.
.7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.
.8 Review warranty requirements.

1.4 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 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 Ontario, Canada where indicated.
.2 Submit shop drawings detailing temporary bracing required, designed to resist wind pressure and lateral forces during installation.

.4 Samples:
.1 Provide samples as follows:
.1 2 of each type of masonry veneer unit specified, including special shapes, supplemented with specific requirements in Sections.

.5 Certificates: submit manufacturer's product certificates certifying materials comply with specified requirements.

.6 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 and mortar ingredients 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.

.7 Installer Instructions: provide manufacturer's installation instructions, including storage, handling, safety and cleaning.

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 EXTRA MATERIALS

.1 Submit manufacturer's instructions in accordance with Section 01 78 00 - Closeout Submittals covering maintenance requirements and parts catalogue, with cuts and identifying numbers.

1.7 QUALITY ASSURANCE

.1 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-up panel of exterior masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, ties, through-wall flashing, weep holes, jointing, pointing, coursing, mortar and quality of work.
.3 Mock-up used:
.1 To judge quality of work, substrate preparation, operation of equipment and material application.
.4 Construct mock-up where directed by Consultant.
.5 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.
.6 When accepted by Consultant, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
.7 Start work only upon receipt of written acceptance of mock-up by Consultant.

1.8 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.

1.8 DELIVERY, STORAGE AND HANDLING (Cont'd)

.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 material from nicks, scratches, and blemishes.
.3 Keep materials dry until use except where wetting of bricks 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.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.9 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperatures are above 4 degrees C.

.2 Weather Requirements: to CAN/CSA-A371 to IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 Cold weather requirements:
.1 To CAN/CSA-A371 with following requirements.
.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.
.2 Maintain ambient temperature of masonry work and it's constituent materials between 5 degrees C and 50 degrees C and protect site from windchill.
.3 Maintain temperature of masonry above 0 degrees C for minimum of 3 days, after mortar is installed.

1.9 SITE CONDITIONS (Cont'd)

.3 (Cont'd)

.1 (Cont'd)

.4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.

.2 Hot weather requirements:

.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.

.3 Spray mortar surface at intervals and keep moist for maximum of 3 days after installation.

1.10 WARRANTY

.1 For Work in this Section 04 05 00 - Common Work Results for Masonry, 12 months warranty period is extended to 60 months.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified elsewhere in related Sections:

.1 Section 04 05 19 - Masonry Anchorage & Reinforcing.

.2 Section 04 05 23 - Masonry Accessories.

.3 Section 04 21 13 - Masonry Veneer.

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.
.1 Co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.
.1 Inform Consultant of unacceptable conditions immediately upon discovery.
.2 Proceed with installation after unacceptable conditions have been remedied.

.3 Verification of Conditions:
.1 Verify that:
.1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of brick.
.2 Site conditions are acceptable and are ready to receive work.
.3 Built-in items are in proper location, and ready for roughing into masonry work.
.2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

.1 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.

.2 Establish and protect lines, levels, and coursing.

.3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

3.4 INSTALLATION (Cont'd)

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.5 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 to be 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 Wetting of bricks:

3.5 CONSTRUCTION (Cont'd)

.5 (Cont'd)

.1 Except in cold weather, wet bricks having initial rate of absorption exceeding 1 g/minute/1000 $mm^2$: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.

.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

.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 Construct continuous control joints as indicated.

.9 Movement joints:

.1 Build-in continuous movement joints as indicated.

.10 Interface with other work:

.1 Cut openings in existing work as indicated.

.2 Openings in walls: approved reviewed by Departmental Representative DCC Representative Consultant.

.3 Make good existing work. Use materials to match existing.

3.6 SITE TOLERANCES

.1 Tolerances in notes to CAN/CSA-A371 apply.

3.7 SITE QUALITY CONTROL

.1 Site Tests, Inspection:

.1 Perform site inspection and testing in accordance with Section 01 45 00 - Quality Control.

3.7 SITE QUALITY CONTROL (Cont'd)

.1 (Cont'd)
.2 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
.1 Leave Work area clean at end of each day.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.9 PROTECTION

.1 Temporary Bracing:
.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
.2 Bracing approved by Consultant.
.3 Brace masonry walls as necessary to resist wind pressure and lateral forces 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 work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.
.3 Air Temperature Protection: protect completed masonry as recommended in 1.9, SITE CONDITIONS.

.3 In hot weather conditions, supplement CAN3-A71 with the following requirements:
.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

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

.2 Section 04 05 23 - Masonry Accessories.

### 1.2 REFERENCE STANDARDS

.1 CSA Group
.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.
.3 CAN/CSA-A371-04(R2009), Masonry Construction for Buildings.
.4 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.2 International Masonry Industry All-Weather Council (IMIAC)
.1 Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 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 masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Samples: submit unit samples in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows:

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.3 (Cont'd)
.1 (Cont'd)
.1 Submit confirmation of source or product data sheet, prior to mixing or preparation of mortars.

.4 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.

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 from nicks, scratches, and blemishes.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 (Cont'd)
.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 21 - Construction/Demolition Waste Management and Disposal.

1.6 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:
.1 Minimum 5 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 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 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA-A179, Type N.
.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.3 Aggregate: supplied by one supplier.
.1 Use aggregate passing 1.18 mm sieve where 6 mm thick joists are indicated.

.4 Water: clean and potable.

2.2 MORTAR MIXES

.1 Mortar for exterior masonry above grade:

2.2 MORTAR MIXES (Cont'd)

.1 (Cont'd)
.1 Non-Load Bearing: N based on property specifications.

.2 Parging Mortar: type N to CAN/CSA-A179.

.3 Following applies regardless of mortar types and uses specified above:
.1 Mortar for calcium silicate brick and concrete brick: type O based on proportion specifications.

2.3 MORTAR MIXING

.1 Use pre-blended, pre-coloured mortar prepackaged under controlled factory conditions. Ingredients batching limitations to be 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 Do not use anti-freeze compounds including calcium chloride or chloride based compounds.

.6 Do not add air entraining admixture to mortar mix.

.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.

2.3 MORTAR MIXING (Cont'd)

.10 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 5 degrees C.

2.4 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 prior to construction and 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.

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.

3.2 PREPARATION

.1 Apply bonding agent to existing concrete surfaces.

3.3 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.3 CONSTRUCTION (Cont'd)

.2 Apply parging in uniform coating not less than 10 mm thick, where indicated.

3.4 MIXING

.1 All 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.

.2 Clean all mixing boards and mechanical mixing machine between batches.

.3 Mortar must be weaker than the units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.5 MORTAR PLACEMENT

.1 Install mortar to requirements of CAN/CSA-A179.

.2 Remove excess mortar from grout spaces.

3.6 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 prior to construction and during construction in accordance with CAN/CSA-A179.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - 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.

3.7 CLEANING (Cont'd)

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 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 SECTIONS

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

.2 Section 04 21 13 - Concrete Masonry Veneer.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM D 2240-02b, Standard Test Method for Rubber Property - Durometer Hardness.

.2 Canadian Standards Association (CSA International).
.1 CSA-A371-94(R1999), Masonry Construction for Buildings.

### 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 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

### 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.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Control joint filler: purpose-made elastomer durometer hardness to ASTM D 2240 of size and shape indicated.

.2 Lap adhesive: recommended by masonry flashing manufacturer.

.3 Weep hole vents: purpose-made PVC, colour to match block.

.4 Cavity Wall Flashing: self adhered membrane consisting of a 40mLs thick SBS rubberized asphalt compound, integrally laminated to a cross-laminated polyethylene film. Acceptable material: Bakor TWF.

.5 Primer: as recommended by manufacturer.

.6 Brick Ties: hot dipped galvanized adjustable unit ties. Type, style and size to suit application, Blok-Loc BL-607 or equal.

.7 Metal Flashing (where indicated on drawings) Zinc coated steel, 0.61 thickness, commercial quality to ASTM A 653/A653M-99 with Z275 designated zinc coating.

## 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 continuous control joint fillers in control joints at locations indicated on drawings.

3.2 INSTALLATION (Cont'd)

.2 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.

3.3 CONSTRUCTION

.1 Build in flashings in masonry in accordance with CSA-A371.

.1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings. Install flashings under weep hole courses and as indicated.

.2 In cavity walls and veneered walls, carry flashings from front edge of masonry, under outer wythe, then up backing not less than 150 mm, and as follows:

.1 For masonry backing, fully adhere flashing.

.2 For concrete backing, fully adhere flashing.

.3 Lap joints 150 mm and seal with adhesive.

.4 Masonry shall not be installed above any flashing until each instance is approved by Consultant.

.5 Overhang flashing 25 mm and cut off with a razor knife after approval by Consultant.

3.4 BRICK TIES

.1 Tie masonry veneer to backing in accordance with OBC and as indicated.

3.5 CLEANING

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

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

.2 Section 04 05 12 - Mortar and Masonry Grout.

.3 Section 04 05 23 - Masonry Accessories.

### 1.2 REFERENCES

.1 Brick Industry Association (BIA).
.1 Technical Note No. 20-2000, Cleaning Brick Masonry.

.2 Canadian Standards Association (CSA International).
.1 CSA-A165 Series-94(R2000), CSA Standards on Concrete Masonry Units.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

.1 Masonry Veneer: to CAN/CSA-A165.2 & ASTM C1634.
.1 Acceptable Material: Granada Series by Brampton Brick, Colour: to be selected from full range of colours, Size: Combo, large combo.

.2 Precast Concrete sill units: CAN/CSA-A165
.1 Finesse Window Sill as manufactured by Brampton Brick, 150 x 80 x 813mm.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

.1 Bond: Running.

.2 Coursing Pattern: large combo pattern.

.3 Jointing: concave where exposed or where paint or similar thin finish coating is specified.

3.1 INSTALLATION (Cont'd)

.4 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.

.5 Clean unglazed clay masonry as work progresses.

3.2 CLEANING

.1 Clean masonry as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean masonry veneer as follows:
.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
.2 Scrub with solution of 25mL trisodium phosphate and 25 mL household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by masonry veneer manufacturer in accordance with manufacturer's directions.
.3 Repeat cleaning process as often as necessary to remove mortar and other stains.
.4 Use acid solution treatment for difficult to clean masonry as directed in Technical Note No. 20 published by Brick Institute of America dated Sept./Oct. 1977.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

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

.2 Section 09 91 23 - Painting.

### 1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
.2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.2 Canadian Standards Association (CSA International)
.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
.2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
.4 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.5 CSA W59-1989(R2001),Welded Steel Construction (Metal Arc Welding) (Imperial Version).

### 1.3 SUBMITTALS

.1 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
.3 For guards & railings and pit ladder, submit shop drawings reviewed & stamped by professional engineer licenced in the provide of Ontario.

1.4 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.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.

.2 Steel pipe: to ASTM A 53/A53M standard weight, black finish.

.3 Stainless steel sheet metal: to ASTM A 167-99, Type 304.

.4 Plate steel: to ASTM A1008-00

.5 Welding materials: to CSA W59.

.6 Welding electrodes: to CSA W48 Series.

.7 Bolts and anchor bolts: to ASTM A 307.

.8 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

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.

2.2 FABRICATION (Cont'd)

.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.

.4 Stainless Steel: ASTM No.4 finish.

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 stainless steel, 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 EXTERIOR GUARDS & RAILS

.1 Stainless steel hand rail, mid rail, and posts, formed to shapes and sizes as indicated in drawing details.

.2 Detail drawings of guards and rails are schematic in nature. Actual construction to suit actual site conditions.

.3 Bolt and tack weld all joints.

2.6 EXTERIOR GUARDS & RAILS (Cont'd)

.4 All bolts, nuts, and washers to be stainless steel.

.5 All welds ground smooth.

.6 Sealed caps on ends of all hollow pipes & sections.

.7 All edges ground smooth to minimum 3mm radius.

2.7 INTERIOR GUARD & RAILS

.1 Galvanized steel top rail, mid rail, bottom rail, ballusters, and posts. Shapes and sizes as indicated in drawing details.

.2 Detail drawings of interior guards are schematic in nature. Actual construction to suit actual site conditions.

.3 Bolt and tack weld all joints.

.4 All welds ground smooth.

.5 Sealed caps on ends of all hollow pipes & sections.

.6 All edges ground smooth to minimum 3mm radius.

2.8 ANGLE LINTELS

.1 Fabricated from CAN/CSA-G40.21-M, 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.

2.9 PIT ACCESS LADDERS

.1 Fabricated as per structural drawings.

.2 Hot dipped galvanized finish.

2.9 PIT ACCESS LADDERS (Cont'd)

.3 Provide shop drawings stamped by Professional Engineer licensed to practice in Ontario.

2.10 CENTRIFUGE ACCESS LADDER

.1 Fabricated as per drawings.

.2 Hot dipped galvanized finish.

.3 Provide shop drawings stamped by Professional Engineer licensed to practice in Ontario.

2.11 STEEL PLATE PIT COVERS

.1 25mm thick A36 mild steel road plates, dimensions as per drawings.

.2 Include two (2) removable shouldered eye bolts per cover, hot-dipped galvanized, rated to suit weight of cover, for use to lift covers with overhead crane.

.3 Provide holes in plate to facilitate lifting using eye bolts.

.4 Provide one access hatch with lid per cover, with steel angle perimeter as per drawings. Lid must be able to be secured with flush screws to secure in place when cover is lifted.

.5 Grind edges smooth.

.6 Coordinate with concrete trade to ensure floor slab is cast to allow covers to sit flush with top of floor.

2.12 BENCH & SHELF SUPPORTS

.1 Provide galvanized steel supports for bench & shelf as per detail drawings. Construct supports of 40mm HSS as detailed. Where indicated, anchor supports to partition. All open ends of HSS to receive welded steel caps, grind all edges smooth.

.2 Provide all drill holes required for anchorage of brackets and for anchoring to building structure.

2.13 BOLLARDS

.1 Supply 2400 long 150 mm dia. steel cassions for mounting and filling with concrete.

.2 Apply zinc rich primer to bollards.

2.14 PRIVACY SCREEN

.1 Exterior privacy screen of galvanized steel square section, as per drawing details.

.2 Detail drawings are schematic in nature. Actual construction to suit site conditions.

.3 Paint finish, with touch-up after installation.

PART 3 - EXECUTION

3.1 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 CAN/CSA-S16.1, 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.

3.1 ERECTION (Cont'd)

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 References

.1 American Society for Testing and Materials (ASTM)
.1 ASTM D 1761-00, Standard Test Methods for Mechanical Fasteners in Wood.
.2 ASTM D 5055-02, Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
.3 ASTM D 5456-01ae1, Specification for Evaluation of Structural Composite Lumber Products.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-11.3-M87, Hardboard.
.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
.4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

.3 Canadian Standards Association (CSA)
.1 CSA O121-M1978 (R1998), Douglas Fir Plywood.
.2 CAN/CSA-O122-M89 (R1999), Structural Glued-Laminated Timber.
.3 CAN/CSA-O141-91 (R1999), Softwood Lumber.
.4 CSA O151-M1978 (R1998), Canadian Softwood Plywood.
.5 CSA O153-M1980 (R1998), Poplar Plywood.
.6 CAN/CSA-O325.0-92 (R1998), Construction Sheathing.

.4 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2000.

### 1.2 Quality Assurance

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.2 Quality Assurance (Cont'd)

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

.3 Wood materials FSC-certified.

1.3 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and the Waste Reduction Workplan, to the maximum extent economically possible.

PART 2 - PRODUCTS

2.1 Framing and Structural Materials

.1 Lumber: unless specified otherwise, FSC-certified softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
.1 CAN/CSA-O141-91 (R1999).
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Glued end-jointed (finger-jointed) lumber is not acceptable.

.3 Glulam in accordance with Structural Glued-Laminated Timber CAN/CSA-O122-M89 (R1999).

.4 Wood I-joists in accordance with Prefabricated Wood I-Joists ASTM D 5055-02.

.5 Light-frame trusses in accordance with "Truss Design and Procedures for Light Metal Connected Wood Trusses", Truss Plate Institute of Canada.

.6 Structural Composite Lumber (SCL) in accordance with ASTM D 5456-01ae1.

.7 Framing and board lumber: in accordance with NBC, except as follows:
.1 Loadbearing stud wall framing: S-P-F Stud Grade, unless noted otherwise on the drawings.
.2 Posts and beams: S-P-F No. 2.

2.1 Framing and Structural Materials (Cont'd)

.7 (Cont'd)
.3 Other structural lumber: S-P-F- No. 2, unless noted otherwise on the drawings. Studs at sides of openings and wall plates in shed walls shall conform to NBC Part 9, unless otherwise noted.

.8 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
.1 S2S is acceptable.
.2 Board sizes: "Standard" or better grade.
.3 Dimension sizes: "Standard" light framing or better grade.
.4 Post and timbers sizes: "Standard" or better grade, except where specified otherwise in structural drawings.

.9 Pressure treated lumber: Curbs and parapets shall be S-P-F No. 2 Grade, Factory Treated with preservative to CSA O80.

2.2 Panel Materials

.1 Plywood, OSB and wood based composite panels: to CAN/CSA-O325.0-92 (R1998).

.2 Douglas fir plywood (DFP): to CSA O121-M1978 (R1998), standard construction.

.3 Canadian softwood plywood (CSP): to CSA O151-M1978 (R1998), standard construction.

.4 Interior mat-formed wood particleboard: to ANSI 208.1.

.5 Mat-formed structural panelboards (OSB wafer): to O437 Series-93(R2001).

2.3 Accessories

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32-M77 single ply spunbonded

.2 Ice/Water Shield: to CSA A123.2-M1979 (R2001), Type S.

.3 Subflooring adhesive: to CAN/CGSB-71.26-M88, cartridge loaded.

2.3 Accessories (Cont'd)

.4 General purpose adhesive: to CSA O112 Series.

.5 Nails, spikes and staples: to CSA B111-1974 (R1998).

.6 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.7 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.8 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.9 Roof sheathing H-Clips: formed "H" shape, thickness to suit panel material, type approved by Engineer.

2.4 Fastener Finishes

.1 Galvanizing: to CAN/CSA-G164-M92 (R1998), use galvanized fasteners for exterior work and pressure-preservative treated lumber.

2.5 Wood Preservative

.1 Surface-applied wood preservative: coloured, copper napthenate or petachlorophenol solution, water repellent preservative.

PART 3 - EXECUTION

3.1 Installation

.1 Comply with requirements of NBC 1995 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

3.1 Installation (Cont'd)

.5 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.6 Install subflooring and with panel end-joints located on solid bearing, staggered at least 800 mm.
.1 In addition to mechanical fasteners for floor panels, secure floor subflooring to floor joists using glue and screws. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt.

.7 Install OSB wall sheathing in accordance with manufacturer's printed instructions.

.8 Install plywood roof sheathing in accordance with requirements of NBC.

.9 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

.10 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
.1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.11 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.12 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.13 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

3.2 Erection

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

.3 Provide edge support for sheathing consisting of not less than 38x38 blocking securely nailed between framing members.

.4 Support edges of plywood roof deck panels using either metal H-clips, tongue and groove edge joints, or 38x38 blocking securely nailed between framing members.

.5 Provide wood nailers on top flange of steel members where required, Nailer width shall match width of flange. Fasten nailers to steel members with 10mm diameter bots at 600 o.c. staggered on each side of the web.

3.3 Schedules

.1 Canopy Roof sheathing:
.1 SPF, 38mm thick tongue & groove, unless noted otherwise on structural drawings.

.2 Exterior wall sheathing:
.1 Plywood, sheathing grade, 19 mm thick unless otherwise noted.

.3 Pressure treated lumber: To curbs and parapets as indicated on drawings.

.4 Electrical & Mechanical equipment mounting boards:
.1 Plywood, DFP grade, square edge 19 mm thick.

END OF SECTION

## PART 1 - GENERAL

### 1.1 Related Sections

.1 Section 06 40 00 - Architectural Woodwork

.2 Section 09 91 23 - Painting

### 1.2 References

.1 American National Standards Institute (ANSI)
.1 ANSI A208.1-1999, Particleboard.
.2 ANSI A208.2-1994, Medium Density Fibreboard (MDF).

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
.1 AWMAC Quality Standards for Architectural Woodwork 1994.

.3 North American Architectural Woodwork Standards (NAAWS), 4.0 or latest edition.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-11.3-M87, Hardboard.

.5 Canadian Standards Association (CSA)
.1 CSA B111-1974 (R1998), Wire Nails, Spikes and Staples.
.2 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
.4 CSA O121-M1978 (R1998), Douglas Fir Plywood.
.5 CAN/CSA-O141-91 (R1999), Softwood Lumber.
.6 CSA O151-M1978 (R1998) (R1998), Canadian Softwood Plywood.
.7 CSA O153-M1980 (R1998) (R1998), Poplar Plywood.

.6 National Hardwood Lumber Association (NHLA)
.1 Rules for the Measurement and Inspection of Hardwood and Cypress January 1996.

.7 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2000.

1.3 Shop Drawings

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

.2 Indicate details of construction, profiles, jointing, fastening and other related details.

.3 Indicate materials, thicknesses, finishes and hardware.

1.4 Samples

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

.2 Submit duplicate samples: sample size 1000 x 1000 mm or unless specified otherwise.

1.5 Delivery, Storage, and Handling

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Protect materials against dampness during and after delivery.

.3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal and Waste Reduction Workplan, to maximum extent economically possible.

PART 2 - PRODUCTS

2.1 Lumber Material

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
.1 CAN/CSA-O141-91 (R1999).
.2 NLGA Standard Grading Rules for Canadian Lumber.

2.1 Lumber Material (Cont'd)

.1 (Cont'd)
.3 AWMAC premium grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable.

.3 Hardwood lumber: moisture content in accordance with following standards:
.1 National Hardwood Lumber Association (NHLA).
.2 AWMAC premium grade, moisture content as specified.

2.2 Panel Material

.1 Douglas fir plywood (DFP): to CSA O121-M1978 (R1998), standard construction.

.2 Canadian softwood plywood (CSP): to CSA O151-M1978 (R1998), standard construction.

.3 Medium density fibreboard (MDF): to ANSI A208.2-1994, density 640-800 kg/$m^3$.

.4 Hardwood plywood: clear birch to ANSI/HPVA

2.3 Accessories

.1 Nails and staples: to CSA B111-1974 (R1998); galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.

.2 Wood screws: plain steel, type and size to suit application.

.3 Splines: metal.

.4 Adhesive: recommended by manufacturer.

.5 Use least toxic sealants, adhesives, sealers, and finishes necessary to comply with requirements of this section.

## PART 3 - EXECUTION

### 3.1 Installation

.1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

### 3.2 Construction

.1 Fastening.

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.

.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.

.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round cleanly cut hole and plug with wood plug to match material being secured.

.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Hardware.

.1 Install wood doors and door hardware supplied by Section 08 71 10.

END OF SECTION

## PART 1 - GENERAL

**1.1 Related Sections**

.1 Section 07 92 10 - Joint Sealants.

.2 Secction 05 50 00 - Metal Fabrications

**1.2 References**

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
.1 AWMAC Quality Standards for Architectural Woodwork 1998.

.2 North American Architectural Woodwork Standards (NAAWS), 4.0 or latest edition.

.3 Canadian General Standards Board (CGSB).
.1 CAN/CG SB-17.20-M88, Adhesive, Contact, Brushable.

.4 Canadian Standards Association (CSA)
.1 CSA B111-1974 (R1998) 1974, Wire Nails, Spikes and Staples.
.2 CSA O115-M1982 M1982, Hardwood and Decorative Plywood.
.3 CSA O121-M1978 (R1998) M1978, Douglas Fir Plywood.
.4 CAN/CSA-O141-91 (R1999) 91, Softwood Lumber.
.5 CSA O151-M1978 (R1998) M1978, Canadian Softwood Plywood.
.6 CAN3-O188.1-M78 M78, Interior Mat-Formed Wood Particleboard.
.7 CSA Z760-94, life cycle assessment.

.5 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2000.

**1.3 Shop Drawings**

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

.2 Indicate details of construction, profiles, jointing, fastening and other related details.
.1 Scale: profiles full size, details 1/2 full size.

1.3 Shop Drawings (Cont'd)

.3 Indicate all materials, thicknesses, finishes and hardware.

.4 Indicate locations of all service outlets in casework, typical and special installation conditions, and all connections, attachments, anchorage and location of exposed fastenings.

1.4 Samples

.1 Submit 150mm square sample of finished birch veneer plywood and engineered quartz countertop.

1.5 Delivery, Storage, and Handling

.1 Protect millwork against dampness and damage during and after delivery.

.2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

PART 2 - PRODUCTS

2.1 Materials

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 8 % or less in accordance with following standards:
.1 CAN/CSA-O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 AWMAC custom premium grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Hardwood lumber: moisture content 7% or less in accordance with following standards:
.1 National Hardwood Lumber Association (NHLA).
.2 AWMAC custom premium grade birch.

.4 Douglas fir plywood (DFP): to CSA O121, standard construction.

2.1 Materials (Cont'd)

.5 Canadian softwood plywood (CSP): to CSA O151-M1978 (R1998), standard construction.

.6 Hardwood veneer plywood: to CSA O115, AWMAC, clear birch.

.7 High density wood particleboard plywood: to ANSI A 208.1, AWMAC, clear birch.

.8 Engineered quartz couter tops: Grade C, minimum 19mm, profile & backsplash as per drawing details.

.9 Adhesive for Field Joints:
.1 Epoxy type, resistant to chemicals as specified for plastic laminate laboratory surfaces.

.10 Nails and staples: to CSA B111-1974 (R1998).

.11 Wood screws: type and size to suit application.

.12 Splines: metal.

.13 Sealant: 07 92 10 - Joint Sealants.

.14 Hardware:
.1 Hinges: Hettich #742-t-42 (self closing) 110 degree opening, nickel plated complete with mounting plates (19mm and 10mm overlay) or equivalent.
.2 Drawer slides: Accuride model #2132 or equivalent
.3 Cabinet door and drawer pulls: Hettich 782-034 or equivalent, brushed chrome finish.
.4 Shelf standards and supports: Hettich 00120-096-15 aluminum, or equivalent, complete with supports.
.5 Locks: cam locks/deadbolt locks complete with lock core by Hafele, type to suit application and installation. Installed as indicated on drawings.

2.2 Manufactured

.1 Casework.
.1 Fabricate caseworks to AWMAC premium quality grade.

2.2 Manufactured (Cont'd)

.1 (Cont'd)
.2 Fabricate cabinets in modular units with demountable fastenings to permit access to service piping.

.2 Cabinets
.1 Doors: to be 19mm stain grade clear birch veneer with 6 x 19 mm solid clear birch edging, mitred at corners.
.2 Gables and Shelves: to be 19mm particle core stain grade clear birch veneer with 6 x 19 mm solid clear birch nosings on all exposed edges.
.3 Concealed backs: to be 6 mm melamine backing.

.3 Drawers
.1 Fabricate drawers to AWMAC premium grade supplemented as follows:
.2 Sides and Backs.
.1 Clear birch veneer plywood, 13 mm thick
.3 Bottoms.
.1 Clear birch veneer plywood, 6 mm thick
.4 Fronts.
.1 19 mm particle core stain grade clear birch veneer with mitered 6 x 19 solid clear birch nosings.

.4 Casework Doors
.1 Fabricate doors to AWMAC premium grade supplemented as follows:
.2 Doors to be 19 mm stain grade clear birch veneer with mitered 6 x 19 solid clear birch nosings, nailed & glued.

.5 Sealant: mildew and chemical resistant silicone sealing compound approved for use by counter top manufacturer.

2.3 Fabrication

.1 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.2 Shelving to cabinetwork to be adjustable unless otherwise noted.

2.3 Fabrication (Cont'd)

.3 Provide cutouts for vents, plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.4 Fabricate countertops in largest sections practicable, with top surface joints flush.

.5 Countertops with drip groove cut on underside at overhanging edge.

.6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.7 Provide removable back panels for access to pipe chases.

2.4 Finishing

.1 Fitments and cabinet work of wood construction shall be prefinished by woodwork supplier before delivery to site.

.2 Surface to be finished shall be dry and thoroughly cleaned, free of all machine, tool and sandpaper marks, dust, grease, or any material liable to impair the finish work.

.3 Finished work shall be uniform as to sheen, colour, and texture.

.4 Materials:
.1 one coat of wood filler
.2 one coat solvent based stain CAN/CGSB-1.145-M90 Type 2, semi transparent.
.3 one coat alkyd sanding sealer CAN/CGSB-1.102-M89.
.4 two coats varnish CAN/CGSB-1.36-M90 Type 2 semi gloss.

PART 3 - EXECUTION

3.1 Installation

.1 Do architectural woodwork to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.

3.1 Installation (Cont'd)

.2 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

.3 Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted cabinets.

.4 Use draw bolts and epoxy-type adhesive in countertop joints.

.5 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.

.6 At junction of counter back splash and adjacent wall finish, apply small bead of sealant.

.7 Adjust hardware accurately and securely in accordance with manufacturer's directions.

3.2 Cleaning

.1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.

3.3 Protection

.1 Protect millwork and cabinet work from damage until final inspection.

.2 Protect stairs until final inspection. Make good any damage to materials or finish.

END OF SECTION

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CGSB 37.2 m88 m88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
.2 CGSB 37.3 - M89 M89, Application of Emulsified Asphalts for Damproofing or Waterproofing.

### 1.2 PRODUCT DATA

.1 Submit product data sheets for bituminous dampproofing products. Include:
.1 Product characteristics.
.2 Performance criteria
.3 Application methods
.4 Limitations

### 1.3 DELIVERY, STORAGE, AND HANDLING

.1 Provide and maintain dry, off-ground weatherproof storage.

.2 Store materials on supports to prevent deformation.

.3 Remove only in quantities required for same day use.

.4 Store materials in accordance with manufacturer's written instructions.

### 1.4 Project/Site Environmental Requirements

.1 Temperature, relative humidity, moisture content.
.1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
.2 Maintain air temperature and substrate temperature at dampproofing installation area above 5°C for 24 hours before, during and 24 hours after installation.
.3 Do not apply dampproofing in wet weather.

## PART 2 - PRODUCTS

2.1 VAPOUR RETARDER

.1 Asphalt:
.1 For application and curing at temperatures above 5°C; to CAN/CGSB-37.2M88.
.1 Package label or bill of lading for bulk hot liquid asphaltmust indicate type, flash point, equiviscous temperature range and final blowig temperature.
.2 VOC content.
.3 Recycled material content.
.4 Acceptable materials:
.1 Henry Bakor 700-01.
.2 W.R. Meadows Sealmastic Type II

## PART 3 - EXECUTION

3.1 PREPARATION

.1 Before applying dampproofing:
.1 Seal exterior joints between foundation walls and footings, joints betweeen concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.2 APPLICATION

.1 Do dampproofing in accordance with Manufacturers Specifications.

.2 Do sealing work in accordance with CGSB 37-GP-11M.

.3 Apply damproofing in accordance with applicable CGSB application standard.

3.3 SCHEDULE

.1 Apply continuous, uniform coating to exterior side of foundation walls, pits and rooms below finished grade. Include exterior portion of interior walls where floors in adjacent rooms are at different elevations.

3.3 SCHEDULE (Cont'd)

.2 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

.3 Apply two additional coats of dampproofing around pit walls & footings.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 07 26 00 - Air and Vapour Barriers.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM D1621, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

.2 Underwriters Laboratories of Canada (ULC).
.1 CAN/ULC-S701-2001, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

### 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.

### 1.4 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
.2 Deliver materials and accessories in insulation manufacturer's original packaging with identification labels intact and in sizes to suit project.
.3 Ensure insulation materials are not exposed to moisture during delivery.
.4 Replace wet or damaged insulation materials.

.2 Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
.1 Store in original packaging until installed.

1.4 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Packaging Waste Management:
.1 Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
.2 Remove waste packaging materials from site and dspose of packaging materials at appropriate recycling facilities.
.3 Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

2.1 INSULATION

.1 Foundation Insulation and under slab and frost protection insulation: Extruded polystyrene (XPS): to CAN/ULC-S701-2001.
.1 Type: 4.
.2 Thickness: As indicated.
.3 Size: 610 x 2440 mm.
.4 Edges: ship lapped.
.5 Compressive strength: ASTM D 1621-00 min. 210 kPa.

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.

## 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.

.2 Mechanically fastened as per manufacturer recommendations.

3.2 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 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.

.4 Any unauthorized covering will be required to be removed for examination.

3.3 EXAMINATION

.1 Examine substrates and immediately inform Consultant in writing of defects.

.2 Prior to commencement of work ensure:
.1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.4 RIGID INSULATION INSTALLATION

.1 Secure insulation boards with clips and disks spacing as recommended by manufacturer.

3.5 PERIMETER FOUNDATION INSULATION

.1 Extend boards vertically below bottom of floor slab, as indicated on drawings.

3.6 BELOW-SLAB INSULATION

.1 Install horizontally below concrete floor slab, as indicated on detail drawings.

3.7 CLEANING

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

END OF SECTION

## PART 1 - GENERAL

**1.1 REFERENCES**

.1 Underwriters Laboratories of Canada (ULC).
.1 CAN/ULC - S702, Standard for Mineral Fibre Insulation.

**1.2 WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management and Disposal.

## PART 2 - PRODUCTS

**2.1 INSULATION**

.1 Sound batt insulation:
.1 Type: 1, to ASTM E 492, ASTM E 413.
.2 Thickness: to full width of stud.
.3 Acoustic batt insulation 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 INSULATION INSTALLATION**

.1 Install insulation to maintain continuity of thermal and acoustical protection to building elements and spaces.

.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-S604-1991 Type A chimneys and CGA B149.1-00 and CGA B149.2-00 Type B and L vents.

3.1 INSULATION INSTALLATION (Cont'd)

.5 Do not enclose insulation until it has been inspected and approved by Consultant.

3.2 CLEANING

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 07 21 13 - Board Insulation.

### 1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

.2 ASTM
.1 ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under concrete slabs.
.2 ASTM E154, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls or as Ground Cover.
.3 ASTM D 1709, Plastic Film Impact Resistance.

### 1.3 SUBMITTALS

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

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include:
.1 Product characteristics.
.2 Performance criteria.
.3 Limitations.
.4 Compatibility of all components.

### 1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 SHEET VAPOUR BARRIER UNDER SLAB

.1 Plastic vapour retarder membrane below slabs on grade must meet or exceed all requirements of ASTM E 1745 Classes A, B, & C.
.1 Minimum Permeance: ASTM E96, 0.034 Perms.
.2 Resistance to organisms and Substrates in Contact with soil: ASTM E154, Section 13, 0.051 Perms.
.3 Tensile Strength: ASTM E 154, Section 9, 52 lbs. Force/Inch.
.4 Puncture Resistance: ASTM D 1709, Method B, 3,770 Grams.
.5 Water Vapour Retarder: ACI 302.1R, not less than 15 mil.

.2 Seam Tape: High density polyethylene tape with pressure sensitive adhesive. Minimum width 100mm.

2.2 TRANSITION MEMBRANE

.1 Transition Membrane - self adhering membrane compatible with system products on project.
.1 Acceptable Product: Henry Blueskin Butyl Flash, Soprema Sopraseal Stick 1100TC.

2.3 THRU WALL FLASHING

.1 Thru Wall Flashing: accpetable product, IKO AquaBarrier TWF, Bakor TWF, Sporaseask WFM andself-adhesive thru-wall flashing compatible with system products on project.

2.4 WATERPROOF MEMBRANE (SLOPED METAL ROOF)

.1 Self adhered waterproofing membrane: acceptable products.
.1 Ice and water shield by Grace.
.2 Self adhered waterproofing membrane Resisto.

2.5 ACCESSORIES

.1 Joint sealing tape: high density polyethylene tape with pressure sensitive adhesive, minimum width 100 mm.

2.5 ACCESSORIES (Cont'd)

.2 Sealant: compatible with vapour retarder materials, recommended by vapour retarder manufacturer.

.3 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

.4 Primer, Liquid sealant, sealant and mastic as recommended by manufacturers for installation of air barrier, transition membrane and thru wall flashing.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Ensure services are installed and inspected prior to installation of retarder.

.2 Install sheet vapour retarder on warm side of exterior wall assemblies prior to 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.

.5 Flexible membranes to wrap all window and door bucks and tie into adjacent vapour barriers.

3.2 EXTERIOR SURFACE OPENINGS

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

3.3 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.

3.3 PERIMETER SEALS (Cont'd)

.1 (Cont'd)
.3 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.2 Air/Vapour Barrier self adhesive flexible transition membrane:
.1 Tie-in to window frames, door frames, roofing system and at the interface of dissimilar materials with transition membrane as indicated in drawings. Refer to manufacturers standard details.
.2 Ensure no wrinkles or air pockets are present.

3.4 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 minimum 150 mm and press into sealant bead.
.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 VAPOUR RETARDER BELOW SLAB

.1 Install Vapour retarder below floor slab immediately prior to concrete placement and inaccordance with ASTM E 1643-98.

.2 Prepare surfaces in accordance with manufacturer's recommendations.

.3 Unroll vapour retarder with the longest dimension parallel with the direction of the pour.

.4 Overlap joints 150mm and seal with manufacturer's tape.

.5 No penetrations of the vapour retarder is allowed except for reinforcing steel and permanent utilities.

3.5 VAPOUR RETARDER BELOW SLAB (Cont'd)

.6 Repair damaged areas by cutting patches of vapour retarder, overlapping damaged areas 150mm and taping all four sides with tape.

.7 Restrict traffic over vapour retarder.

.8 Prior to placing concrete inspect vapour retarder and repair all tears and punctures.

3.6 TRANSITION MEMBRANE INSTALLATION

.1 Examination: Verify that surfaces and conitions are ready to accept the Work of thissection. Notify Consultant in writing of any discrepancies. COmmencment of the work or any parts there of shall mean acceptance of the prepared substrate.

.2 Ensure all surfaces are free of oil, dirt & contaminants. Area must be dry & sound.

.3 Primer:
.1 Apply primer for membrane at rate recommended by manufacturer.
.2 Primed surfaces not covered by membrane during the same working day must be re-primed.

.4 Transition Mebrane:
.1 Tie-in to door frame, windows and openings for services including pipes, vents, ductwork, canopy soffits, at top of foundation wall to insulated wall panel and at the interface of dissimilar materials with transition membrane and as indicated. Refer to manufacturer's standard details. Transition membrane to seal to components.
.2 Ensure all projections, including wall ties, are properly sealed with a trowel or caulk application of liquid sealant.
.3 Ensure no wrinkles or air pockets are present.
.4 Ensure product is compatible with insulated wall panels.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

3.7 CLEANING (Cont'd)

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

SPEC NOTE: DESCRIPTION: Focusing on steel and aluminum, materials and components are integrated to meet project design requirements. Field or shop assembled options given.

SPEC NOTE: This Section specifies environmentally responsible material choices, utilizing the three R's (reduce, reuse and recycle) whenever possible, and providing generally available disposal options. For construction and demolition waste management practices in Federal Government projects refer to PWGSC's Sustainable Development Strategy (SDS - 2007-2009), where these requirements have been specifically targeted.

SPEC NOTE: This Section includes general requirements and procedures for compliance with the Canada Green Building Council's (CaGBC) - LEED Canada prerequisites or credits required for LEED Project certification. Co-ordinate with Section 01 35 21 - LEED Requirements.

SPEC NOTE: This Section 07 42 13.23 was renumbered from 07 42 43.01 to meet the recommendations of the MasterFormat 2016 classification system.

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

SPEC NOTE: Edit the following paragraphs to list documents or Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. Do not include Division 00 or Division 01 Sections in this listing.

.1 Section [_____].

### 1.2 REFERENCE STANDARDS

SPEC NOTE: Edit the following paragraphs for this specific project.

.1 Aluminum Association (AA)
  .1 AA DAF 45-[03(R2009)], Designation System for Aluminum Finishes.

1.2 REFERENCE STANDARDS (Cont'd)

.2 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.3 ASTM International
.1 ASTM A 653/A 653M-[11], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A 792/A 792M-[10], Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
.3 ASTM D 523-[08], Standard Test Method for Specular Gloss.
.4 ASTM D 822-[01(2006)], Standard Practice, For Conducting Test on Paint and Related Coatings and Materials Using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
.5 ASTM D 2832-[92 (2011)], Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.

.4 Canada Green Building Council (CaGBC)
.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations (including Addendum [2007]).
.2 LEED Canada-NC-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for New Construction and Major Renovations 2009.
.3 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Commercial Interiors.
.4 LEED Canada-EB: O&M-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System for Existing Buildings: Operations and Maintenance 2009.

.5 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-93.1-[M85], Sheet, Aluminum Alloy, Prefinished, Residential.

.6 CSA Group (CSA)

1.2 REFERENCE STANDARDS (Cont'd)

.6 (Cont'd)
.1 CAN/CSA-S136-[07], North American Specification for the Design of Cold-Formed Steel Structural Members.
.2 CSA S136.1-[07], Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

SPEC NOTE: Include requests for relevant data to be furnished by the Contractor, before, during or after construction.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for [building panels, hardware, and accessories] and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit [2] copies of WHMIS SDS in accordance with Section [01 35 29.06 - Health and Safety Requirements][01 35 43 - Environmental Procedures]. Indicate VOC's for materials as follows:
.1 Indicate VOC's for material as follows:
.1 Caulking and sealant materials during application [and curing].
.2 Finishing materials.
.3 Insulation adhesives.
.4 Paints.
.5 Isolation coatings.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in [Province][Territory], Canada.
.2 Indicate on drawings:
.1 Dimensions, wall openings, head, jamb, sill and mullion detail, materials and finish, anchor details, compliance with design criteria and requirements of related work.

.4 Samples:

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.4 (Cont'd)
.1 Submit [_____].
.2 Submit duplicate [300 x 300] mm samples of wall system, representative of materials, finishes and colours.

.5 Manufacturer's Field Reports:
.1 Submit manufacturer's written reports within [3] days of review, verifying compliance of Work, as described in Part 3 - FIELD QUALITY CONTROL.

SPEC NOTE: Co-ordinate the following paragraph with Section 01 35 21 - LEED Requirements.

.6 Sustainable Design Submittals:
.1 LEED Canada submittals: in accordance with [Section 01 35 21 - LEED Requirements].
.2 Construction Waste Management:
.1 Submit project [Waste Management Plan][Waste Reduction Workplan] highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that [50][75]% of construction wastes were recycled or salvaged.
.3 Recycled Content:
.1 Submit listing of recycled content products used, including details of required percentages of recycled content materials and products, showing their costs and percentages of [post-consumer][and][post-industrial] content, and total cost of materials for project.
.2 Submit evidence, when Supplementary Cementing Materials (SCMs) are used, to certify [reduction in cement from Base Mix to Actual SCMs Mix, as percentage].
.4 Regional Materials: submit evidence that project incorporates required percentage [10][20]% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: submit operation and maintenance data for [composite metal building panels] for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

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][indoors][in dry location] and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect [metal building panels, hardware and accessories] from [nicks, scratches, and blemishes].
.3 Replace defective or damaged materials with new.

SPEC NOTE: Co-ordinate the following paragraph with Section 01 35 21 - LEED Requirements.

.4 Develop [Construction Waste Management Plan][Waste Reduction Workplan] related to Work of this Section and in accordance with Section [01 35 21 - LEED Requirements].

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.5 Packaging Waste Management: remove for reuse [and return][by manufacturer] of [pallets,][crates,][padding,][and][packaging materials] as specified in [Construction Waste Management Plan][Waste Reduction Workplan] in accordance with Section [01 74 19 - Waste Management and Disposal][and][Section 01 35 21 - LEED Requirements].

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

SPEC NOTE: Design to National Building Code of Canada (NBC) or relevant codes and CAN/CSA-S136 and CSA S136.1. Conform to relevant Canadian Sheet Steel Building Institute standards.

.1 Design metal panel wall system in accordance with [CAN/CSA-S136][CSA S136.1].

SPEC NOTE: Insert expected temperature range for location of building including allowance for skin temperature heat gain in sunlight on coloured finish.

.2 Design metal panel wall to allow for thermal movement of component materials caused by ambient temperature range of [_____] degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.3 Include expansion joints to accommodate movement in wall system and between wall system and building structure, caused by structural movements, without permanent distortion, damage to infills, racking of joints, breakage of seals, or water penetration.

.4 Design members to withstand dead load and wind loads calculated in accordance with National Building Code of Canada (NBC) and applicable local regulations, to maximum allowable deflection of 1/180th of span.

2.1 DESIGN REQUIREMENTS (Cont'd)

.5 Allow for positive drainage of condensation occurring within wall construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principles".

SPEC NOTE: Insert RSI value.

.6 Thermal resistance: [_____] minimum calculated with design wind loads in accordance with [ASHRAE] procedures.

SPEC NOTE: Insert maximum allowable permeance. Manufacturers normal permeance will not be less than 30 ng/(Pa.s.$m^2$).

.7 Permeance through wall system: [_____] ng/(Pa.s.$m^2$) maximum.

.8 Design wall system to accommodate specified erection tolerances of structure.

.9 Design wall system to allow for movement of air between exterior and interior side of metal cladding.

.10 Include air barrier, to prevent infiltration and exfiltration of air through wall assembly.

2.2 MATERIALS

SPEC NOTE: Use fluorocarbon or PVC finish near corrosive atmosphere. Use light duty modified silicone finish for interior applications and modified silicone or fluorocarbon for exterior applications. Specify 0.10 mm film thickness for PVC finish only. Z275 designation is the standard zinc coating. Refer to ASTM A 653 for other coating designations.

.1 Sheet steel: cladding, structural quality, grade [_____] to ASTM A 653, with Z275 zinc coating:
.1 Factory precoated with [modified silicone][fluorocarbon][light duty modified silicone][polyvinylchloride] finish.
.2 Colour: [_____][selected colour from manufacturer's standard range].

2.2 MATERIALS (Cont'd)

.1 (Cont'd)

.3 Dry film thickness: on exposed surface [_____] mm minimum thick, on reverse side [_____] mm minimum thick.

SPEC NOTE: Coating designations and mass, listed in ASTM A 792/A 792M are not applicable for material manufactured in Canada.

.2 Aluminum-zinc alloy coated steel sheet: to [ASTM A 792/A 792M], commercial quality, grade [33][37] with [AZ150][AZ180] coating, [regular spangle][extra smooth] surface [prefinish as specified in [1.2]], [chemically treated (passivated) for unpainted finish][mill phosphatized in accordance with ASTM A 653/A 653M for site-applied paint finish], [_____] mm minimum base metal thickness.

SPEC NOTE: Z275 designation is the standard zinc coating. Refer to ASTM A 653 for other coating designations.

.3 Sheet steel: liner sheet, structural quality, grade [_____] to ASTM A 653, with Z275 zinc coating:

.1 Light duty modified silicone finish.

.2 Dry film thickness: [0.025] mm minimum.

.3 Gloss [_____].

.4 Colour [_____][selected colour from manufacturer's standard range].

SPEC NOTE: Aluminum sheet is widely available plain or patterned, mill finish or prefinished with factory applied coatings which may be an acceptable alternative or option for other available aluminum alloys and tempers where special mill finish or anodic finish is not required. Consult manufacturers for intended uses.

.4 Plain aluminum sheet:

.1 Alloy AA [_____], temper [_____], [anodizing quality], [[mill] [anodic] finish as specified in 2.4], [_____] mm minimum thickness.

.2 Alloy AA 3102, temper H14-H16, [mill finish], [prefinish as specified]. [_____] mm minimum thickness.

2.2 MATERIALS (Cont'd)

.5 Patterned aluminum sheet:
.1 Alloy AA [_____], temper after embossing [_____], [_____] pattern, [mill finish], [prefinished as specified], [_____] mm minimum thickness.
.2 Alloy AA 3102, temper after embossing [_____], [_____] pattern, [mill finish], [prefinish as specified], [_____] mm minimum thickness.

.6 For copings and flashings provide prefinished, [formed][extruded] material to match cladding.

SPEC NOTE: Insert appropriate text from Section 07 21 16 - Blanket Insulation.

.7 Batt and blanket mineral fibre insulation: [_____].

SPEC NOTE: Insert appropriate text from Section 07 21 13 - Board Insulation.

.8 Expanded polystyrene insulation: [_____].

SPEC NOTE: Insert appropriate text from Section 07 21 13 - Board Insulation.

.9 Urethane (Isocyanurate) insulation: [_____].

.10 Insulation adhesive: compatible with insulation type and [zinc coated steel][aluminum] sheet, incombustible after curing.

.11 Screws: [cadmium plated steel][stainless steel], head colour same as exterior sheet, dished [steel and neoprene][aluminum and neoprene][stainless steel and neoprene].

.12 Powder actuated fasteners: galvanized, peened ballistic point, plastic cap of same colour as exterior sheet.

SPEC NOTE: Insert appropriate text from Section 07 92 00 - Joint Sealants.

.13 Sealants: [_____].

2.2 MATERIALS (Cont'd)

.14 Gaskets: [soft pliable arctic grade vinyl, extruded profile][closed cell polyurethane foam, adhesive on two sides, release paper protected].

.15 Touch-up paint: as recommended by panel manufacturer.

.16 Isolation coating: [alkali resistant][bituminous paint][epoxy resin solution].

2.3 PREFINISHED STEEL SHEET

SPEC NOTE: Use the following paragraph to specify 10 000 Series.

.1 Prefinished steel with factory applied polyvinylidene fluoride.
.1 Class [F1S][F2S].
.2 [_____] colour [selected by [Departmental Representative] [DCC Representative] [Consultant] from manufacturer's standard range].

SPEC NOTE: If metallic colour series is used then specular gloss should be 15 +/-5 units.

.3 Specular gloss: [30] units +/- in accordance with ASTM D 523.
.4 Coating thickness: not less than [22] micrometres.
.5 Resistance to accelerated weathering for chalk rating of [8], colour fade [5] units or less and erosion rate less than [20]% to ASTM D 822 as follows:
.1 Outdoor exposure period [2500] hours minimum.
.2 Humidity resistance exposure period [5000] hours minimum.

SPEC NOTE: Use the following paragraph to specify Barrier Series.

.2 Prefinished steel with factory applied polyvinyl chloride.
.1 Class [F1S][F2S].

2.3 PREFINISHED STEEL SHEET (Cont'd)

.2 (Cont'd)

.2 [_____] colour [selected by [Departmental Representative] [DCC Representative] [Consultant] from manufacturer's standard range].

.3 Specular gloss: [30] units +/-5 in accordance with ASTM D 523.

.4 Coating thickness: not less than [200] micrometres.

.5 Resistance to accelerated weathering for chalk rating of [8], colour fade [5] units or less and erosion rate less than [20]% to ASTM D 822 as follows:

.1 Outdoor exposure period [5000] hours minimum.

.2 Humidity resistance exposure period [5000] hours minimum.

SPEC NOTE: Use the following paragraph to specify 2000 and 5000 series.

.3 Prefinished steel with factory applied silicone modified polyester.

.1 Class [F1S][F2S].

.2 [_____] colour [selected by [Departmental Representative] [DCC Representative] [Consultant] from manufacturer's standard range].

.3 Specular gloss: [30] units +/-5 in accordance with ASTM D 523.

SPEC NOTE: Use 20 micrometres for 2000 Series and 25 micrometres for 5000 Series.

.4 Coating thickness: not less than [20][25] micrometres.

.5 Resistance to accelerated weathering for chalk rating of [8], colour fade [5] units or less and erosion rate less than [20]% to ASTM D 822 as follows:

SPEC NOTE: For exposure periods use 500 hours for 2000 Series and 1000 hours for 5000 Series.

.1 Outdoor exposure period [500][1000] hours minimum.

.2 Humidity resistance exposure period [500][1000] hours minimum.

## 2.4 ALUMINUM FINISHES

SPEC NOTE: Include symbols for mechanical, chemical and coating finish designation as appropriate. If more than one finish required ensure that locations of all finishes are shown on drawings.

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
.1 As fabricated or mill finish: designation AA DAF 45 [_____].
.2 Clear anodic finish: designation AA DAF 45 [_____].
.3 Integral colour anodic finish: designation AA DAF 45 [_____], [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].
.4 Impregnated colour anodic finish: designation AA DAF 45 [_____], [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].
.5 Electrolytically deposited colour anodic finish: designation AA DAF 45 [_____], [_____] colour [to match [Departmental Representative's] [DCC Representative's] [Consultant's] sample].

## 2.5 PREFINISHED ALUMINUM SHEET

SPEC NOTE: Use the following paragraph for performance specifications. If more than one kind of paint system is required, repeat text and designate different types and locations.

.1 Prefinished system for aluminum sheet exposed to exterior: [plain][or][patterned] material with factory applied paint system:
.1 Conforming to CAN/CGSB-93.1 supplemented and amended as follows:
.2 Type [1][2].
.3 Class [F1S][F2S].
.4 [_____] colour [selected by [Departmental Representative] [DCC Representative] [Consultant] from manufacturer's standard range].
.5 Specular gloss: [_____] units.
.6 Coating thickness: not less than [_____] micrometres.
.7 Outdoor exposure period: [_____] years.

2.5 PREFINISHED ALUMINUM SHEET (Cont'd)

.1 (Cont'd)

.8 Exposure period for humidity resistance: [_____] hours minimum.

.9 Exposure period for salt spray resistance: [_____] hours minimum.

SPEC NOTE: Use the following paragraph for proprietary names, in accordance with clients policy. Insert acceptable manufacturers' names and coating designations.

.2 [_____].

.3 Thickness specified for prefinished aluminum sheet applies to base metal.

2.6 COMPONENTS

.1 Exterior sheet: factory preformed coated metal, to profile [as indicated][of [_____] mm deep [fluted] [ribbed] section [_____] mm wide sheets], ["S" lap][interlocking edges], [vinyl gasket shop fitted into one side of interlocking joint][one side of interlocking joint filled to 50% with non-skinning, non-hardening sealant], of [_____] mm minimum base metal thickness.

SPEC NOTE: Use preformed or factory built corners for horizontal cladding.

.2 Exterior corners: of same profile, material and finish as adjacent cladding material, [shop cut][factory built] and brake formed to required angle, concealed corner brace, [hairline exposed joint], pop rivet connections with painted head to match cladding.

.3 Exposed joint (perpendicular to profile): ends of cladding sheet shop cut clean and square, backed with tight fitting filler lapping back of joint, exposed components colour matched to cladding.

SPEC NOTE: Consider use of 0.5 mm thick flashings where face sheets are heavier. Sheet metal 1.0 mm thick does not form as easily and may not be necessary. However ensure that perfect colour match can be obtained with thinner material.

2.6 COMPONENTS (Cont'd)

.4 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material, [thickness] and finish as exterior cladding, brake formed to shape.

.5 Liner sheet: factory formed [flat][profiled][flat ribbed][to details], [_____] mm module, interlocking joint profile, shop installed seal material one side of interlocking joint.

SPEC NOTE: Z275 designation is the standard zinc coating. Refer to ASTM A 653 for other coating designations.

.6 Sub-girts: of [_____] mm minimum base metal thickness, structural quality steel to ASTM A 653, with Z275 zinc coating, [_____] profile [as indicated] to accept [liner and][exterior sheet] with structural attachment to building frame.

SPEC NOTE: Insert appropriate text from Section 07 95 13 - Expansion Joint Cover Assemblies.

.7 Expansion joints: [_____].

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 composite metal building panel installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of [Departmental Representative][DCC Representative][Consultant].
.2 Inform [Departmental Representative][DCC Representative][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 [Departmental Representative] [DCC Representative] [Consultant]].

3.2 MANUFACTURER'S RECOMMENDATIONS

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

3.3 PREPARATION

.1 Protect metal surfaces in contact with concrete, masonry mortar, plaster or other cementitious surface with isolation coating.

3.4 INSTALLATION (FIELD ASSEMBLED)

SPEC NOTE: Specify in the following paragraph precaulking of interlocking joint only when not specified in PART 2.

.1 Install liner sheet and sub-girts to structural wall supports, using [self tapping screws][powder actuated fasteners].
.1 Interlock and seal side and end joints.
.2 Precaulk one side of interlocking joint to ensure continuous [air barrier][vapour retarder][dust proof seal].

.2 Install insulation using adhesive to ensure continuous thermal barrier in conjunction with [air barrier][and][vapour retarder] formed by liner sheet.

.3 Install exterior finish cladding to internal [sub-girts][girts] with [concealed][coloured] fasteners.

.4 Provide notched and formed top closures, sealed to arrest direct weather penetration at vertical profiles for exterior cladding.
.1 Ensure continuity of "pressure equalization" of rain screen principle.

.5 Include alignment bars, brackets, clips, inserts, shims as required to securely and permanently fasten wall system to building structure.

3.5 INSTALLATION (SHOP ASSEMBLED)

.1 Attach shop assembled wall system to building framing system with inside fasteners.

3.5 INSTALLATION (SHOP ASSEMBLED) (Cont'd)

.2 Install [insulated] wall assembly to achieve [thermal barrier][[and] [air barrier]][[and] [vapour retarder]].

.3 Install wall/cladding over sill flashings, install [cap][coping] flashings and ensure completed installation is continuously sealed at perimeter.

.4 Install and seal notched and formed top closures, to arrest direct weather penetration at vertical profiles of exterior cladding.
.1 Ensure continuity of "pressure equalization" of rain screen principle.

3.6 CONTROL AND EXPANSION JOINTS

.1 Construct [control][expansion] joints as indicated.

.2 Use cover sheets, of brake formed profile, of same material and finish as adjacent material.

.3 Use mechanical fasteners to secure sheet materials.

.4 Assemble and secure wall system to structural frame so stresses on sealants are within manufacturers' recommended limits.

3.7 CONSTRUCTION

.1 Site Tolerances:
.1 Maintain following installation tolerances:
.1 Maximum variation from plane or location shown on approved shop drawings: [10] mm/m of length and up to [20] mm/100 m maximum.
.2 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

3.8 FIELD QUALITY CONTROL

SPEC NOTE: Use the following paragraphs only when manufacturer's field services are desired to verify the quality of the installed components. Establish the number and duration of periodic site visits required by the manufacturer and specify below. Consult with the manufacturer for services required. Delete if field services are not required.

.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 field services: include 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 at stages listed:
.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends 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.

.4 Obtain reports within [3] days of review and submit.

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.
.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

3.9 CLEANING (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
.2 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.
.3 Remove excess sealant with recommended solvent.

.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][01 35 21 - LEED Requirements].
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.10 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by composite metal building panel installation.

END OF SECTION

# GENERAL

## 1.1 SECTION INCLUDES

A. Steel faced, polyisocyanurate foamed-in-place insulated roof panels.

B. Accessories including fasteners, perimeter trim and penetration treatments.

C. Products requiring coordination with this section but furnished and installed in other sections 07 62 00 – Sheet Metal Flashing & Trim, 07 42 15 – Metal Wall Panels, 07 46 13 Preforming Metal Siding and Section 13 34 19 – Metal Building System.

## 1.2 REFERENCES

A. American Society of Civil Engineers (ASCE)

1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

B. ASTM International

1. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
2. ASTM A792: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by Hot Dip Process.
3. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
4. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
5. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
6. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
7. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
8. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
9. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
10. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
11. ASTM E72; Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
12. ASTM E84; Standard Test Method for Surface Burning Characteristics of Building Materials

13. ASTM E108: Fire Tests of Roof Coverings
14. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
15. ASTM E1592: Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
16. ASTM E1646; Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
17. ASTM E1680; Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems

C. FM Global (FM)

1. FM 4471; Approval Standard for Class 1 Panel Roofs
2. Approval Standard 4880; Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.

D. International Building Code (IBC): current edition

E. UL Canada (ULC) Approvals:

1. CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies
2. CAN/ULC-S126: Standard Method of Test for Fire Spread Under Roof Deck Assemblies.
3. CAN/ULC-S138: Standard Method of Test for Fire Growth of Insulated Building Panels in Full-Scale Room Configuration

## 1.3 SUBMITTALS

A. Refer to Section 01 33 00 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each type of product.

C. Shop Drawings: Submit detailed drawings and panel analysis showing:

1. Profile, R value of assembly & insulation type.
2. Gauge of both exterior and interior sheet
3. Location, layout and dimensions of panels
4. Location and type of fasteners
5. Shape and method of attachment of all trim
6. Locations and type of sealants
7. Installation sequence

8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
9. Other details as may be required for a weathertight installation

D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection L/240 (roof). Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.

E. Samples: Provide nominal 3 x 5 inch of each color indicated.

F. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

## 1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated roof panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years experience in the production of insulated roof panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.

B. Installer Qualifications:

1. Installer shall be authorized by the panel manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated metal standing seam roof panels on similar type and size projects.

2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01 60 00 Product Requirements.

B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

C. Store roof panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance, bond integrity, deflection and buckling and weather tightness.

1. Warranty Period: Two (2) years from date of Substantial Completion, or 2 years and 6 months from the date of shipment from manufacturer's plant, whichever occurs first.

B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess, and /or color fading.

1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 6 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Kingspan Insulated Panels, Inc., 726 Summerhill Drive, Deland, FL 32724 (888-882-5862); 2000 Morgan Road, Modesto, CA 95358 (800-377-5110) (www.kingspanpanels.us)

B. Kingspan Insulated Panels Ltd. 12557 Coleraine Drive, Caledon, ON L7E 3B5 (866-442-3594); 5202-272nd Street, Langley, B.C. V4W 1S3 (866-442-3594) (www.kingspanpanels.ca).

C. Basis of Design: Kingspan RingRib3 Roof panels.

D. Substitution Limitations:

1. Submit written request for approval of substitutions to the Architect a minimum of 14 days prior to the date for receipt of bids. Include the following information:

   a. Name of the materials and description of the proposed substitute.
   b. Drawings, cut sheets, performance and test data.
   c. List of projects similar scope and photographs of existing installations.
   d. Test reports indicating compliance with the performance criteria.
   e. Other information necessary for evaluation.

2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.

## 2.2 EXTERIOR ROOF PANELS

A. Design Criteria – Roof Panels:

1. Uplift Rating
   a. Design Uplift Load: Insert loads psf per ASCE 7.
   b. Design deflection criteria shall be L/240 for roof.
   c. Units shall be rated and carry the following listings:

      1) Factory Mutual 1-60 uplift rating for 5 foot spans with minimum 16 gauge purlins
      2) Factory Mutual 4471 – Class 1 Approval

2. Fire Classifications

   a. Factory Mutual Class 1A Approval when installed at a maximum roof slope of 5:12.

B. Performance Criteria – Roof Panels:

1. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 and/or ASTM E1592.
2. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 12 psf, when tested in accordance with ASTM E1646.

3. Air Infiltration: Air infiltration through the panel shall not exceed 0.032 cfm/sf at 6.24 psf air pressure differential when tested in accordance with ASTM E1680.

4. Hailstorm Rating for roof panels: Factory Mutual 1 SH hailstorm rating
   a. Tests performed in accordance with ASTM E84

5. Fire Test Response Characteristics for panels: Steel-faced panels with polyisocyanurate (ISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.

   a. FM 4880: Class I rated per FM Global, panels are approved for use without a thermal barrier and do not create a requirement for automatic sprinkler protection.
   b. Flame Spread and Smoke Developed Tests on exposed Insulating Core:
      1) Flame Spread: Less than 25
      2) Smoke Developed: Less than 450
   c. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
   d. Exterior Fire Exposure Test: The roof panels shall be tested as a Class A material per ASTM E108.
   e. NFPA 259 Potential Heat Content; established for foam core.
   f. CAN/ULC S102, S126, S138 UL Canada fire test standards; successfully passed.

6. Insulating Core:
   a. Minimum 90 percent closed cell structure (per ASTM D6226) urethane modified isocyanurate core with the following minimum physical properties:
   b. Thermal Properties: The panel shall provide a nominal R-value of 7.1 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C518 at 75°F mean temperature and 8.1 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C518 at 35°F mean temperature
   c. Density Nominal: 2.1-2.5 pcf per ASTM D1622
   d. Shear Strength: 14 psi per ASTM C273
   e. Tensile Strength: 8.25 psi per ASTM D1623
   f. Compressive Strength: 14 psi per ASTM D1621
   g. Dimensional Stability: 14 day aged per ASTM D2126: -20 degree F < 1% chg, dry heat 158 degree F < 1.5% chg, Humid Heat 158 degree F/95% RH < 4.5% chg

C. Roof Panel Assembly Description:

1. Panel thickness: 6 inches thick.
2. Panel width: 40 inches.

3. Panel Lengths: As indicated on Drawings.

4. Panel Attachment: Shall consist of exposed fasteners and saddle washers.
5. Exterior Face of Panel:

    a. Material: AZ50/Galvalume/Zincalume per ASTM A792. Minimum Grade 33

    b. Profile description – High Rib: non-embossed with standing ribs spaced 20" on-center and lightly planked mesa intermediate ribs, KingRib3

    c. Texture: Smooth (non-embossed).

    d. Gauge: 26 gauge

    e. Exterior Finish: PVDF finish, dry film thickness of 1.0 mil including primer

    f. Color: Selected from current Kingspan Insulated Panels premium color chart, Regal White

    g. Location: Roof Panels.

        1) SRI: Minimum of 86.

6. Interior Face of Panel:

    a. Material: AZ50/Galvalume/Zincalume per ASTM A792 minimum Grade 33
    b. Profile: Shallow "lightly planked mesa ribs on 2.22" centers
    c. Texture: Smooth (non-embossed)

    d. Gauge: 26 gauge
    e. Interior Paint Finish Color:

        1) Selected from current Kingspan Insulated Roof Panels color chart color as selected by Architect.
    f. Interior Finish: PVDF finish, dry film thickness of 1.0 mil including primer.

        1) Color: Same as exterior finish – Regal White.

## 2.3 ACCESSORIES

A. Fasteners:

1. Structural fasteners: Self-drilling or self-tapping screws and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by factor-applied coating, with weather tight sealing washers.

2. Saddle washer for panel attachment shall include integral self-sealing gasket supplied by the manufacturer.
3. Stitch fasteners for roof panel sidelaps and endlaps shall be self-drilling low profile screws with sealing washers
4. Size and spacing: As recommended by manufacturer.

B. Perimeter Trim and Penetration Treatments: Fabricated perimeter trim, penetration treatments and metal flashing: Shall be same gauge, material and coating color as exterior face of insulated metal roof panel.

C. Butyl Sealants: Non-skinning/curing type as recommended by manufacturer.

D. Butyl Tape: As recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Provide field measurements to manufacturer as required to achieve proper fit of the preformed roof panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

1. Supporting Steel: The contractor or installer shall examine the alignment of the steel supports before installing the metal roof panel system. The steel shall be aligned to the tolerances established in the AISC code of standard practice, Section 8 and the supplemental modification control Section 7.11.
2. All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:

    a. Structural Tolerance: In the plane of the roof ≤ 3/16 inches outward, 0 inches inward with a 1/8'' maximum change in deviation for any member of any 10'-0'' run of panel.
    b. Verify that bearing support has been provided perpendicular to the orientation of the panels. Width of support shall be as recommended by manufacturer.

3. The face of all structural members to which the panels are attached must be in the same vertical plane, flat and free of obstructions, such as weld marks, bolts or rivet heads. In no case shall roof panels be fastened directly to structural framing members installed in the same direction of the roof panels.

B. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

## 3.2 PANEL INSTALLATION

A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.

C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.

D. Butyl Weather Barrier Sealant:

1. Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels.
2. Use non-skinning butyl tube sealant only for tight metal-to-metal contact.
3. Do not use non-skinning butyl tube sealant to bridge gaps.

E. At roof panels endlap apply butyl sealing tape to panel surface to be lapped per manufacturer's instructions.

## 3.3 TRIM INSTALLATION

A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.

B. Place a continuous strip of butyl tube sealant between the inside back face of closure trims and interior panel faces of panels for proper vapor seal.

C. Fasten the exterior ridge trim at roof panels to the metal ridge closure trims, per manufacturer's recommendations, with 1/4 inch by 7/8 inch stitch fasteners.

## 3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS AT ROOF PANELS

A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.

B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.

C. Direct contact between butyl and silicone sealants shall not be permitted.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: General Contractor shall engage an independent testing and inspection agency acceptable to the architect to perform field tests and inspections and to prepare reports of findings.

3.6 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

C. Clean finished surfaces as recommended by metal panel manufacturer.

D. Repair or replace any damaged or defective panels after determination of responsibility.

END OF SECTION

***DISCLAIMER:***

***Kingspan Insulated Panels Guide Specifications have been written as an aid to the professionally qualified Specifier and Design Professional. The use of this Guideline Specification requires the sole professional judgment and expertise of the qualified Specifier and Design Professional to adapt the information to the specific needs for the Building Owner and the Project, to coordinate with their Construction Document Process, and to meet all the applicable building codes, regulations and laws. KINGSPAN INSULATED PANELS EXPRESSLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THIS PRODUCT FOR THE PROJECT.***

GENERAL

1.1 SECTION INCLUDES

A. Steel faced, Polyurethane (polyisocyanurate) metal wall panels.

B. Products requiring coordination with this section, but furnished and installed in other Sections include:07 41 13 – Metal Roof Panels, 07 62 00 Sheet Metal Flashing & Trim and 07 46 13 Preformed Metal Siding specified in Section 13 34 19 Metal Building System

C. Accessories including KarrierRails, hat channel, fasteners, flashings, and perimeter trim.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1. AAMA 501.1: Standard Test Method for Metal Curtain Walls for water penetration using Dynamic Pressure.
2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.

B. American Society of Civil Engineers (ASCE)

1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

C. ASTM International

1. ASTM A480: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
2. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
4. ASTM A792: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot–Dip Process
5. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
6. ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus
7. ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

8. ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board
9. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
10. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
11. ASTM C920: Standard Specification for Elastomeric Joint Sealants
12. ASTM D224; Standard Specification for Smooth-Surfaced Asphalt Roll
13. ASTM D522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
14. ASTM D523: Standard Test Method for Specular Gloss
15. ASTM D714: Standard Test Method for Evaluating Degree of Blistering of Paints
16. ASTM D968: Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
17. ASTM D1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
18. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
19. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
20. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
21. ASTM D1654: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
22. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
23. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
24. ASTM D2244: Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
25. ASTM D2247: Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
26. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
27. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
28. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape Test
29. ASTM D3363: Standard Test Method for Film Hardness by Pencil Test
30. ASTM D4145: Standard Test Method for Coating Flexibility of Prepainted Sheet
31. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
32. ASTM D5894: Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)
33. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
34. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction

35. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
36. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
37. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
38. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
39. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
40. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
41. ASTM G154: Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

D. International Building Code (IBC): current edition

E. National Fire Protection Agency (NFPA)

1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
2. NFPA 268: Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
3. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

F. UL

1. UL1715: Fire Test of Interior Finish Material.

G. UL Canada (ULC)Approvals:

1. CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials
2. CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies
3. CAN/ULC-S127: Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials
4. CAN/ULC-S134: Fire Test of Exterior Wall Assemblies
5. CAN/ULC-S138: Standard Method of Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration

H. International Organization for Standardization (ISO)

1. ISO 14025: Environmental Labels and Declarations

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each type of product.

C. Shop Drawings: Submit detailed drawings and panel analysis showing:

1. Profile, R value of assembly & insulation type.
2. Gauge of both exterior and interior sheet
3. Location, layout and dimensions of panels
4. Location and type of fasteners
5. Shape and method of attachment of all trim
6. Locations and type of sealants
7. Installation sequence
8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
9. Other details as may be required for a weathertight installation

D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.

E. Samples: Provide nominal 3 x 5 inch of each interior color indicated.

F. Miscellaneous Certifications:

1. Submit documentation that products have been certified in accordance with ISO 14025.

G. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years experience in the production of insulated wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance with ISO 14025, for Insulated Metal Panels.

B. Installer Qualifications: Authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated wall panels on similar type and size projects.

1.6 DELIVERY, STORAGE AND HANDLING

A. Refer to Section 01 61 00 Common Product Requirements

B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

C. Store wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the

warranty include structural performance including bond integrity, deflection and buckling weather tightness.

1. Warranty Period: Two (2) years from date of Substantial Completion, or 2 years and 6 months from the date of shipment from manufacturer's plant, whichever occurs first.

B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.

1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

C. Thermal Warranty: Standard form in which manufacturer agrees to repair or replace panels that exhibit greater than 10% reduction from published material R-value at time of manufacture as measured in accordance with ASTM C518 within specified warranty period.

1. Warranty Period: Thirty (30) years from date of Substantial Completion or 30 years and 3 months from date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Insulated Barrier Wall Panel:

1. Kingspan Insulated Panels Ltd. 12557 Coleraine Drive, Caledon, ON L7E 3B5 (866-442-3594); 5202-272nd Street, Langley, B.C. V4W 1S3 (866-442-3594) (www.kingspanpanels.ca);
2. Kingspan Insulated Panels, Inc., 726 Summerhill Drive, Deland, FL 32724 (888-882-5862); 2000 Morgan Road, Modesto, CA 95358 (800-377-5110) (www.kingspanpanels.us)

B. Basis of Design: Kingspan KarrierPanel® Series with 152mm insulation thickness..

C. Substitution Limitations:

1. Submit written request for approval of substitutions to the Architect a minimum of 14 days prior to the date for receipt of bids. Include the following information:

    a. Name of the materials and description of the proposed substitute.
    b. Drawings, cut sheets, performance and test data.
    c. List of projects similar scope and photographs of existing installations.
    d. Test reports indicating compliance with the performance criteria.
    e. Other information necessary for evaluation.

2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.
3. Substitutions following award of contract are not allowed except as stipulated in Division 01 – General Requirements.

## 2.2 EXTERIOR WALL PANELS

A. Performance Criteria – Insulated Barrier Wall Panel:

1. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 and E330. Deflection criteria shall be L/180.
2. Freeze / Heat Cycling Test: Panels shall exhibit no delamination, surface blisters, permanent bowing or deformation when subjected to cyclic temperature extremes of minus 36 deg. F to plus 180 deg. F temperatures for twenty-one, eight-hour cycles.
3. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E331.
4. Dynamic Water Penetration: There shall be no uncontrolled water penetration through the panel assembly at a pressure difference of 15 psf, when tested in accordance with AAMA 501.1.
5. Air Infiltration: Air infiltration through the panel shall not exceed 0.01 cfm/sf at 6.24 psf air pressure differential when tested in accordance with ASTM E283.
6. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion when subjected to plus 140 deg. F temperature and 100 percent relative humidity for a total of 1500 hours (62 days).
7. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of the foam core from the metal skins after being subjected in an autoclave to a pressure of 2psig (13.8kPa) at a temperature of plus 218 deg. F (plus 103 deg. C) for a period of 2 1/2 hours.
8. Seismic Performance: Comply with ASCE 7, Section 13, “Seismic Design Requirements for Non-Structural Components”. Panels shall be hard-fastened to structure along one

edge only such that lateral slippage between panels can occur in the event of seismic activity.

9. Fire Test Response Characteristics: Steel-faced panels with polyisocyanurate (POLYISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.
    a. Flame Spread and Smoke Developed Tests on exposed Insulating Core:
        1) ASTM E84 Flame spread and smoke developed indices:
            a) Flame Spread: 25 or less.
            b) Smoke Developed: 250 or less.
        2) CAN/ULC S102 Flame spread and smoke developed indices:
            a) Flame Spread: 35 or less.
            b) Smoke Developed: 120 or less.
    b. UL1715 Fire Test of Interior Finish Material: Successfully passed acceptance criteria.
    c. NFPA 259 Potential Heat Content; established for foam core.
    d. NFPA 268 Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source; successfully passed acceptance criteria.
    e. NFPA 285 Intermediate Scale Multi-story Fire Evaluation; successfully passed acceptance criteria when installed per listed details.
    f. UL 263 Fire Resistive Rating; classified as a component of a fire-rated wall assembly for 1-hour and 2-hour rating Design No. U053 (rated assemblies include appropriate layers of fire-rated Type X Gypsum board).
    g. CAN/ULC S101 Standard Methods of Fire Endurance Tests of Building Construction Materials
        1) Fire Endurance Test – 10 minutes: 3 inch or greater Panels remained in place without joint stitch fastening
        2) Fire Endurance Test – 10 minutes: Less than 3 inch Panels remained in place with joint stitch fastening
    h. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
    i. S101, S102, S127, S134, S138 UL Canada fire test standards; successfully passed.

10. Insulating Core: Polyisocyanurate (POLYISO) core, ASTM C591 Type IV, CFC and HCFC free, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:

    a. Core is 95 percent closed cell when tested in accordance with ASTM D6226
    b. Panel shall provide a nominal R-values of 7.2 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75°F mean temperature and 8.25 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 35°F mean temperature.

c. Foam has a density of 2.2 to 2.8 pounds per cubic foot when tested in accordance with ASTM D1622
d. Compressive Stress: Panels shall have a compressive stress of 19 psi. when tested according to ASTM D1621
e. Shear Stress: 25 psi when tested in accordance with ASTM C273
f. Tensile Stress: 23 psi when tested in accordance with ASTM D1623
g. Oven Aging at 212 degrees F:
    1) 14 days: minus 3.2 percent volume change
    2) Tested according to ASTM D2126
h. Low Temperature Aging at minus 40 degrees F:
    1) 14 days: minus 0.1 percent volume change
    2) Tested according to ASTM D2126

B. Paint Finish Characteristics:

1. Gloss: 15 ± 5 measured at 60 degree angle tested in accordance with ASTM D523.
2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363.
3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
4. Flexibility, Mandrel: No cracking when bent 180° around a 1/8 mandrel as tested in accordance with ASTM D522.
5. Adhesion: No adhesion loss tested in accordance with ASTM D3359.
6. Reverse Impact: No cracking or adhesion loss when impacted 3000 by inches of metal thickness (lb-in), tested in accordance with ASTM D2794.
7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32 inch diameter of metal substrate when tested in accordance with ASTM D968.
8. Graffiti Resistance: Minimal effect.
9. Acid Pollutant Resistance: No effect when subjected to 30 percent sulfuric acid for 18 hours, or 10 percent muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
10. Salt Fog Resistance: Passes 1000 hours, when tested in accordance with ASTM B117 (5 percent salt fog at 95 deg. F).
11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours when tested in accordance with ASTM D5894.
12. Humidity Resistance: Passes 1500 hours at 100 percent relative humidity and 95 deg. F, with a test rating of 10 when tested in accordance with ASTM D2247, and D714.
13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154.
14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
15. Color Tolerances: Maximum of 5ΔE Hunter units on panels when tested in accordance with ASTM D2244.

C. Panel Assembly:

1. Panel thickness: 152 mm thick.
2. Panel width: 1067mm, as indicated on drawings.
3. Panel Lengths: Minimum 2438mm, maximum 1000mm, as indicated on Drawings.
4. Panel Attachment: Shall consist of fasteners and 16 gauge galvanized Kingspan KarrierRail subgirt integrated with the panel side joint.
5. Horizontal Panel Joint Reveals: 3/8 inch.

6. Vertical Joint Treatments (for horizontal panels):

    a. Panel trimless ends with black gasket insert
    b. Surface mounted top hat metal flashing

7. Vertical Panel Joint Reveals: 3/8 inch.
8. Exterior Face of Panel:

    a. Material:

        1) Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/ Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792.
        2) Gauge: 26 gauge

    b. Profile: Shadowline
    c. Texture: Non-directional stucco embossed
    d. Exterior Paint Finish Color:

        1) Selected from current Kingspan Insulated Panels color chart.
        2) Finish System:

            a) 1.0 mil. Fluropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70 percent) SOLID color coat.

9. Interior Face of Panel:

    a. Material:

        1) Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/ Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792.

    b. Profile: Shadowline.

1) Profile description: Linear striations nominal 0.0625 inch deep by 3/4 inches wide at 3 inches on center.

c. Texture: Non-directional stucco embossed.
d. Gauge: 26 gauge
e. Interior Finish: modified polyester, dry film thickness of 1.0 mil including primer.
f. Color: Selected from the current Kingspan Insulated Panels stock color chart.

D. KarrierRails: Manufacturer's standard, ASTM A653 cold-formed, G90 hot-dip galvanized KarrierRails.

2.3 Insulated Barrier Wall ACCESSORIES

A. Fasteners:

1. Self drilling fasteners shall be corrosion resistant plated steel with neoprene bonded washer, as recommended by manufacturer.
2. Material: Hex-head type with steel and neoprene washer and 12-gauge stainless steel clip supplied by the manufacturer.
3. Size: As recommended by manufacturer.

B. Perimeter Trims:

1. Fabricated perimeter trim and metal flashing: Shall be same gauge, material and coating color as exterior face of insulated metal wall panel.

C. Sealants: Butyl, non-skinning/curing type as recommended by manufacturer.

D. Butyl Tape: As recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Provide field measurements to manufacturer as required to achieve proper fit of the preformed wall panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:

1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.
2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
3. Plus or minus 1/2 inch from framing plane on any elevation.
4. Plumb or level within 1/8 inch at all changes of transverse for pre-formed corner panel applications.
5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support shall be as recommended by manufacturer.

C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 BARRIER WALL PANEL INSTALLATION

A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

1. Multi-story installation fire stopping as recommended by manufacturer or otherwise indicated on the approved shop drawings

B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.

C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.

D. Butyl Weather Barrier Sealant:

1. Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels.
2. Use non-skinning butyl tube sealant only for tight metal-to-metal contact.
3. Do not use non-skinning butyl tube sealant to bridge gaps.

E. KarrierRail Attachment

1. Attachment at panel joint: Place panel fasteners through KarrierRails. Fasteners are concealed within the joint of the panel. Set fastener in Butyl Sealant. Secure KarrierRail to structural supports.
2. Secure opposite side of KarrierRail, using manufacturer recommended fasteners.
3. Space fasteners as recommended by manufacturer or otherwise indicated on the approved shop drawings.

4. Alter KarrierRail as required to accommodate panel accessories per approved shop drawings and manufacturer's standard details.

F. Install perimeter trim for insulated barrier wall panels, where indicated and where trim will be concealed by finish materials.

G. TRIM INSTALLATION

1. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
2. Field drill weep holes where appropriate in horizontal trim; minimum 1/4 inch diameter at 24 inches on center.
3. Place a continuous strip of butyl tube sealant between the inside back face of closure trims and interior panel faces for proper vapor seal.

H. SEALANT INSTALLATION FOR EXPOSED JOINTS

1. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.
2. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.
3. Direct contact between butyl and silicone sealants shall not be permitted.

I. TRIM INSTALLATION

1. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
2. Field drill weep holes where appropriate in horizontal trim where indicated on shop drawings.
3. Place a continuous strip of butyl tape or butyl sealant on closure trims for the length of the panel to be covered as indicated on shop drawings.

3.3 FIELD QUALITY CONTROL

A. Testing shall be performed on Barrier Wall Panel prior to the installation of the finish wall materials.

B. Testing Agency: General Contractor shall engage an independent testing and inspection agency acceptable to the architect to perform field tests and inspections and to prepare reports of findings.

C. Field Water Test: After completing portion of metal wall panel assembly including accessories and trim, test a 2-bay area selected by the architect for water penetration in accordance with AAMA 501.2.

3.4 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

C. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

.1 Section 07 42 13 - Insulated Metal Panel Walls.

.2 Section 07 92 00 - Joint Sealants.

.3 Section 13 34 19 - Metal Building Systems

### 1.2 REFERENCES

.1 American National Standards Institute (ANSI).
.1 ANSI B18.6.4-99, Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws.

.2 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-93.4-92, Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
.2 CGSB 93.5-92, Installation of Metal Residential Siding, Soffits and Fascia.

.3 Canadian Standards Association (CSA International).
.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product data: submit manufacturer's printed product literature, specifications and data sheet 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.
.2 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, and related work.

.3 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit duplicate samples of siding and liner panel material, of colour and profile specified.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management and Disposal.

.2 Divert used metal cut-offs from landfill by disposal at the nearest metal recycling facility.

.3 Divert reusable materials for reuse at nearest used building materials facility.

.4 Divert unused caulking, sealants, and adhesive materials from landfill through disposal at hazardous material depot.

PART 2 - PRODUCTS

2.1 STEEL CLADDING AND COMPONENTS

.1 Sheet siding 1: Prefinished galvanized metal siding. Vicwest Diamond Rib or equal by Agway Metals.
.1 Finish coating: Class F1S.
.2 Colour: Selected by Consultant from "Signature Line".
.3 Gloss: medium.
.4 Thickness: 26 gauge base metal thickness.
.5 Profile: 16 mm deep, preformed interlocking joints, fastener holes prepunched.

.2 Sheet siding 2: Prefinished galvanized corrugated siding. Vicwest Corrugated or equal by Agway Metals.
.1 Finish coating: Class F1S.
.2 Colour: Selected by Consultant from "Signature Line".
.3 Gloss: medium.
.4 Thickness: 26 gauge base metal thickness.
.5 Profile: 14mm deep

.3 Fascia facings and exposed trim: to CGSB 93.4:
.1 Finish coating: Class F1S.
.2 Colour: To match Siding 1.
.3 Gloss: medium.

.4 Canopy Soffit:

2.1 STEEL CLADDING AND COMPONENTS (Cont'd)

.4 (Cont'd)
.1 Vicwest AD300 dark cedar perforated or Agway profile equal in Cherry Woodgrain perforated.

2.2 ACCESSORIES

.1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour and gloss as cladding, with fastener holes pre-punched.

.2 Galvanized hat channels: 12mm deep, 16 gauge, spacing as recommended by siding manufacturer.
.1 Coordinate with steel building design and insulated metal panel manufacturer for spacing.
.2 Screws as recommended by insulated metal panel siding manufacturer.

2.3 FASTENERS

.1 Nails: CSA B111. Screws: ANSI B18.6.4. Purpose made, cadmium plated steel.

2.4 CAULKING

.1 Sealants: Section 07 92 00 - Joint Sealants.

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 cladding in accordance with CGSB 93.5, and manufacturer's written instructions. Coordinate with requirements of insulated metal panel manufacturer.

.2 Orientation
.1 Siding 1: Horizontally

3.2 INSTALLATION (Cont'd)

.2 (Cont'd)

.2 Siding 2: Vertically

.3 Provide all necessary flashing, closures, and drip edges at transitions between siding types to ensure watertight installation and continous rainscreen drainage.

.3 Install hat channels horizontally or vertically to suit siding orientation. Coordinate with requirements of insulated metal panel manufacturer.

.4 Set hat channels in butyl sealant at fastener locations.

.5 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.

.6 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.7 Install soffit and fascia cladding as indicated.

.8 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.9 Attach components in manner not restricting thermal movement.

.10 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.

3.3 CLEANING

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

END OF SECTION

## PART 1 - GENERAL

**1.1 SECTION INCLUDES**

.1 Materials and installation for sheet metal roofing at canopies.

**1.2 RELATED SECTIONS**

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

**1.3 REFERENCES**

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM A 653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM D 523-89(2008), Standard Test Method for Specular Gloss.

**1.4 SUBMITTALS**

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

.2 Submit product data sheets for sheet metal roofing. Include:
.1 Product characteristics.
.2 Performance criteria.
.3 Limitations.

.3 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.4 Indicate arrangements of sheets and joints, types and locations of fasteners and special shapes and relationship of panels to structural frame.

**1.5 WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management And Disposal.

1.5 WASTE MANAGEMENT AND DISPOSAL (Cont'd)

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.6 WARRANTY

.1 Provide a 2-year warranty covering the roof system installtion and water tightness.

.2 Provide a warranty from the manufacturer of the roof panels covering all of the following criteria; multiple warranties are not acceptable:
.1 Manufacturer's 30-year watertight warranty, including coverage for all trim, flashings, and penetrations associated with the standing seam roof area.
.2 Twenty (20) year coverage on finish including checking, crazing, peeling, chalking, fading and/or adhesion.
.3 Warranty shall commence on date of substantial performance.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Zinc coated core by continuous hot dipped process in accordance with ASTM A653 Tee Style mechanically seamed side lap, 38 mm high with 31 mm Tee. 0.76 mm base steel core and 400 mm wide sheet coverage. High molecular weight polyester prefinished coating with 100% ceramic pigments. Colour: To be selected by Architect from manufacturers full range of standard colours.
.1 Acceptable Products: Vicwest Tradition 150 or equal by Agway.

.2 1 colour to be selected.

2.2 FASTENERS

.1 As recommended by the manufacturer. Exposedfasteners colour matched to selected roof colour complete with neoprene washer.

2.3 ACCESSORIES

.1 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.

.2 Touch-up paint: as recommended by sheet metal roofing manufacturer.

2.4 FABRICATION

.1 Fabricate sheet metal in accordance with ASTM A 653/A 653M.

.2 Form individual pieces in maximum lengths. 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 Protect sheet metals against oxidization by backpainting with isolation coating where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Use exposed fastenings system approved by Manufacturer installation requirements.

.2 Install sheet metal roof panels using cleats spaced as per manufacturer's recommendations.

.3 Stagger transverse seams in adjacent panels.

.4 Flash roof penetrations with material matching roof panels, and make watertight.

.5 Form seams in direction of water-flow and make watertight.

.6 Refer to details for waterproofing membrane and addition information.

END OF SECTION

## PART 1 - GENERAL

### 1.1 Related Sections

.1 Section 07 61 00 - Sheet Metal Roofing.

.2 Section 07 46 13 - Preformed Metal Siding.

.3 Section 13 34 19 - Metal Building Systems.

.4 Section 07 42 13 - Insulated Metal Panel Walls.

### 1.2 References

.1 American Society for Testing and Materials (ASTM International)
.1 ASTM A 653/A 653M-02a 653M-02a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 2 ASTM D 822-01, prefinished sheet steel.
.3 ASTM D523 - 08 Standard Test Method for Specular Gloss

### 1.3 Submittals

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

.2 Submit samples for each colour.

### 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.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Sheet Metal Materials

.1 Zinc coated steel sheet: 0.61 mm (24 gauge) thickness, commercial quality to ASTM A 653/A653M-99 653M, with Z2475 desgination zinc coating.

2.2 Prefinished Steel Sheet

.1 Prefinished steel with factory applied polyvinvylidene fluoride.
.1 Class F2S.
.2 Colour to match metal roofing or siding as applicable.
.3 Specular gloss: 30 units +/- in accordance with ASTM D 523-89 (1999).
.4 Coating thickness: not less than 22 micrometres.
.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D 822-96 as follows:
.1 Outdoor exposure period 2500 hours.
.2 Humidity resistance exposure period 5000 hours.

2.3 Accessories

.1 Isolation coating: alkali resistant bituminous paint.

.2 Sealants: 07 92 00.

.3 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.4 Fasteners: of same material as sheet metal, to CSA B111, prefinished cap screws with neoprene gaskets and nylon heads of length and thickness suitable for metal flashing application.

.5 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.6 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details as indicated.

.2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm. 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 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 Fascia and Flashings

.1 Preformed from 26 gauge prefinished metal.

.2 Sizes and profiles as indicated on drawings.

.3 Provide necessary fastenings as recommended by manufacturer.

2.6 Eavestroughs and Downspouts

.1 Form eaves troughs and downspouts from 28 gauge prefinished aluminum.

.2 Provide necessary fastenings installed at 300mm o.c.

PART 3 - EXECUTION

3.1 Installation

.1 Install sheet metal work in accordance with CRCA FL series details.

.2 Use concealed fastenings except where approved before installation.

.3 Lock end joints and caulk with sealant.

3.2 Eaves Troughs and Downspouts

.1 Install eaves troughs and secure to building at 300 mm on centre with concealed offset mounting brackets. Slope eaves troughs to downpipes. Seal joints watertight.

.2 Install downspouts and provide goosenecks back to wall. Secure downpipes to wall with straps at 1800 mm on centre; minimum two straps per downpipe.

.3 Downspouts to discharge into stormwater management system. Coordinate with civil. Fully seal where downnpipe meets stormwater stand pipe.

END OF SECTION

## PART 1 - GENERAL

### 1.1 References

.1 Underwriter's Laboratories of Canada (ULC)
.1 ULC-S115-05, Standard Method of Fire Tests of Firestop Systems.

.2 Firestopping contractor shall be a member in good standing of the International Firestop Council (IFC).

### 1.2 Shop Drawings

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

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

### 1.3 Product Data

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

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

### 1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

PART 2 - PRODUCTS

2.1 Materials

.1 Use fire stop materials from a single manufacturer only for this project. Acceptable Manufacturers:
   .1 Ad Fire Protections Systems Inc.
   .2 Hilti Canada Corporation
   .3 3M Canada Inc.
   .4 Tremco Ltd.

.2 Fire stopping and smoke seal systems: in accordance with ULC-S115-1995(R2001).
   .1 Asbestos-free materials and systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115-1995(R2001) and not to exceed opening sizes for which they are intended and conforming to special requirements specified in 3.5.
   .2 Firestop system rating: refer to drawings for Fire Ratings and Fire Separations.

.3 Service penetration assemblies: certified by ULC in accordance with ULC-S115-1995(R2001) and listed in ULC Guide No.40 U19.

.4 Service penetration firestop components: certified by ULC in accordance with ULC-S115-1995(R2001) and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.6 Pillow type fire stopping and smoke seals at openings intended for ease of re-entry such as cables and cable trays.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

2.1 Materials (Cont'd)

.9 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.

.10 Sealants for vertical joints: non-sagging.

.11 Where firestopping will be exposed at completion of work, provide white or paintable caulking material.

## PART 3 - EXECUTION

3.1 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals 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.

3.2 Installation

.1 Fire stopping shall be installed by one installer, experienced in the application of listed fire stop systems.

.2 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

3.2 Installation (Cont'd)

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Tool or trowel exposed surfaces to a neat finish.

.6 Remove excess compound promptly as work progresses and upon completion.

3.3 Inspection

.1 Notify Consultant when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 Schedule

.1 Firestop and smoke seal at:
.1 Penetrations through all fire-resistance rated assemblies including, but not limited to all fire-rated masonry, concrete, and gypsum board ceilings, floors, partitions and walls.
.2 Top of fire-resistance rated masonry and roof assembly.
.3 Intersection of fire-resistance rated masonry partitions.
.4 Penetrations through fire-resistance rated slabs, ceilings and roofs.
.5 Openings and sleeves installed for future use through fire separations.
.6 Around mechanical and electrical assemblies penetrating fire separations.
.7 Rigid ducts: greater than 129 $cm^2$: 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.

3.5 Clean Up

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

## PART 1 - GENERAL

### 1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM C 919-02, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
.3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

### 1.2 SUBMITTALS

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

.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.

### 1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

1.5 PROJECT CONDITIONS

.1 Environmental Limitations:
.1 Do not proceed with installation of joint sealants under following conditions:
.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
.2 When joint substrates are wet.

.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.

1.6 ENVIRONMENTAL REQUIREMENTS

.1 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.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

## PART 2 - PRODUCTS

### 2.1 SEALANT MATERIALS

.1 Materials: Approved Manufactures - Tremco, Sika, Dow Corning, or approved equivalent.

.2 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.3 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.4 Where sealants are qualified with primers use only these primers.

### 2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1: low modulus, one component, moisture curing, modified polyurethane joint sealer to: ULC CAN4 S115 CAN/CGSB-19.13-M87, ASTM C 920-02, Type S, Grade NS Class 25.

.2 Type 2: One part, high performance, neutral cure, medium modulus, silicone sealant to: ASTM C 920-02 Type S, Grade NS, Class R5, CAN/CGSB-19.13-M87.

.3 Type 3: One part, moisture cure, general purpose construction grade acetoxy silicone sealant to ASTM C 920-02, Type S, Grade NS, CAN/CGSB-19.13-M87.

.4 Type 4: One part, acrylic latex, fast setting, pliable seal with minimum shrinkage sealant to ASTM C 834-00e1, CAN/CGSB 19.GP-17M.

.5 Type 5: Single component, non-skinning, non-hardening synthetic rubber acoustical sealant to CAN/CGSB-19.21-M87.

.6 Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

2.2 SEALANT MATERIAL DESIGNATIONS (Cont'd)

.6 (Cont'd)
.1 (Cont'd)
.1 Extruded closed cell foam backer rod.
.2 Size: oversize 30 to 50 %.
.2 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building: Sealant type: 1.

.2 Seal interior perimeters of windows: Sealant type: 2.

.3 Perimeter of exterior side of windows where frames meet exterior masonry or metal siding: sealant type: 1.

.4 Interior control/sawcuts and expansion joints in floor surfaces: Sealant type: 4.

.5 Perimeters of interior frames: Sealant type: 4.

.6 Joints at perimeter of non-load bearing Gypsum board: Sealant type: 5.

.7 Perimeter of washroom fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type: 3.

.8 Exposed interior control joints in drywall: Sealant type: 4.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

## PART 3 - EXECUTION

### 3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

### 3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

### 3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

### 3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 APPLICATION

.1 Sealant.
.1 Apply sealant in accordance with manufacturer's written instructions.
.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
.3 Apply sealant in continuous beads.
.4 Apply sealant using gun with proper size nozzle.
.5 Use sufficient pressure to fill voids and joints solid.
.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
.7 Tool exposed surfaces before skinning begins to give slightly concave shape.
.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.
.1 Cure sealants in accordance with sealant manufacturer's instructions.
.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
.1 Clean adjacent surfaces immediately and leave Work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

END OF SECTION

## PART 1 - GENERAL

**1.1 Related Sections**

.1 Section 07 92 10 - Joint Sealing: Caulking of joints between frames and other building components.

.2 Section 08 71 10 - Door Hardware - General: Supply of finish hardware, including weatherstripping and mounting heights.

.3 Section 08 80 50 - Glazing.

.4 Section 09 91 23 - Painting.

**1.2 Scope**

.1 Work of this Section:
.1 Hollow metal doors and door frames.
.2 Hollow metal interior window frames.

**1.3 References**

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 Canadian Standards Association (CSA International)
.1 G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) (Metric Version).

.3 Canadian Steel Door Manufacturers' Association, (CSDMA).
.1 CSDMA, Specifications for Commercial Steel Doors and Frames, 1990.
.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.

.4 National Fire Protection Association (NFPA)
.1 NFPA 80-2007, Standard for Fire Doors and Fire Windows.
.2 NFPA 252-2003, Standard Methods of Fire Tests of Door Assemblies.

1.3 References (Cont'd)

.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN4-S104-80(R1985), Fire Tests of Door Assemblies.
.2 CAN4-S105-85(R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.4 Shop Drawings

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

.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed louvred, arrangement of hardware and fire rating and finishes.

.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.

.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 Requirements

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M NFPA 252 for ratings specified or indicated.

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 channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

2.2 Door Core Materials

.1 Stiffened: insulated core.
.1 Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/$m^3$.

.2 All exterior doors are to be thermally insulated.

2.3 Adhesives

.1 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement. Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

2.4 Primer

.1 Touch-up prime CAN/CGSB-1.181.

2.5 Accessories

.1 Door silencers: single stud rubber/neoprene type.

.2 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.

.3 Metallic paste filler: to manufacturer's standard.

.4 Fire labels: metal rivetted.

.5 Sealant:07 92 10.

.6 Glazing:08 80 50.

.7 Make provisions for glazing as indicated and provide necessary glazing stops.
.1 Design exterior glazing stops to be tamperproof.

.8 Provide conduit as indicated. Fully coordinate with hardware schedule to ensure all conduit and cut-outs are provided as required for hardware.

2.5 Accessories (Cont'd)

.9 Prepare for and install cables for access control, electric strikes, power door operators, and any other electrical components. Provide protection for wire and connectors during shipping to site. Refer to hardware section, method of operation and riser diagram.

2.6 Frames Fabrication General

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Frames: 1.6 mm (16 gauge) welded type construction.

.4 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.

.5 Protect mortised cutouts with steel guard boxes.

.6 At fire rated doors, fabricate frame to accept FRR glazing. Coordinate with glazing provider to ensure thicker glazing can be installed and sealed.

.6 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.7 Manufacturer's nameplates on frames and screens are not permitted.

.8 Conceal fastenings except where exposed fastenings are indicated.

.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.10 All exterior door frames are to be insulated.

2.7 Frame Anchorage

.1 Provide appropriate 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 1 additional anchor for each additional 760 mm of height or fraction thereof.

.4 Locate anchors for frames in existing openings not more than 150 mm (6")from top and bottom of each jambs and intermediate at 660 mm (26")o.c. maximum.

2.8 Frames: Welded Type

.1 Welding in accordance with 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 a 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 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.9 Door Fabrication General

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Fabricate doors with longitudinal edges locked seamed, adhesive assisted,visible.

.3 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

2.9 Door Fabrication General (Cont'd)

.4 Factory prepare holes 12.7 mm (1/2") diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.5 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.7 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104 ASTM E 152 NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.8 Manufacturer's nameplates on doors are not permitted.

.9 All exterior doors are to be insulated.

2.10 Hollow Steel Construction

.1 Form each face sheet for doors from 1.6 mm (16 gauge) sheet steel.

PART 3 - EXECUTION

3.1 Installation General

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.2 Frame Installation

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm (4'0") wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Grout:
.1 Grout frames in solid in all masonry installations
.2 Provide low expansion in all metal stud installations

.6 Caulk perimeter of frames between frame and adjacent material.

3.3 Door Installation

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 - Door Hardware - General.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
.1 Hinge side: 1.0 mm (.0418").
.2 Latchside and head: 1.5 mm (.059").
.3 Finished floor, top of carpet noncombustible sill and thresholds: 13 mm (1/2").

.3 Adjust operable parts for correct function.

.4 Install louvres - coordinate with mechanical.

3.4 Finish Repairs

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.5 Glazing

.1 Install glazing for doors and frames in accordance with Section 08 80 50 - Glazing.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 07 92 00 - Joint Sealants.

.2 Section 08 71 10 - Door Hardware - General

.3 Section 08 80 50 - Glazing.

### 1.2 REFERENCES

.1 Aluminum Association (AA).
.1 DAF 45-03, Designation System for Aluminum Finishes.

.2 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

### 1.3 SYSTEM DESCRIPTION

.1 Design Criteria.
.1 Design frames and doors in exterior walls 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 E 330 under wind load of 1.2 kpa submit certificate of tests performed.
.3 Movement within system.
.4 Movement between system and perimeter framing components or substrate.

### 1.4 SHOP DRAWINGS

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

.2 Indicate materials and profiles and provide full-size, scaled details of components for door and frame. Indicate:
.1 Interior trim and exterior junctions with adjacent construction.
.2 Junctions between combination units.

1.4 SHOP DRAWINGS (Cont'd)

.2 (Cont'd)
.3 Elevations of units.
.4 Core thicknesses of components.
.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
.6 Location of caulking.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
.1 Apply temporary protective coating to finished surfaces.
.2 Leave protective covering in place until final cleaning of building.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition 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.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aluminum extrusions: Aluminum Association alloy AA 6063-T5 anodizing quality.

.2 Sheet aluminum: Aluminum Association alloy AA 1100 - H14 anodizing quality.

.3 Fasteners: finished to match adjacent material.

.4 Door bumpers: black neoprene.

.5 Isolation coating: bituminous paint.

.6 Glazing materials: Section 08 80 50.

2.1 MATERIALS (Cont'd)

.7 Sealants: Section 07 92 00.

2.2 ALUMINUM DOORS

.1 Acceptable Products
.1 Alumicor, 7700 Thermaporte Entrance Doors, T400B or equal by Windspec or Kawneer.

.2 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.

.3 Provide thermally broken doors for exterior. Maximum U value to not exceed 0.69.

.4 Hardware:
.1 Threshold: 178 mm wide (exterior door) Barrier Free Complaint.
.2 Hinges: Heavy Duty Butt Hinges. 1.5" pair, BB1199 add 3 plated steel butt back-up plates 4.7 mm thick x 254 mm long, heavy duty.
.3 Exit device: surface mounted rim type exit device.
.4 Closer: LCN 4041 PA-CUSH, with delayed closing.
.5 Stabilizing security blocks from door to frame.
.6 Pull Handle: CO-12.
.7 Door sweep and weather stripping as recommended by the manufacturer.
.8 Rim cylinder for unlocking panic hardware.

2.3 ALUMINUM FRAMES

.1 Construct thermally broken frames of aluminum extrusions to match doors.

2.4 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, and Protective and Decorative.

2.5 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with steel primer to CGSB 1.40 zinc coating to CSA G164.

2.6 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm 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.

.7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

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 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.2 Anchor securely.

.3 Install doors and hardware in accordance with hardware templates and manufacturer's instructions. Install Door Closers using through bolt method.

.4 Adjust operable parts for correct function.

3.2 INSTALLATION (Cont'd)

.5 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

.6 Coordinate with hardware for aluminum doors noted in Section 08 71 10 - Hardware Schedule.

3.3 GLAZING

.1 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.

3.4 CAULKING

.1 Apply sealant in accordance with Section 07 92 00 - Joint Sealants.

.2 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

3.5 CLEANING

.1 Perform cleaning of aluminum components in accordance with AAMA 609.1 - Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Clean aluminum with damp rag and approved non-abrasive cleaner.

.4 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.5 Clean glass and glazing materials with approved non-abrasive cleaner.

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 07 92 10 - Joint Sealing

### 1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM A 1008/A 1008M-02e1, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
.2 ASTM D 523-99(R1999), Test Method for Specular Gloss.

.2 ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

.3 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-1.105-M91, Quick-Drying Primer.
.2 CAN/CGSB-1.213-95, Etch Primer (Pretreatment Coating) for Steel and Aluminum.
.3 CAN/CGSB-1.181-99, Coating, Zinc-Rich, Organic, Ready Mixed.

.4 Canadian Standards Association (CSA International).
.1 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

### 1.3 SYSTEM DESCRIPTION

.1 Design Requirements.
.1 Design exterior door assembly to withstand windload of 1 kPa with a maximum horizontal deflection of 1/240 of opening width.
.2 Design door panel assemblies with thermal insulation factor R 16.
.3 Design door assembly to withstand minimum 15000 cycles per annum.

1.4 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 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories, power requirements required clearances.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for overhead door hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal, and with Waste Reduction Workplan.

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-02e1.

.3 Cable: multi-strand galvanized steel aircraft cable.

2.2 DOORS

.1 Sectional door assembly: metal/foam/metal sandwich panel constructed with EPDM thermal break and ship lap design.

.2 Unit to meet the following:

2.2 DOORS (Cont'd)

.2 (Cont'd)
.1 Panel thickness 51 mm.
.2 Exterior steel 20 gauges, 0.912 mm.
.3 End stiled double 16 gauge with thermal break, 1.519 mm.
.4 Springs: high cycles.
.5 Insulation: polyurethane fully encapsulated to meet design requirements.
.6 Thermal value R 16.
.7 High use package.

.3 Finish and Colour: two coat baked-on polyester with white colour, smooth finish.

2.3 STANDARD DUTY INDUSTRIAL HARDWARE

.1 Track: customized high vertical lift hardware with 75 mm size minimum 2.28 mm core thickness galvanized steel track. Customize track to suit bulding structure, overhead crane, and to maximized overhead clearance for operation of equipment within space.
.1 Submit shop drawing indicating customized track configuration prior to fabrication.

.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.

2.3 STANDARD DUTY INDUSTRIAL HARDWARE (Cont'd)

.8 Cable: minimum 4 mm diameter galvanized steel aircraft cable.

2.4 ACCESSORIES

.1 Overhead 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/$m^2$ to CAN/CSA-G164-M92 (R1998).

2.5 OPERATORS

.1 Equip doors for operation by:
.1 Hand, two handles on inside face of door.
.2 Chain hoist with galvanized steel chain.

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.

3.2 INSTALLATION (Cont'd)

.3 Touch-up steel doors with primer where 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 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking; clean doors and frames.

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

.1 Section 08 80 50 Glazing.

.2 Section 08 11 16 Aluminum Doors and Frames.

### 1.2 REFERENCE STANDARDS

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA)
.1 AAMA CW-10-04, Care and Handling of Architectural Aluminum From Shop to Site.
.2 AAMA CW-11-85, Design Wind Loads and Boundary Layer Wind Tunnel Testing.
.3 AAMA 501-05, Methods of Test for Exterior Walls.

.3 ASTM International
.1 ASTM A 123/A 123M-09, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM B 209-07, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
.3 ASTM B 221-08, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
.4 ASTM E 283-04, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
.5 ASTM E 330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.
.6 ASTM E 331-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.

1.2 REFERENCE STANDARDS (Cont'd)

.3 (Cont'd)
.7 ASTM E 1105-00(2008), 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.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 Society for Protective Coatings (SSPC)
.1 SSPC - Paint 20-02(R2004), Zinc Rich Coating, Type I - Inorganic and Type II - Organic.
.2 SSPC - Paint 25 - 97(R2004) BCS, Zinc Oxide, Alkyd, Linseed Oil and Primer for Use Over Hand Cleaned Steel Type 1 and Type 2.

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 curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details 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 Ontario, Canada.
.2 Indicate 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 location and details, and field welding required.

1.4 CLOSEOUT SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS (Cont'd)

.2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

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 Handle work of this Section in accordance with AAMA CW-10.
.2 Store materials in accordance with manufacturer's recommendations.
.3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.
.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 degrees 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 SYSTEMS

.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 units from exterior without requiring removal of structural mullion sections.

.2 Performance Requirements:
.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 seismic loads and sway displacement as calculated in accordance with applicable codes.
.3 Limit mullion deflection to flexure limit of glass with full recovery of glazing materials.
.4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.
.5 Ensure system is designed 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 $m^3$ /s/$m^2$ of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501, ASTM E 283.

2.1 SYSTEMS (Cont'd)

.2 (Cont'd)

.7 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure.

.8 Water leakage: none, when measured to AAMA 501, ASTM E 331, ASTM E 1105.

.9 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees 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 assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

.1 Position thermal insulation on exterior surface of air barrier and vapour retarder.

.12 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

2.2 MATERIALS

.1 Extruded aluminum: to ASTM B 221.

.2 Sheet aluminum: to ASTM B 209.

.3 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.4 Fasteners: stainless steel, finish to match curtain wall.

.5 Glazing: Section 08 80 50.

.6 Sealant: section 07 92 10 and as recommended by manufacturer.

.7 Insulating foam air barrier: one component low expansion polyurethane foam.

2.3 COMPONENTS

.1 Acceptable triple glazed infill products: Alumicor 2600 ThermaWall or equal by Kawneer Triple glazed 1600 U7 System I Curtainwall or Windspec 5500 HTP Triple Glazed.

.2 Mullion profile:
.1 Vertical members: 133.4 x 63.5 mm nominal dimension.
.2 Horizontal members: 133.4 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 Thermal operable units awning style operator. Compatible with curtain wall system. Triple glazed. 44 mm unit (Univent 1350 Alumicor).
.1 Sash: aluminum thermally broken.
.2 Main frame: aluminum thermally broken
.3 Glass: triple glazed in accordance withSection 08 80 00 - Glazing.
.4 Screens: to ASTM E 1748, on ventilatingportion of windows.
.5 Type: aluminum
.6 Fasteners: tamper proof
.7 Screen frames: aluminum colour to match new window frames.
.8 Mount screen frames for interior replacement.
.9 Max U value 0.38 btu/ft2°F.

.5 Exterior sills: aluminum of type and size asdetailed or to suit job conditions; minimum 3mm thick.

2.3 COMPONENTS (Cont'd)

.6 Solar shades: Aluminum, mounted directly onto window frame.
.1 Aluminum extrusions: alloy and temper as recommended by window manufaturer. ASTM B211, alloy 6063-T5.
.2 Provide fixed sunshades and accessories as shown on drawings, 762mm deep.
.3 Fasteners, anchors, and inserts shall be non-ferrous, stainless steel, or aluminum, as recommended by manufacturer and to suit conditions.
.4 Finish: Clear anondized aluminom to match window.
.5 Combined load on shade configuration to be determined in accordance with ASCE 7 or applicable code requirements. Combined load consists of wind, snow, and ice loads.
.6 Acceptable product: Versoleil Sunshade Outrigger by Kawneer, or equivalent by WindSpec or Alumicor.

2.4 FABRICATION

.1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof

.3 Prepare components to receive anchor devices. Install anchors.

.4 Arrange fasteners and attachments to ensure concealment from view.

.5 Reinforce framing members for external imposed loads.

.6 Visible manufacturer's identification labels not permitted.

.7 Finishes:
.1 Finish coatings: Clear anondized finish to designation AA-41.
.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.

2.4 FABRICATION (Cont'd)

.7 (Cont'd)

.4 Concealed steel items: galvanized in accordance with ASTM A 123 to 600 gm/$m^2$primed with iron oxide paint.

.5 Apply 1 coats 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: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Verify dimensions, tolerances, and method of attachment with other work.

.3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.

.4 Inform Consultant of unacceptable conditions immediately upon discovery.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install curtain wall system in accordance with manufacturer's instructions.

.2 Attach to 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 field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

3.2 INSTALLATION (Cont'd)

.5 Use thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Co-ordinate 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 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 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 wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Obtain written report from manufacturer of curtain wall verifying compliance of Work, in handling, installing, applying, protecting and cleaning of products, and submit written reports in acceptable format to verify compliance of Work with Contract within 3 days of review.
.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 in accordance with Section 01 74 00 - Cleaning.
.1 Leave Work area clean at end of each day.
.2 Remove 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.
.5 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 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 SECTIONS

.1 Section 08 11 00 - Metal Doors and Frames.

### 1.2 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
.1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

.2 Standards.
.1 ANSI/BHMA A156.1-2000, Butts and Hinges.
.2 ANSI/BHMA A156.3-2001, Exit Devices.
.3 ANSI/BHMA A156.4-2000, Door Controls (Closers).
.4 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
.5 ANSI/BHMA A156.6-2001, Architectural Door Trim.
.6 ANSI/BHMA A156.8-2000, Door Controls - Overhead Holders.
.7 ANSI/BHMA A156.10-1999, Power-operated Pedestrian Doors.
.8 ANSI/BHMA A156.12-1999, Interconnected Locks and Latches.
.9 ANSI/BHMA A156.13-2002, Mortise Locks and Latches.
.10 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
.11 ANSI/BHMA A156.17-1999, Self-closing Hinges and Pivots.
.12 ANSI/BHMA A156.18-2000, Materials and Finishes.
.13 ANSI/BHMA A156.19-2002, Power Assist and Low Energy Power Operated Doors.

.3 CAN/ULC-S132-07 Emergency exit and emergency fire exit hardware.

### 1.3 SUBMITTALS

.1 Product Data:

1.3 SUBMITTALS (Cont'd)

.1 (Cont'd)
.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 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

.4 Submit for owner review and comments key schedule listing the door number, hardware heading or item, lock function and the key group.

.5 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.

1.4 QUALITY CONTROL

.1 Regulatory Requirements:
.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by 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.

1.5 DELIVERY, STORAGE, AND HANDLING (Cont'd)

.1 (Cont'd)
.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 MAINTENANCE

.1 Extra Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
.2 Supply two sets of wrenches for door closers locksets and fire exit hardware.

PART 2 - PRODUCTS

2.1 DOOR HARDWARE

.1 Use one manufacturer's products only for similar items. Specified items in the Hardware List are one acceptable product. The equivalent quality item from any of the below manufacturers is acceptable. Refer also to 1.9 Warranty.

.2 Locks and latches:
.1 Mortise locks and latches: to ANSI/BHMA A156.13-2002, 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.

2.1 DOOR HARDWARE (Cont'd)

.2 (Cont'd)
.6 Cylinders: New MEDECO keying supplied by owner.
.7 Finished as stated in Hardware Schedule.
.8 Acceptable Manufacturers:
.1 Schlage

.3 Butts and hinges:
.1 Butts and hinges: ANSI/BHMA A156.1-2000, three knuckle concealed bearing. Exterior out swing doors must be non-ferrous and have non-removable pins (NRP).
.2 Acceptable Manufacturers:
.1 Hager

.4 Door Closers and Accessories:
.1 Door controls (closers): to ANSI/BHMA A156.4-2000.
.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 Product:
.1 LCN 4000 Series by Allegion.

.5 Architectural door trim: to ANSI/BHMA A156.6-2001, as listed in Hardware Schedule.
.1 All kickplates, push plates, and bumper plates must have all sides bevelled 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.

2.1 DOOR HARDWARE (Cont'd)

.5 (Cont'd)
.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 LCN 4000 Series

.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 suite 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 Hager

.7 Flush bolts for fixed leaf doors.
.1 Acceptable Manufacturers:
.1 Assa Abloy or approved equivalent.

.8 Panic hardware: Mounted at 1000mm A.F.F.. When mounted in front of glass, provide stainless steel backplate.

.9 Emergency Call System Kit:
.1 ti"Push to Lock" mechanism must not have a unloc
ed
by
occup
nt,
or
from
exter
or
by
key.

2.1 DOOR HARDWARE (Cont'd)

.9 (Cont'd)
.2 Kit to include a call strip mounted near floor.
.3 Call button and strip to connect to the QUeen's Campus Security Emergency Report Centre.

2.2 FASTENINGS

.1 Use only fasteners provided by 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 Exposed fastening devices to match finish of hardware.

.4 Use fasteners compatible with material through which they pass.

2.3 KEYING

.1 Provide construction cores.

.2 All permanent cores and keys to be supplied by Queen's and installed by Contractor.

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.

.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 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.

.2 Use only manufacturer's supplied fasteners. 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 Construction cores will be removed and permanent core installed by Queen's.

.4 Mounting height:
.1 Door operation hardware includes latchsets and exit devices :1000mm.

3.3 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 provide tight fit at contact points with frames.

.4 Section 08 71 10 is a complete supply and install package. Hardware installation includes cabling to HMD/HMF manufacturer prior to shipping to site. Include cabling from power transfer hinge to junction box above door through surface conduit. Coordinate system testing and verification with Electrical.

3.4 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 manufacturer's instructions.

3.4 CLEANING (Cont'd)

.3 Remove protective material from hardware items where present.

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

3.5 SCHEDULE

See Door schedule.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 08 11 14 - Metal Doors & Frames.

.2 Section 08 14 16 - Flush Wood Doors

.3 Section 08 11 16 - Aluminum Doors & Frames

### 1.2 REFERENCES

.1 American National Standards Institute (ANSI).
.1 ANSI/ASTM E330-02, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.2 American Society for Testing and Materials International, (ASTM).
.1 ASTM C 542-94(1999), Specification for Lock-Strip Gaskets.
.2 ASTM D 2240-02b, Test Method for Rubber Property - Durometer Hardness.

.3 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.2 CAN/CGSB-12.8-97, Insulating Glass Units.
.3 CAN/CGSB-12.9-M91, Spandrel Glass

.4 Flat Glass Manufacturers Association (FGMA).
.1 FGMA Glazing Manual - 1997.

### 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

### 1.4 SITE CONDITIONS

.1 Environmental Requirements:
.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management.

.2 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.

.3 Remove form site and dispose of packaging materials at appropriate recycling facilities.

.4 Dispose of corrugated cardboard polystyrene plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

PART 2 - PRODUCTS

2.1 MATERIALS: CURTAINWALL, DOOR AND WINDOW GLASS

.1 Glazing Type GL1 (Insulating glass units): to CAN/CGSB-12.8, triple unit, 44mm overall thickness.
.1 Glass: to CAN/CGSB-12.3 CAN/CGSB-1 2.1, CAN/CGSB-12.2, CAN/CGSB-12.4, CAN/G SB-12.10.
.2 Glass thickness: 6mm each light.
.3 Inter-cavity space thickness: 13mm between inner and middle lights, 13mm between inner and middle outer lights with all non metallic low conductivity spacers.
.4 Glass coating: surface number 2 & 4 low 'E' Solarban 90.
.5 Inert gas fill: argon
.6 Feather friendly bird deterrent film, 'Symmetry' by 3M, with 50mm x 50mm square spacing and 6mm dot size, applied to exterior layer of glass.

.2 Glazing Type GL2 (interior windows & doors): Tempered Glass: to CAN/CGSB-12.1 Transport 6 mm thick, tempered Type 2.
.1 For door lites, sidelites in non-rated partitions & doors.

.3 Glazing Type GL3 (FRR Fire Safety Glass): Ceramic Laminated impact safety rated, fire rated glass. As tested and approved for 60 minutes F.R.R., as indicated in schedule.

2.1 MATERIALS: CURTAINWALL, DOOR AND WINDOW GLASS (Cont'd)

.3 (Cont'd)
.1 Individual lites shall be permanently identified with a listing mark.
.2 Acceptable Products:
.1 Firelite NT Standard Grade
.2 Keralite F Select
.3 Pyran Platinum F filmed.
.4 Superlite II - XL by SaftiFirst..

.4 Glazing Type GL4 (Insulated Spandrel) Glass: to GANA 89-1-6, 6mm, tempered spandrel glass with water-based silicone elastomeric opacifying coating of 0.17mm on #2 surface.
.1 Colour: Clear glazing with colour coating.
.1 Colour to be selected from manufacturer's standard colour range.
.2 20 gauge galvanized steel formed spandrel with 100mm thick extruded polystyrene board insulation, RSI 3.5 min.. Spandrel panels by window manufacturer to coordinate with specified framing system.

2.2 MATERIALS

.1 Sealant: Section 07 92 10.

2.3 ACCESSORIES

.1 Setting blocks: Neoprene Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area. Silicone setting blocks recommended by manufacturer for spandrel glass.
.1 Setting blocks for FRR glazing to be calcium silicate.

.2 Spacer shims: Neoprene Shore A durometer hardness to ASTM D 2240, 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 D 2240; coiled on release paper; x mm size; black colour.
.2 Glazing tape for FRR glazing shall be closed cell polyvinyl chloride (PVC) foam.

2.3 ACCESSORIES (Cont'd)

.4 Glazing clips: manufacturer's standard type.

.5 Lock-strip gaskets: to ASTM C 542.

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 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 Provide manufacturer's inspection report for installation of demountable wall system and firerated wall system.

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 and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

3.4 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE) (Cont'd)

.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 light 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 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking.

.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 OF FINISHED WORK

.1 After installation, mark light with an "X" by using removable plastic tape or paste.

END OF SECTION

## PART 1 - GENERAL

**1.1 REFERENCES**

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM C 475/C 475M-02, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.2 ASTM C 840-02, Specification for Application and Finishing of Gypsum Board.
.3 ASTM C 1002-01, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
.4 ASTM C 1047-99, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

**1.2 DELIVERY, STORAGE AND HANDLING**

.1 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.2 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

## PART 2 - PRODUCTS

**2.1 MATERIALS**

.1 Type X Abuse Resistant Gypsum Board: 12.7mm (1/2") thick (4',0") 1200 mm wide x maximum practical length, ends square cut, edges bevelled.

2.1 MATERIALS (Cont'd)

.2 Standard board; to ASTM C 36/C 36M-01 regular thickness as indicated on drawings, 1200mm wide x maximum practical length, ends square cut, edges bevelled.

.3 Moisture resistant to ASTM C1396/C1396M-16 GB in Type X regular and as required to workshop 109 & crane zone 110, room 107, Jan 106 and Mech 111.

.4 Nails: to ASTM C 514-01.

.5 Steel drill screws: to ASTM C 1002-01.

.6 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047-99, metal, 0.5 mm base thickness, perforated flanges, one piece length per location.

.7 Resilient drywall furring 0.5mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.8 Sealants: in accordance with Section 07 92 00 - Joint Sealing.

.9 Joint compound: to ASTM C 475/C 475M-02, asbestos-free.

.10 Insulating strip & closed cell neoprene strip 3mm thick lengths as required.

PART 3 - EXECUTION

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.

.2 Do application of gypsum sheathing in accordance with ASTM C 1280.

.3 Install work level to tolerance of 1:1200.

.4 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

3.1 ERECTION (Cont'd)

.5 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.6 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.

.7 Furr openings and around built-in equipment, cabinets and access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.8 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.9 Erect drywall resilient furring transversely across studs, spaced maximum 400 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.

.10 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

.11 Apply acoustic sealant at perimeter and penetrations of all new partitions.

3.2 APPLICATION

.1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.

.2 Apply single and double layer gypsum board to metal furring or framing using screw fasteners for first layer, screw fasteners for second layer. maximum spacing of screws 300mm on centre.

.1 Single-layer application:

.1 Apply gypsum board on ceilings priorto application of walls to ASTM C 840-16.

.2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.

.2 Double-layer application:

3.2 APPLICATION (Cont'd)

.2 (Cont'd)

.2 (Cont'd)

.1 Install gypsum board for base layer and exposed gypsum board for face layer.

.2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250mm.

.3 Apply base layers at right angles to supports unless otherwise indicated.

.4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer jointsoffset at least 250 mm with base layers joints.

.3 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.

.4 Install gypsum board on walls vertically to avoid end-butt joints. At high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.5 Install gypsum board with face side out.

.6 Do not install damaged or damp boards.

.7 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 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 on centre using contact adhesive for full length.

3.3 INSTALLATION (Cont'd)

.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 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.

.6 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.

.7 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board 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.

.8 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.

.9 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.

3.3 INSTALLATION (Cont'd)

.10 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.11 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.12 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

.1 Section 09 21 16 - Gypsum board Assemblies.

.2 Section 07 21 16 - Blanket Insulation.

### 1.2 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 645-14e1, Standard Specification for Nonstructural Steel Framing Members.
- .2 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
- .3 ASTM C 754-15, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Underwriter's Laboratories (UL) Environmental Standards
- .1 UL-2768-2011, Architectural Surface Coatings.
- .2 , Surface Coatings - Recycled Water-Borne. UL-2760-2011

.3 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.
  - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.2 (Cont'd)
.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.

1.4 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 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 C 645, 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 A 653, Z180, for screw attachment of gypsum board.
.1 Knock-out service holes at 460 mm centres.

.2 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes, and as follows:

2.1 MATERIALS (Cont'd)

.2 (Cont'd)

.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 A 653, Z180, hot dipped zinc-coated (galvanized), as follows:

.1 Hat Shaped, Rigid Furring Channels: ASTM C 645, 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 A 653, 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 10 - 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.

.8 Batt insulation: in accordance with Section 07 21 16 - Blanket Insulation.

## 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.
.3 Proceed with installation after unacceptable conditions have been remedied.

### 3.2 ERECTION

.1 Erect partitions in accordance with framing requirements of ASTM C 754.

.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.

3.2 ERECTION (Cont'd)

.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 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install insulating strip under studs and tracks around perimeter of sound control partitions.

.18 Install sound batt insulation where shown in floor plans.

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 Related Sections**

.1 Section 07 92 10 - Joint Sealers.

**1.2 References**

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)
.1 ANSI A108.1-99, Specification for the Installation of Ceramic Tile (Includes ANSI A108.1a-1999, 108.4-.13, A118.1-.10, ANSI A136.1-1999 ).
.2 CTI A118.6-92, Specification for Ceramic Tile Grouts (included in ANSI A108.1-1992).

.2 American Society for Testing and Materials (ASTM International) International
.1 ASTM C 144-02, Specification for Aggregate for Masonry Mortar.

.3 Canadian General Standards Board (CGSB)
.1 CGSB 71-GP-22M, Adhesive, Organic, for Installation of Ceramic Wall Tile.
.2 CAN/CGSB-75.1-M88, Tile, Ceramic.

.4 Terrazzo Tile and Marble Association of Canada (TTMAC)
.1 Tile Specification Guide 09300 2006/2007, Tile Installation Manual.
.2 Tile Maintenance Guide 2000.

**1.3 Product Data**

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

.2 Include manufacturer's information on:
.1 Ceramic tile, marked to show each type, size, and shape required.
.2 Chemical resistant mortar and grout (Epoxy and Furan).
.3 Cementitious backer unit.
.4 Dry-set Portland cement mortar and grout.
.5 Divider strip.
.6 Elastomeric membrane and bond coat.
.7 Reinforcing tape.
.8 Leveling compound.

1.3 Product Data (Cont'd)

.2 (Cont'd)
.9 Latex-Portland cement mortar and grout.
.10 Commercial Portland cement grout.
.11 Fasteners.

1.4 Samples

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

.2 Base tile: submit duplicate full tile samples of each colour, texture, size, and pattern of tile.

.3 Floor tile: submit duplicate full tile samples of each colour, texture, size, and pattern of tile.

.4 Trim profiles, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, colour, and size.

1.5 Delivery, Storage and Handling

.1 Deliver materials in containers with labels legible and intact and grade-seals unbroken.

.2 Store material so as to prevent damage or contamination.

.3 Store materials in a dry area, protected from freezing, staining and damage.

.4 Store cementitious materials on a dry surface.

1.6 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

1.6 Waste Management and Disposal (Cont'd)

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.4 Unused adhesive, sealant and coating materials must be disposed of at an official hazardous material collections site as approved by the Engineer.

.5 Unused adhesive, sealant and coating materials must not be disposed of into the sewer system, into streams, lakes, onto the ground or in other location where it will pose a health or environmental hazard.

1.7 Environmental Conditions

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 ° C for 48 h before, during, and 48 h after, installation.

.2 Do not install tiles at temperatures less than 12 ° C or above 38 ° C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 ° C or above 25 ° C.

1.8 Extra Material

.1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide minimum 5% of each type and colour of tile required for project for maintenance use. Store where directed.

.3 Maintenance material to be of same production run as installed material.

PART 2 - PRODUCTS

2.1 Product Description

.1 Ceramic porcelain tile to CAN/CGSB-75.1-M88
.1 Type 1: Washroom Wall Tile & Base Tile.
.1 75 mm x 150 mm.

2.1 Product Description (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
.2 Colour: From full colour range, as selected by Project Manager.
.3 Acceptable products: 'Colour & Dimension Series' by Olympia Tile.
.2 Type 2: Stair 2 and Elevator Floor.
.1 to CAN/CGSB-75.1-M.
.2 Supply coves, caps, inside and outside corners and bullnose tiles as required.
.3 Where unfinished tile edge is exposed, supply cap to match.
.4 Porcelain tile: to CAN/CGSB-75.1, Type 4, Class MR1, 300x300x10mm size, square edges, slip resistant surface, colour as selected by Project Manager from manufacturers' full range.

2.2 Trim Shapes

.1 Conform to applicable requirements of adjoining floor and wall tile.

.2 Use trim shapes sizes conforming to size of adjoining field wall tile, including existing spaces, unless specified otherwise.

.3 Internal and External Corners: Provide trim shapes as follows where indicated.
.1 Bullnose shapes for external corners including edges.
.2 Coved shapes for internal corners.

2.2 Mortar and Adhesive Materials

.1 Portland modified thinset one step mortar to: ANSI A118.4 suited to application.

.2 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.

2.3 Grout

.1 Latex-Portland Cement Grout: to ANSI A108.1-1992, fast curing, high early strength, polymer-modified, stain resistant, sanded mix for floors, unsanded mix for walls and floors with polished tiles commercial tile grout.

2.3 Grout (Cont'd)

.2 Floor and wall grout colour to be selected by Consultant from manufacturer's standard colour range.

2.4 Accessories

.1 Transition Strips: purpose made metal extrusion; stainless steel type.

.2 Sealant: in accordance with Section 07 92 10 - Joint Sealing.

.3 Floor sealer and protective coating: to CAN/CGSB-25.20-95, to tile and grout manufacturers recommendations.

.4 Metal Edging: Provide metal edging along exposed tile edges. 'Jolly' profile by Schluter or approved equivalent.

2.5 Mixes

.1 Mortar and Adhesive: mix to manufacturer's instructions.

.2 Mix bond and levelling coats, and grout to manufacturer's instructions.

.3 Adjust water volumes to suit water content of sand.

2.6 Patching and Leveling Compound

.1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

.2 Have not less than the following physical properties:
.1 Compressive strength - 25 MPa.
.2 Tensile strength - 7 MPa.
.3 Flexural strength - 7 MPa.
.4 Density - 1.9.

.3 Capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish.

.4 Ready for use in 48 hours after application.

2.7 Cleaning Compounds

.1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

.2 Materials containing acid or caustic material are not acceptable.

PART 3 - EXECUTION

3.1 Workmanship

.1 Do tile work in accordance with TTMAC Tile Installation Manual 2000 , "Ceramic Tile", except where specified otherwise.

.2 Apply tile or backing coats to clean and sound surfaces.

.3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.

.4 Maximum surface tolerance 1:800.

.5 Make joints between tile uniform and approximately 1.5 mm wide, plumb, straight, true, even and flush with adjacent tile. Ensure sheet layout not visible after installation. Align patterns.

.6 Lay out tiles so perimeter tiles are minimum 1/2 size.

.7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.

.8 Make internal angles square, external angles rounded bullnosed.

.9 Install edge trim pieces at termination of wall tile panels and top of the tile base, except where panel abuts projecting surface or intersecting plane.

.10 Install divider strips at junction of tile flooring and dissimilar materials.

3.1 Workmanship (Cont'd)

.11 Allow minimum 24 h after installation of tiles, before grouting.

.12 Clean installed tile surfaces after installation and grouting cured.

.13 Make control joints at location of joints in substrate material. Make joint width same as tile joints. Fill control joints with sealant in accordance with Section 07 92 00 - Joint Sealing. Keep building expansion joints free of mortar and grout.

.14 Apply anti-fracture membrane over non structural cracks.

3.2 Floor Sealer and Protective Coating

.1 Apply in accordance with manufacturer's instructions.

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 Related Sections:
.1 Section 09 53 00 - Acoustical Suspension: Suspension system.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 423-02, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
.2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

### 1.3 SUBMITTALS

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

.2 Provide full-sized mock-up of wood ceiling tile, complete with finish.

.3 Submit duplicate 100mm x 100mm samples acoustical units.

### 1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

1.4 DELIVERY, STORAGE AND HANDLING (Cont'd)

.2 (Cont'd)
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.
.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
.3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.5 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 Queen's, upon completion of the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 ACT: Acoustic units for suspended ceiling system: to CAN/CGSB-92.1-M89 ASTM E 1264-98.
.1 610mm x 1220mm x 19mm (24" x 48" x 3/4"), lay-in, white.
.1 Acceptable product:
.1 Optima Lay-In or equivalent by CGC or Certainteed.
.1 Light reflectance 88%.
.2 Fire Class A.
.3 0.90 NRC/180 AC.
.4 Mold/Mildew resistant 0.5 sac resistant.
.2 Provide 5% of area in spare tiles, or nearest full carton.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Queen's and authorities having jurisdiction.

### 3.2 INSTALLATION

.1 Install acoustical panels and tiles in ceiling suspension system.

### 3.3 APPLICATION

.1 Install acoustical units as indicated on reflected ceiling plan.

.2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

### 3.4 INTERFACE WITH OTHER WORK

.1 Co-ordinate with Section 09 53 00 - Acoustical Suspension.

.2 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.

END OF SECTION

## PART 1 - GENERAL

**1.1 Related Sections**

.1 09 51 13 - Acoustical Panel Ceilings

**1.2 References**

.1 American Society for Testing and Materials (ASTM International)
.1 ASTM C 635-00, Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
.2 ASTM C 636-96, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

**1.3 Design Requirements**

.1 Maximum deflection: 1/360th of span to ASTM deflection test.

**1.4 Shop Drawings**

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

**1.5 Waste Management and Disposal**

.1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition 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.

## PART 2 - PRODUCTS

**2.1 Materials**

.1 Intermediate duty system to ASTM C 635-00.

2.1 Materials (Cont'd)

.2 Maximum deflection: 1/360th of span to ASTM C 635 /ASTM C635m deflection test.

.3 Basic materials for suspension system: commercial quality cold rolled steel mill finished.

.4 Non Fire Resistant Rated Suspension system: two directional exposed tee bar grid system:
.1 two directional exposed tee bar grid.
.2 610x1220mm grid.

.5 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.

.6 Hanger wire: galvanized soft annealed steel wire.
.1 3.6 mm diameter for access tile ceilings.
.2 to ULC design requirements for fire rated assemblies.

.7 Hanger brackets: purpose made for hollow core concrete slabs.

.8 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.

.9 Do not reuse existing anchors and pencil rod.

## PART 3 - EXECUTION

3.1 Installation

.1 Installation: in accordance with ASTM C 636-96 except where specified otherwise.

.2 Install suspension system to manufacturer's instructions.

3.1 Installation (Cont'd)

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Queen's.

.4 Secure hangers to structure as recommended by the manufacturer.

.5 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.

.6 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.

.7 Ensure suspension system is co-ordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers.

.10 Support at light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.11 Interlock: Attach cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.2 INTERFACE WITH OTHER WORK

.1 Co-ordinate with Section 09 51 13 - Acoustical Panel Ceilings

3.2 INTERFACE WITH OTHER WORK (Cont'd)

.2 Co-ordinate ceiling work to accomodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into accoustic ceiling components.

3.3 Cleaning

.1 Touch up scratches, abrasions, voids and other defects in finished surfaces.

END OF SECTION

## PART 1 - GENERAL

### 1.1 SUMMARY

.1 This section includes one resinous flooring system, one with epoxy body.
.1 Application method: Squeegee, screed and broadcast.

### 1.2 RELATED SECTION

.1 Section 03 35 00 - Concrete Finishing

### 1.3 SUBMITTALS

.1 Product Data: For each type of product indicated. Include Manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

.2 Samples for Verification: For each resinous flooring system required, provide two (2) 150mm x 150mm square samples, applied to a rigid backing by installer of project. Sample must also indicate the final finish texture of the proposed material.

.3 Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on drawings in product schedule.

.4 Installer Certificates: Signed by Manufacturer certifying that installers comply with specified requirements.

.5 Maintenance data: For Resinous flooring to include in maintenance manual. Data to include contact information for installer for re-sealing purposes, and a copy of all previous submittals.

1.4 QUALITY ASSURANCE

.1 No request for substitution shall be considered that would change the generic type of flooring system specified (ie. epoxy based flake broadcast with mortar coat). Equivalent materials of other manufacturers may be substituted only on approval of Consultant. Request will be subject to specification requirements described in this section.

.2 Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
.1 Engage an installer who is certified, in writing, by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

.3 Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant and repair materials of type and form source recommended by manufacturer of primary materials.

.4 Manufacturer Field Technical Service Representatives: Resinous flooring manufacturer shall retain the services of Field technical Service Representatives who are trained specifically on installing the system to be used on this Project.

.5 Pre-Installation Conference:
.1 General Contractor shall arrange a meeting not less than 30 days prior to starting of work.
.2 Attendance required:
.1 Architect
.2 General Contractor

1.4 QUALITY ASSURANCE (Cont'd)

.5 (Cont'd)
.2 (Cont'd)
.3 Manufacturer/ Installer's Representative
.4 Owner

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

.2 Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

.3 All materials used shall be factory pre-weighed and per-packaged in single, easy to manage batches to eliminate on site mixing errors. No onsite weighing or volumetric measurements allowed.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
.1 Maintain material and substrate temperature between 18 and 30°C during resinous flooring application and for not less than 24 hours after application.

.2 Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

.3 Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.6 PROJECT CONDITIONS (Cont'd)

.4 Concrete substrate shall be properly cured for a minimum of 30 days. A vapour barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

1.7 WARRANTY

.1 Manufacturer shall furnish a single, written warranty covering both materials and workmanship for a period of one (1) full year from date of Substantial Completion, or provide a joint and several warranty warrantying the materials and workmanship for a period of one (1) full year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 RESINOUS EPOXY FLOORING

.1 Epoxy mortar system, four-component troweled. Basis of Design:
.1 'StonClad GR' by Stonhard.

.2 System Physical Properties:
.1 Compressive Strength: 10,000 psi
.2 Tensile strength: 1,750 psi
.3 Flexural Modulus of Elasticity: 2.0x10^6 psi.
.4 Hardness (ASTM D2240 Shore D):85 to 90
.5 Impact Resistance: >160 in/lbs
.6 Water Absorbsion (ASTM C-413): 0.2%
.7 VOC Content (ASTM D-2369): <5 g/L

.3 System Characteristics:
.1 Colour and Pattern: As selected by Consultant from manufacturers standard colour range.
.2 Wearing Surface: Standard, slip resistant
.3 Overall System thickness: nominal 6mm

.4 System Components: Manufacturer's standard component that are compatible with each other as follows:
.1 Primer:

2.1 RESINOUS EPOXY FLOORING (Cont'd)

.4 (Cont'd)

.1 (Cont'd)

.1 Material Basis: Stonhard Standard Primer

.2 Resin: Epoxy

.3 Formulation Description: (2) two component 100% solids

.4 Application Method: Squeegee and roller

.5 Number of coats: (1) one

.6 Aggregates: Broadcast quartz into wet primer coat.

.2 Mortar Base:

.1 Material Design Basis: StonClad GS

.2 Resin: Epoxy

.3 Formulation Description: (3) three component, 100% solids

.4 Application Method: Metal Trowel

.1 Thickness of Coats: 6.4mm

.2 Number of Coats: (1) one

.5 Aggregates: Quartz pigmented blended aggregate; with 25% post-industrial recycled glass.

2.2 ACCESSORY MATERIALS

.1 Matching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated. No single component or cementitions materials.

.2 Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 PREPARATION

.1 General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

3.1 PREPARATION (Cont'd)

.2 Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with resinous flooring.

.1 Mechanically prepare substrates as follows:

.1 Mechanically prepare with the use of diamond grinding equipment to provide sound concrete surface free of laitance, glaze, efflorescence, curing compound, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with resinous flooring. OR

.2 Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.

.3 Comply with ASTM C811 requirements, unless manufacturer's written instructions are more stringent.

.2 Repair damaged and deteriorated concrete according to manufacturer's written recommendations.

.3 Verify that concrete substrates are dry

.4 Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 80%.

.5 Perform anhydrous calcium chloride test, ASTM F1869. Proceed with application only after substrates have maximum moisture-vapour-emission rate of 3lb of water/1000ft² of slab in 24 hours.

.6 Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

.7 Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform test recommended by manufacturer. Proceed with application only after substrates pass testing.

.3 Resinous Materials: Mix Components and prepare materials according to resinous flooring manufacturer's written instructions.

3.1 PREPARATION (Cont'd)

.4 Treat control joints and other non-moving substrate cracks to prevent cracks from reflecting though resinous flooring according to manufacturer's written recommendations. Include allowance for Stonflex MP7 joint fill material.

3.2 APPLICATION

.1 General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

.1 Co-ordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.

.2 Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.

.3 At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

.1 Apply joint sealant to comply with manufacturer's written recommendations.

.2 Mix and Supply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.

.3 Broadcast: Immediately broadcast quartz silica aggregate into the primer using manufacturer's specially designed spray caster. Strict adherence to manufacturer's installation procedures and coverage is imperative.

.4 Body Coat: Mix base material according to manufacturer's recommended procedures. Uniformly spread mixed material over previously primed substrate using manufacturer's installation tool. Roll Material with strict adherence to manufacturer's installation procedures and coverage rates.

3.2 APPLICATION (Cont'd)

.5 Second Sealer: Lightly sand fist sealer coat. Mix and apply second sealer coat with strict adherence to manufacturer's installation procedures.

.6 Matt Polyurethane Finish: Lightly sand or scrape surface to remove any floor surface irregularities. Mix and roller apply mar resistant finish with strict adherence to manufacturer's installation procedures.

3.3 TERMINATIONS

.1 Chase edges to "lock" the coating system into the concrete substrate along lines of termination.

.2 Penetration Treatment: Lap and seal coating onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

.3 Trenches: Continue coating system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

.4 Treat floor drains by chasing the coating to lock in place at point of termination.

3.4 JOINTS AND CRACKS

.1 Treat control joints to bridge potential cracks and to maintain monolithic protection.

.2 Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces and interfaces.

.3 Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.5 FIELD QUALITY CONTROL

.1 Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples betaken, identified, sealed, and certified in presence of Contractor.

.1 Independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of the Contractor.

.2 Testing Agency will test samples for compliance with the requirements, using application reference testing procedures or,if not referenced, using testing procedures listed in manufacturer's product data.

.3 If test results show applied materials do not comply with specified requirements, pay for testing, remove all noncompliant materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.6 CLEANING, PROTECTION, AND CURING

.1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 18 hours.

.2 Protect resinous flooring materials from damage and wear during construction operations. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General contractor is responsible for protection and cleaning of surfaces after final coats.

.3 At time of final inspection, remove temporary covering and clean resinous flooring. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

END OF SECTION

## PART 1 - GENERAL

### 1.1 RELATED SECTIONS

.1 Section 08 11 00 - Metal Doors and Frames.

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 06 40 00 - Architectural Woodwork

### 1.2 REFERENCES

.1 Master Painters Institute (MPI)
.1 MPI Architectural Painting Specifications Manual - current edition.

.2 Environmental Protection Agency (EPA)
.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
.2 SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (SDS).

### 1.3 QUALITY ASSURANCE

.1 Conform to latest MPI requirements for interior painting work including preparation and priming.

.2 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.

.3 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 SUBMITTALS

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

.2 Product Data:
.1 Submit product data and instructions for each paint and coating product to be used.
.2 Submit product data for the use and application of paint thinner.
.3 Submit 2 copies of WHMIS SDS in accordance with 01 35 43 - Environmental Procedures.
.4 Confirm products to be used are in MPI's approved product list.

.3 Upon completion, provide records of products used. List products in relation to finish system and include the following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Safety Data Sheets (SDS).
.6 MPI #.

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 Identify products and materials with labels indicating:
.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.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.4 (Cont'd)
.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 Unless pre-approved written approval by Specifying body and product manufacturer, perform no painting when:
.1 Substrate and ambient air temperatures are not expected to fall within MPI or 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 to adequately prepared surfaces and to surfaces within moisture limits.

1.6 SITE CONDITIONS (Cont'd)

.3 (Cont'd)

.3 Apply paint when previous coat of paint is dry or adequately cured.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Provide paint materials for paint systems from single manufacturer.

.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.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.4 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

2.2 COLOURS

.1 Consultant will provide Colour Schedule after Contract award.

.2 Colour schedule will be based upon selection of three base colours and two accent colours.

.3 Selection of colours will be from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection based on limited range.

.5 For deep and ultra deep colours; 4 coats may be required.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

2.3 MIXING AND TINTING (Cont'd)

.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.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

| | Gloss @ 60 degrees | Sheen @ 85 degrees |
|---|---|---|
| Gloss Level 1 - Matte Finish (flat) | Max. 5 | Max. 10 |
| Gloss Level 2 - Velvet-Like Finish | Max.10 | 10 to 35 |
| Gloss Level 3 - Eggshell Finish | 10 to 25 | 10 to 35 |
| Gloss Level 4 - Satin-Like Finish | 20 to 35 | min. 35 |
| Gloss Level 5 - Traditional Semi-Gloss Finish | 35 to 70 | |
| Gloss Level 6 - Traditional Gloss | 70 to 85 | |
| Gloss Level 7 - High Gloss Finish | More than 85 | |

.2 Gloss level ratings of painted surfaces as specified herein and as noted on Finish Schedule.

2.5 INTERIOR

.1 Primer: Based on evaluation of substrate.
.1 MPI VOC Level: E3
.2 Tinted when covering or applying bright or saturated colours.

.2 Walls (gypsum board):
.1 High performance Architectural Latex
.2 Gloss Level 3 (Eggshell)

2.5 INTERIOR (Cont'd)

.2 (Cont'd)
.3 MPI No. 139
.4 MPI VOC Level: E3
.5 Two top coats

.3 Accent Walls:
.1 High performance Architectural Latex
.2 Gloss Level 3 (Eggshell)
.3 MPI No. 139
.4 MPI VOC Level: E3
.5 Light Colours: Two top coats
.6 Dark Colours: Four top coats
.7 Highly saturated colours like red, yellow, or blue: 8 top coats.

.4 Ceilings (gypsum board):
.1 Interior Latex
.2 Gloss Level 1 (flat)
.3 MPI No. 53
.4 MPI VOC Level: E3
.5 Two top coats

.5 Galvanized metal: frames, misc. steel, doors, railings, etc.
.1 Pre-catalyzed water-based epoxy
.2 Gloss Level 5 (semi-gloss)
.3 MPI No. 141
.4 MPI VOC level: E3
.5 2 top coats
.6 Both sides of doors & frames.

.6 Exposed structural steel, purlins, columns braces, & metal fabrications.
.1 INT 5.1B waterborne light industrial.
.1 2 coats rust-inhibitive primer, water-based, MPI No. 107, MPI VOC Level E3.
.2 2 coats water-based light industrial coating, MPI No. 153, MPI VOC level E3, Gloss level 5.

.7 All other exposed unfinished surfaces including ones that have been shop primed: paint with type as recommended by supplier.

2.6 EXTERIOR PAINTING SYSTEM

.1 Exterior primer:
.1 Based on evaluation of substrate.
.2 MPI No. 301 Water-based epoxy primer

2.6 EXTERIOR PAINTING SYSTEM (Cont'd)

.2 Exterior Steel doors, frames, lintels, structural steel, and miscellaneous metals.
.1 Exterior Urethane Enamel, gloss level 5 semi-gloss.
.2 MPI No. 161
.3 MPI VOC level: E3
.4 Two top coats

PART 3 - EXECUTION

3.1 GENERAL

.1 Perform preparation and operations for interior 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 All exposed surfaces in a room indicated to receive paint finish shall be painted, unless pre-finished with a finish acceptable to Consultant.

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:
.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 Engineer.
.2 Protect items that are permanently attached such as Fire Labels on doors and frames.
.3 Protect factory finished products and equipment.

3.3 PREPARATION (Cont'd)

.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 Engineer.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:

.1 Sand existing painted surfaces, remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.

.2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush 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.

.4 Remove all labels, printing, and markings fromall exposed structural wood components both interior and exterior. Ensure that removal method does not result in uneven finishing. If necessary, sand entire exposed surface to create and even finish.

.5 Lightly sand all existing block and concrete surface prime and two coats or paint.

3.3 PREPARATION (Cont'd)

.6 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.

.7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.8 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 or ceiling.

.2 Method of application to be as 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. Paint surfaces and corners not accessible to roller using brush, daubers 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 continuous film of uniform thickness. 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.

3.4 APPLICATION (Cont'd)

.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 2 finish coats.

3.5 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.6 FIELD QUALITY CONTROL

.1 Field inspection of painting operations to be carried out be independent inspection firm as designated by Consultant.

.2 Advise Consultant when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Cooperate with inspection firm and provide access to areas of work.

END OF SECTION

## PART 1 GENERAL

### 1.01 Summary

A. Furnish louvred vision barrier, structural supports and attachment brackets as shown on the drawings, as specified, and as needed for a complete and proper installation.
B. The louvred vision barrier to be furnished includes the following:
    1. Fixed extruded vision barrier.

### 1.02 References

A. The Aluminum Association Incorporated
    1. Aluminum Standards and Data
    2. Specifications and Guidelines for Aluminum Structures
B. American Society of Civil Engineers
    1. Minimum Design Loads for Buildings and Other Structures
C. American Society for Testing and Materials
    1. ASTM B209
    2. ASTM B211
    3. ASTM B221
    4. ASTM E90-90
D. Architectural Aluminum Manufacturers Association
    1. AAMA 800 Voluntary Specifications and Test Methods for Sealants
    2. AAMA 605.2 Voluntary Specification for High Performance Organic Coatings on Aluminum Extrusions and Panels.
    3. AAMA TIR Metal Curtain Wall Fasteners
    4. AAMA 2605-98 Superior Performing Organic Coatings on Aluminum Extrusions and Panels
E. Canadian Standards Association
    1. CAN3-S157-M83 Strength Design in Aluminum
    2. S136 94 Cold Formed Steel Structural Members

### 1.03 Submittals

A. Product Data
    1. Material types and thickness.
B. Shop Drawings
    1. Include elevations, sections, and specific details for each louver.
    2. Show anchorage details and connections for all component parts.
    3. Include signed and sealed structural calculations.
C. Samples
D. Submit color chips for approval.

### 1.04 Quality Assurance

A. Single subcontract responsibility: Subcontract the work to a single firm that has had not less than six years' experience in the design and manufacturing of work similar to that shown and required.
B. Structural Requirements: Design all materials to withstand wind and snow loads as required by the applicable building code. Maximum allowable deflection for the louver structural members to be l/180 or 19mm, whichever is less. Maximum allowable deflection for the louver blades to be l/120 or 12mm across the weak axis, whichever is less.

C. Professional Engineer Requirements: Drawings and structural calculations to be signed and sealed by a professional engineer licensed to practice in the Province of Ontario.
D. Warranty: Provide written warranty to the owner that all products will be free of defective materials or workmanship for a period of one year from substantial completion.

**1.05 Delivery, Storage and Handling**

A. Delivery: At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, louver sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.
B. Storage:
    1. Material may be stored flat on end or on its side.
    2. Material may be stored either indoors or outdoors.
    3. If stored outdoors the material must be raised sufficiently off the ground to prevent it being flooded.
    4. If stored outdoors the material must be covered with a weatherproof flame-resistant sheeting or tarpaulin.
C. Handling:
    1. Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking.

**PART 2 - PRODUCTS:**

**2.01 Materials**

A. Aluminum Extrusions: ASTM B211, Alloy 6063-T5, 6063-T6 or 6061-T6.
B. Aluminum Sheet: ASTM B3209, Alloy 1100, 3003 or 5005.

**2.02 Fabrication, General**

A. Provide components, structural supports and accessories as specified and/or shown on the drawings. Materials, sizes, depths, arrangements, and material thickness to be as indicated or as required for optimal performance with respect to strength; durability; and uniform appearance.
B. Vision barrier to be mechanically assembled using stainless steel or aluminum fasteners.
C. Include supports, anchorage, and accessories required for complete assembly.
D. Blades to run parallel to roof edge, as shown in drawings, with all elements trimmed or angled to suit.

**2.04 Vision Barrier Models:**

**A.** CS Aluminum Screen, Vert-A-Cade 301 as manufactured by Construction Specialties, Inc.. Blades to be fabricated from extruded aluminum sections in 6063-T52 alloy and spaced approximately 171mm on center. Blades to be nominal 100mm deep and mechanically secured to continuous extruded aluminum supports. Blades to be mitred at corners, with expansion gap as recommended by manufacturer. Aluminum supports fixed directly to horizontal steel components with aluminum clip angles. All fasteners to be stainless steel or aluminum. Support braces and mounting clips to painted standard Kynar to coat black.

**B.** Alternate equivalent products by other manufacturers will be accepted if approved by architect prior to deadline for addenda. Submit product data and cut sheets prior to question deadline during tender perior.

## 2.05 Finishes

A. 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 that will be visible after completing finishing process. Provide color as selected by architect.
   1. Colour to be selected from standard colour range.

B. 100% Fluoropolymer Resin Powder Coat System complying with AAMA-2605-5 standards for gloss and color retention. Finish thickness to be 1.5 to 3.0 mils.
   1. Finish to allow zero VOCs 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 for gloss and color retention

## PART 3 EXECUTION

**3.01 Examination:** Examine openings to receive the work. Do not proceed until any unsatisfactory conditions have been corrected.

### 3.02 Installation

A. Comply with manufacturer's instructions and recommendations for installation of the work.
B. 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.
C. Anchor sunshades to the building substructure as indicated on architectural drawings.
D. 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.
E. Do not erect warped, bowed, deformed, or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.
F. Set units level, plumb and true to line, with uniform joints.

### 3.03 Protection

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

### 3.04 Adjusting and cleaning

A. Immediately clean exposed surfaces of the louvers to remove fingerprints and dirt accumulation during the installation process. Do not let soiling remain until the final cleaning.
B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to the material finishes. Thoroughly rinse surfaces and dry.
C. Restore louvers and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Architect, remove damaged materials, and replace with new materials.
   1. Touch up minor abrasions in finishes with a compatible air-dried coating that matches the color and gloss of the factory applied coating.

End of Section

## PART 1 - GENERAL

### 1.1 SUBMITTALS

.1 Product Data.
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00.

.2 Shop Drawings.
.1 Submit shop drawings in accordance with Section 01 33 00.
.2 Indicate, by large scale details, materials, finishes, dimensions, anchorage and assembly.

### 1.2 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

### 1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

.1 Metal corner guards: 3mm thick, 150x150mm size, 1220mm tall, with 3mm corner radius type 302 polished satin finished stainless steel, with removable protective cover, with profiles to match applicable walls, flush surface, mechanically mounted.

### 2.2 ACCESSORIES

.1 Fasteners: self-tapping stainless steel, concealed flush mounting.

## 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 units on solid backing and erect with materials and components straight, tight and in alignment.

.2 Mechanically fasten wall guards at 200 mm on centre with bottom edge 25mm above top of wall base, and top edge 1370mm above finish floor line, straight and level to variation plus or minus 3 mm over 3000 mm straight edge, non-cumulative.

.3 Mechanically fasten corner guards with stainless steel fasteners to substrate at 200 mm on centre.

### 3.3 CLEANING

.1 Comply to Section 01 74 11.

.2 Clean surfaces after installation using manufacturer's recommended cleaning procedures.

.3 Perform cleaning after installation to remove construction and accumulated environmental dirt.

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

END OF SECTION

## PART 1 - GENERAL

### 1.1 References

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM A 167-99, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .2 ASTM A 653/A 653M-02a sheet steel.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.5-M86, Mirrors, Silvered.

.3 Canadian Standards Association (CSA)
- .1 CAN/CSA-B651-2005, Barrier-Free Design.

### 1.2 Shop Drawings

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

.2 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.

## PART 2 - PRODUCTS

### 2.1 Materials

.1 Sheet steel: to ASTM A 653/A 653M-02a with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A 167-99, 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 tamperproof fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.1 Materials (Cont'd)

.5 Acceptable Products: Bobrick, Watrous, Frost, except where specified otherwise.

2.2 Components

.1 Grab bar (GB):
.1 38 mm diameter, 1.6mm wall tubing of stainless steel, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Lengths and configurations as indicated on drawings. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2kN.
.2 Finish: Type 304 stainless steel with a satin finish and peened grip.
.3 Sizes: as indicated.

.2 Swing-up Grab Bar:
.1 18-8, Type 304, 18 gauge stainless steel tubing with satin finish, 32mm outside diameter.
.2 Backplate of 5mm stainess steel, equipped with screw holes for attachment to wall.
.3 Counterweighted weighted design to prevent bar from falling back down once bar is raised to vertical position.
.4 Acceptable Product: Bobrick B-4998, or approved equal.

.3 Mirrors (MR): CAN/CGSB 12.5-M86. Mirror quality Type 3B Laminated.
.1 Welded Stainless Steel Frame with 304 Satin Finish.
.2 6mm glass mirror.
.3 Above sinks: Bobrick B-290 1836 or similar approved product.
.4 Wall mirror in Universal Washroom: Bobrick B290 2472, or similar approved product.

.4 Robe hook (CH): stainless steel with 50 mm projection.

.5 Fold-down baby change table: Polypropelene with steel chasis, with pneumatic cylinder for controlled opening. Colour: Grey.
.1 Acceptable product: Koala Kare KB300 Horizontal Surface-mounted.

2.2 Components (Cont'd)

.6 Fold-down adult change table: Surface-mounted, 200 kg capacity, powder laquered stainless steel, foldable safety rail, ADA compliant.
.1 Installed as per manufacturer's written instruction.
.2 Provide mounting kit and all anchors, flanges, and accessories for a complete and functional installation.
.3 Acceptable product: SCT 3000 by Pressalit, or approved equivalent.

PART 3 - EXECUTION

3.1 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 or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
.3 Solid masonry, marble, stone or concrete: use bolt with lead expansion sleeve set into drilled hole.
.4 For adult and baby change tables, provide all backing and structural support as per manufacturer's written instructions.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Install user-provided accessories as indicated in drawings, and at heights indicated.

.4 Use tamper proof screws/bolts for fasteners.

.5 Fill units with necessary supplies shortly before final acceptance of building.

.6 Locate accessories as indicated on the drawings. Exact locations to be coordinated on site, and confirmed with consultant.

3.1 Installation (Cont'd)

.7 Install change tables in accordance with manufacturers instructions, providing appopriate anchorage in walls. Install at height recommended by Manufaturer for barrier-free access.

END OF SECTION

## PART 1 - GENERAL

**1.1 Shop Drawings**

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

.2 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.

.3 Note that manufactured specialties shown on contract drawings are somewhat schematic in nature, and details may vary depending on specific products provided. Shop drawings are to be coordinated with associated project components to avoid any interference, and accurate details provided in shop drawings.

## PART 2 - PRODUCTS

**2.1 Overhead Crane**

.1 10 tonne single-girder travelling overhead crane and runway.

- .1 Wire rope hoist
- .2 Max hoist capacity: 10,000 kg
- .3 Lifting height: 8.0 m
- .4 Trolley type: Low headroom
- .5 Reeving type: True lift
- .6 Speeds:
  - .1 Hoisting Speed: 6/1m/min 2-speed
  - .2 Trolley traversing speed: 20m/min stepless VFD
  - .3 Bridge travelling speed: 32 m/min Stepless VFD
- .7 Motors:
  - .1 Hoist Motor: 11/1.6kW 60% ED
  - .2 Trolley Motor: 2x0.43 kW 40% ED
  - .3 Bridge travelling motor: 2x0.46 kW 40% ED
- .8 Crane controlled with radio remote control and pendant control.
- .9 Overload protection device
- .10 40:1 rope to drum ratio
- .11 Thermal protection on hoisting motor
- .12 Rope guides to prevent rope overlap

2.1 Overhead Crane (Cont'd)

.1 (Cont'd)
.13 Squirrel cage motors with DC disk brakes
.14 4 step geared upper limit switch
.15 Lifetime adjustment on hoist brake.

.2 Span & travel dimensions as per drawings and to suit building size. Coordinate with structural and with overhead doors to ensure there is no interference.

.3 Provide all components, accessories, installation materials & labour, for complete and functional installation. Coordinate with all trades to ensure power, controls, and structural elements are complete and functional.

.4 Acceptable Product: KONECranes Canada, Inc.
.1 Contact Info: Paul Vandermeulen Tel 905-332-5409
.2 Reference Offer #T26682-0907

2.2 Solid HDPE Lockers

.1 Body: Fabricated of solid HDPE plastic.

.2 Doors: Of solid HDPE plastic, full width of the locker with no frame. Must have either perimeter ventilation or ventilation through door panel.

.3 Finishing: Colour selected by Consultant from manufacturer's standard range.

.4 Door hinges: 16 gauge continuous piano hinge, fastened to the door with stainless steel fasteners.

.5 Handles: With stainless steel hasp for use with a pad lock.

.6 Equipment: Furnish each locker with two wall hooks, and with a metal number plate on the door.

.7 End panels and fillers of same colour and material as the lockers.

.8 Boot cubbies below lockers, as shown in drawings, of same material & colours as lockers.

2.2 Solid HDPE Lockers (Cont'd)

.9 Provide multiple locker heights, as shown in elevation drawings. All lockers of same type of manufacture and materials, including matching handles.

.10 Securely fasten lockers to studs in wall.

.11 Acceptable product: Hollowell Aquamax, or approved equal.

2.3 Tactile Walking Suface Indicator

.1 Exterior Concrete (where shown in plans):
.1 Truncated dome tile of vitrified polymer composite, with bevelled edges.
.2 Domes spaced 42mm O.C., 4mm tall, 23mm diameter.
.3 Sizes to suit application - full width of stair X 920mm deep.
.4 Colour: Federal Yellow.
.5 Acceptable product: Armor-Tile by Kinesik, or approved equal.

2.4 Operable Curtain Divider

.1 Customized, Retractable, floor-to-ceiling thermal curtain partition.

.2 Minimum thermal value: R4

.3 Curtain: Min. 18 oz PVC, accordion or folding, washable, manually operated, ceiling mounted, with curtained man-door openings as shown in drawings.
.1 Colour: Selected by Project Manager from manufacturer's standard colour range.

.4 Track: Min. 12 guage heavy-duty, with steel rollers.

.5 Configuration: Customized to suit actual site conditions. Floor plan configuration is schematic in nature. Submit shop drawing of proposed configuration prior to ordering.

.6 Installation: Coordinate with all other building systems to ensure full retractability to east end of crane space. Notify Project Manger prior to fabrication if there is any interference or conflicts.

2.4 Operable Curtain Divider (Cont'd)

.7 Include 2 walk thru door panels aligned in relation to floor plan.

.8 Acceptable Manufacturers:
- .1 Soper's Engineered Fabric Solutions
- .2 QSD Incorporated
- .3 Canado-Nacan Equipements
- .4 Western Tarpaulin

2.5 Bike Rack

.1 316 Stainless steel, brushed finish, surface-mounted with SS bolts into concrete slab.

.2 Acceptable Product: Model CAH-205 'City Bike Rack' by Canaan Site Furnishings, or equal approved by Project Manager.

2.6 Cast-in-Place Cable Trenches

.1 Cast-in-place, covered, load rated cable trench.

.2 Trench: High density polymer concrete with a solid bottom. Trench interior minimum 175mm tall by 150mm wide clear.

.3 Cover: Plastibeton removable lid, with load rating min. 16,000lb. Cover must set in flush with floor surface.

.4 Configuration: Floor plan configuration is schematic in nature. Submit shop drawing of proposed configuration prior to ordering.

.5 Acceptable Product: 'Plastibeton 68' by Oldcastle Infrastructure, or approved equivalent.

2.7 Work Tables

.1 Adjustable height steel workbench with solid hardwood top, C-channel legs, and steel lower shelf.

.2 Min 1500 lb load capacity.

2.7 Work Tables (Cont'd)

.3 Dual-sided electrical outlets mounted into legs, with surge protection and reset button. Outlets plug into standard duplex receptacle without hardwiring.

.4 Solid maple or birch wood top minimum 45mm thick with square edges, and mineral oil finish.

.5 Dimensions: 60"L x 30"W and 48"L x 30"W, as per furnishing schedule.

.6 Adjust leg height to 865mm tall, and install in Workroom and Control Room as shown in drawings.

.7 Acceptable product: 'Adjustable Height C-Challel Leg Workbench' by Global Industrial, or approved equal that meets specifications.

## PART 3 - EXECUTION

3.1 Preparation

.1 Verify substrate surfaces are solid, free from surface water, dust, oil, grease, projections and other foreign matter detrimental to performance.

.2 Items to be built in: provide information and templates required for installation of work of this section, and assist or supervise, or both, the setting of anchorage devices, and construction of other work incorporated with products specified in this section in order that they function as intended.

.3 Provide cut-outs, templates, or dimensions to other trades, including excavator, to facilitate preparation of works to accept manufactured specialities.

3.2 Installation

.1 Install miscellaneous specialties level and securely and rigidly anchored to substrate in accordance with authorities having jurisdiction, reviewed shop drawings, and manufacturer's written instructions.

3.2 Installation (Cont'd)

.2 Install all items according to manufacturer's written instructions.

.3 Coordinate installation with related and adjacent items to ensure proper function and complete installation that will maintain warranty of all items.

.4 After installation, adjust miscellaneous specialties in accordance with manufacturer's written instructions.

3.3 Cleaning

.1 Clean exposed surfaces prior to acceptance.

END OF SECTION

## PART 1 - GENERAL

**1.1 References**

.1 American National Standards Institute (ANSI)
.1 ANSI/NFPA 10-1998, Portable Fire Extinguishers.

.2 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S508-M90(R1995), Rating and Fire Testing of Fire Extinguishers and Class "D" Extinguishing Media.

**1.2 Shop Drawings and Product Data**

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

**1.3 Closeout Submittals**

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

**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.

## PART 2 - PRODUCTS

**2.1 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. Sizes: 3A 10BC and 3A 20BC, locations as indicated on plans.

**2.2 Extinguisher Brackets**

.1 Type recommended by extinguisher manufacturer.

2.3 Cabinets

.1 Surface mounted cabinets (equipment area): stainless steel, 180° opening door with latching device in kitchen 116.

.2 Semi-Recessed Cabinets (workroom area): stainless steel, 180° opening door with latching device.

.3 Cabinet doors: with 5 mm full glass panel.

2.4 Identification

.1 Identify extinguishers in accordance with recommendations of ANSI/NFPA 10-1998 CAN/ULC-S508-2002.

.2 Attach bilingual tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

PART 3 - EXECUTION

3.1 Installation

.1 Install cabinets & extinguishers as indicated.

END OF SECTION

## PART 1 - GENERAL

### 1.1 References

.1 American Society for Testing and Materials (ASTM)
.1 ASTM D 1784-02, Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

.2 Environmental Choice Program (ECP)
.1 ECP-66-94, Office Furniture.

.3 Government of Canada Corded Window Coverings Regulations: SOR 2019-97.

### 1.2 Design Requirements

.1 Design roller shades to following requirements:
.1 Be designed in a manner that allows wear susceptible parts to be replaceable by either the user or the manufacturer.
.2 Be accompanied by instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
.3 Be designed in a manner that permits effective disassembly of components in order to permit recycling of materials for which recycling markets exist.
.4 Include stamps on all major plastic components indicating composition code to facilitate recycling efforts.
.5 Government of Canada Corded Window Coverings Regulations: SOR 2019-97.

### 1.3 Shop Drawings

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

.2 Indicate dimensions in relation to window jambs, operator details, head and sill anchorage details, hardware and accessories details.

1.4 Samples

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

.2 Submit duplicate samples of manufacturer's standard colours for selection by Consultant.

.3 After approval samples will be returned for incorporation into the Work.

1.5 Waste Management and Disposal

.1 Remove and dispose from site all packaging materials at appropriate recycling facilities.

.2 Dispose of all corrugated cardboard polystyrene plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

PART 2 - PRODUCTS

2.1 Materials and Fabrication

.1 Cassette Equipped Roller shade:
.1 Chain Roller Shade with Optispace ALS by Altex or equivalent product by Shade O Matic or SOL-R.
.1 Stainless steel chain with heavy duty clutch and spring assisted system.
.2 Fabric: Woven PVC/Polyester, Sheerweave with 1% openess factor. Meets NFPA 701 for flame retardance. Colour to be Alabaster or approved equivalent.
.3 Cassette Equipped with Removable Fascia.

PART 3 - EXECUTION

3.1 Installation

.1 Install roller shades where indicated on plan. Install shades between structural jambs and on underside of window header.

.2 Site measure all openings and ensure fit with minimum gaps around shade.

3.1 Installation (Cont'd)

.3 Include centre brackets where necessary to prevent deflection of headrail.

.4 Adjust to provide for operation without binding.

.5 Use non corrosive metal fasteners for installation, concealed in final assembly.

END OF SECTION

## Part 1 General

### 1.1 SUMMARY

.1 Section includes:

.1 Materials and installation of building:

.1 rigid frames and columns.

.2 roof purlins and wall girts.

.3 roof vent flashings.

.4 Supports for overhead crane.

.2 Note that the steel frame components and configuration on the contract drawings is schematic in nature. Final configuration and components are to be determined by the metal building fabricator and shown accurately on the engineered shop drawings. Fabricator is responsible to fully coordinate with other building components to avoid interference, and to provide required clearances and height.

### 1.2 RELATED SECTIONS

.1 06 10 00 – Rough Carpentry

.2 07 41 13 – Insulated Metal Panel Roof

.3 07 42 13 – Insulated Metal Panel Walls.

.4 07 46 13 – Preformed Metal Siding

.5 07 62 00 – Sheet Metal Flashing & Trim

.6 10 29 10 – Manufactured Specialties (overhead crane)

### 1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.2 ASTM F3125/F3125M-15a, Standard Specification for High Strength Structural Bolts, Steel, Heat Treated 830 Mpa and 1040 MPa Minimum Tensile Strength.

.3 ASTM A 653/A 653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A 792/A 792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.5 ASTM A123/A123M-15 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 Canadian Standards Association (CSA International).

.1 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA-S16-14, Limit States Design of Steel Structures.

.3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.4 CSA A660-10(R2014), Certification of Manufacturers of Steel Building Systems.

.5 CAN/CSA-S136-12, North American Specification for the Design of Cold-formed Steel Structural Members.

.6 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.

.7 CSA W55.3-08, Certification of Companies for Resistance Welding of Steel and Aluminum.

.3 Canadian Institute of Steel Construction (CISC):

.1 CISC-Handbook of Steel Construction.

.2 CISC/CPMA-1-73a A Quick Dry One-Coat Paint of use on Structural Steel.

.3 CISC/CPMA-2-75 A Quick Drying Primer or use on Structural Steel.

.4 Federal Specifications (FS):

.1 SSPC-Paint 15, Primer, Raw Linseed Oil and Alkyd Primer without Lead and Chromate Pigments.

.5 Metal Building Manufacturers Association (MBMA):

.1 MBMA Metal Building Systems Manual.

.6 North American Insulation Manufacturers Association (NAIMA):

.1 NAIMA 202 - Standard for Flexible Fiber Glass Insulation to be Laminated for Use in Metal Buildings.

.7 The Society for Protective Coatings (SSPC):

.1 SSPC-Paint 15-Primer for Use Over Head Cleaned Steel. Performs to SSPC-Paint 15 standards.

.2 SSPC-SP2-Hand Tool Cleaning.

.8 Underwriters Laboratories (UL):

.1 UL 580-Standard for Tests for Uplift Resistance of Roof Assemblies.

.2 UL 723-Standard for Test for Surface Burning Characteristics of Building Materials.

.9 Canadian Sheet Steel Building Institute (CSSBI).

.1 CSSBI 30M-06, Standard for Steel Building Systems.

.2 CSSBI, Design in Cold Formed Steel-latest edition.

.3 CSSBI Bulletin B15-07, Snow, Wind and Earthquake Load Design Criteria.

.4 CSSBI Sheet Steel Fact Sheet # 3-February 2006, Care and Maintenance of Prefinished Sheet Steel Building Products.

.5 CSSBI S8-2008: Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.

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

.1 Material Safety Data Sheets (MSDS).

**1.4 SUBMITTALS**

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

.2 Product Data: Submit metal building system manufacturer's product information, specifications and installation instructions for building components and accessories.

.3 Erection Drawings: Submit metal building system manufacturer's erection drawings, including plans, wall systems, elevations, sections and details, indicating roof framing, transverse cross-sections, covering and trim details and accessory installation details to clearly indicate proper assembly of building components. Where associated system (e.g. wall panels, overhead crane, roofing) is being provided by other trade, coordinate requirements and include all requirements in metal building shop drawing.

.4 Certification: Submit written "Certificate of design and manufacturing conformance" prepared and signed by a Professional Engineer, registered to practice in The Province of Ontario verifying that the metal building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.

.1 Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year and load applications and importance category (Normal).

.2 Submit certification 3 days before bid date on the metal building system manufacturer's letterhead.

.5 Dealer Certification: Submit certification with shop drawings submittal that the metal building system supplier or metal roof system supplier is a manufacturer's authorized and franchised dealer of the system to be furnished.

.1 Certification shall state date on which authorization was granted.

.6 Installer Certification: Submit certification with shop drawing submittal that the metal building system or roof system installer has been regularly engaged in the installation of building systems of the same or equal construction to the system specified.

.7 Warranty Documentation: Submit manufacturer's standard warranty.

.8 Submit metal building anchor bolt layout with anchor bolt sizes indicated.

**1.5 DESIGN REQUIREMENTS**

.1 Design steel building system to withstand dead loads and live loads including mechanical units suspended from underside of roof, and overhead crane supported from overhead structure of building.

.1 Heights & clearances of crane and other components to be incorporated into design of steel building system. Dimensions on drawings reflect required minimum building heights and clearances.

.2 Design metal building system to work with wall and roof panel systems.

.3 Design metal building system to facilitate all openings shown in documents.

.4 Support for curtain wall system.

.5 Support of infilled metal stud & 2 layers 2.7mm type X moisture resistant GB.

.2 Design steel building system for the local snow, seismic, and wind load requirements as specified on the structural drawings.

.3 Design steel building system for the maximum factored base reaction loads specified on the structural foundation drawings.

.4 Maximum deflection:

.1 Conform to the maximum deflection criteria specified in the Ontario Building Code and not less than deflection criteria indicated.

.5 Design building walls and roof to allow for thermal movement of component materials caused by ambient temperature range of 50°C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.6 Ensure building is weathertight.

.7 Provide for positive drainage to exterior of condensation occurring within wall construction and water entering at joints.

.8 Design building enclosure elements to accommodate, by means of expansion joints, any movement in element itself and between element and building structure caused by structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.

**1.6 QUALITY ASSURANCE**

.1 Manufacturer's Qualifications:

.1 Manufacturer regularly engaged, for past 10 years, in manufacture of metal building systems of similar type to that specified.

.2 Accredited based on the requirements of CSA A660 Certification.

.2 Installer's Qualifications:

.1 Installer regularly engaged, for past 5 years in installation of metal building systems of similar type to that specified.

.2 Employ persons trained for installation of metal building systems.

.3 Certificate of design and manufacturing conformance:

.1 Metal building system manufacturer shall submit written certification prepared and signed by a Professional Engineer, registered to practice in The Province of Ontario, verifying that building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.

.2 Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year and load applications and importance category (Normal).

.3 Certificate shall be on metal building system manufacturer's letterhead.

.4 Material Testing:

.1 In addition to material certifications of structural steel, Metal building system manufacturer shall provide, upon request at time of order, evidence of compliance with specifications through testing.

.2 This quality assurance testing shall include testing of structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

## 1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

.2 Storage and Handling Requirements:

.1 Store and handle materials in accordance with manufacturer's instructions.

.2 Keep materials in manufacturer's original, unopened containers and packaging until installation.

.3 Do not store materials directly on ground.

.4 Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.

.5 Protect materials and finish during storage, handling, and installation to prevent damage.

.3 Protect prefinished steel sheet during fabrication, transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.

.4 Handle and protect galvanized materials from damage to zinc coating.

.1 During storage space surfaces of galvanized materials to permit free circulation of air.

## Part 2 Products

### 2.1 MATERIALS

.1 Approved manufacturers: Butler, American, Robertson, Behlen, Steelway or approved alternate. Other manufacturers shall submit data for approval indicating compliance with specification.

.2 Building Dimensions: Indicated on the Drawings.

.1 Horizontal Dimensions: Measure to inside face of wall sheets.

.2 Eave Height: Measure from top of finished floor to intersection of insides of roof and sidewall sheets.

.3 Clear Height Between Finished Floor and Bottom of Roof Steel: as indicated.

.3 Primary Structural Members:

.1 Primary Framing System: framing system as specified in this specification section.

.2 Frames: Welded up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly as specified in this specification section.

.3 Bolts for Field Assembly of Primary Steel: High-strength bolts as indicated on metal building system manufacturer erection drawings.

.4 Beam and Post Endwall Frames: Endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.

.5 Exterior Columns: Welded-up "H" sections or cold-formed "C" sections.

.6 Interior Columns: Square HSS columns.

.7 Connection of Primary Structural Members: ASTM A 325 bolts through factory-punched holes.

.8 Primary Structural Members: Paint with metal system manufacturer's standard primer with surface preparation as specified in this specification section.

.4 Secondary Structural Members:

.1 Secondary Framing System: Acrylic-coated G30 galvanized finish.

.2 C/Z Purlins and Girts: Acrylic-coated G30 galvanized finish.

.5 Metal wall panels & metal roof panel system refer to specification section 07 41 13 and 07 42 13.

.6 Sealants: as recommended by sealant manufacturers.

**2.2 COMPONENTS**

.1 Metal panel roof system refer to Section 07 41 13.

.2 Metal panel wall system refer to section 07 42 13.

.1 Gutters and Downspouts: prefinished gutters and downspouts with all clips and fasteners. Colour to match building wall panel finish. Refer to Specification 07 62 00 – Sheet Metal Flashing & Trim.

.2 Wall & Roof System:

.1 Refer to Specification Section 07 41 13 – Insulated Metal Roof Panels, 07 42 13 – Insulated Metal Wall Panels, and 07 46 13 – Preformed Metal Siding. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation.

.1 Cut ends of sheets square and clean.

.2 Exterior corners-wall: of material to match finish and profile of adjacent cladding material, shop cut and brake formed to correct angle.

.3 Accessories to exterior wall cladding, brake or bend to shape, of material and finish to match wall cladding, comprising cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill, corners.

.5 Sub-girts and clips: factory preformed Steel sheet, aluminum-zinc alloy coated. Coordinate with requirements for Insulated Metal Panel Walls.

**2.3 FABRICATION**

.1 Fabricate structural members in accordance with shop drawings and to CAN/CSA-S16.

.1 Tolerance not to exceed those specified in CSSBI 30M.

.2 Provide holes for attachment of other work, as indicated.

.3 Reinforce openings to maintain design strength.

**Part 3 Execution**

**3.1 ERECTION**

.1 Do work in accordance with CSSBI 30M except where specified otherwise.

.2 Erect structural frame in accordance with shop drawings and to CAN/CSA-S16.

.1 Erection tolerances not to exceed those specified in CSSBI 30M.

.3 Prepare galvanized structural steel surfaces for field welding by removing zinc before welding.

.1 After welding, chip away flux and prime with CAN/CGSB 1.40.

.4 Obtain written permission from Consultant prior to field cutting or altering of structural members.

.5 Touch up with shop primer bolts, rivets, welds and burned or scratched surfaces where exposed at completion of erection.

.6 Install wall cladding assemblies ensuring completed installation.

.7 Secure sub-girts to structural wall supports.

.8 Secure roof cladding sheets to structural purlins.

.1 Terminate sheet ends over structural supports.

.9 Secure side laps.

.10 Continuously seal end and side laps.

.11 Install roof assemblies ensuring completed installation.

.12 Install interior ceiling liner panels to ensure continuous vapour, air, dust-proof barrier.

.13 Install necessary closures, gaskets, caulking sealants and flashings.

.14 Install insulation and vapour retarder to maintain continuity of thermal and moisture protection to building elements and spaces.

.15 Fit insulation closely around and behind electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.16 Keep insulation away from hot surfaces chimneys and gas vents.

.17 Do not compress insulation to fit into spaces.

.18 Verify anchor bolt installation dimensions on site prior to installing metal building. Report any discrepancies to Consultant.

**3.2 FIELD QUALITY CONTROL**

.1 Inspection of erected steel work and workmanship will be carried out by and independent inspection agency designated by the Owner.

.2 Provide safe access and working areas for inspection on site, as required by inspection agency and as authorized by the Owner.

.3 Submit test reports to the Owner within 5 days.

.4 Owner will pay costs for steel erection inspection services.

.5 Contractor shall promptly correct deficiencies noted in inspection reports prior to the start of any related work that may be affected.

**3.3 WARRANTY**

.1 Metal Building system manufacturer shall provide a written weather-tightness warranty for minimum of 25 years against leaks in roof panels, arising out of or caused ordinary wear and tear under normal weather and atmospheric conditions.

.1 Warranty shall be signed by both the metal roof system manufacturer and the metal roof system installer.

.2 Maximum liability of warranty shall be no less than $0.70 USD per square foot of roof area.

.2 Metal building system manufacture shall provide a written warranty for minimum of 25 years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions.

.1 Warranty shall be signed by metal roof manufacturer.

**3.4 CLEANING**

**.1** Progress Cleaning: clean in accordance with Section 01 74 11 - 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 11 - 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 metal building system installation.

END OF SECTION