

**Parkview Seniors Expansion  
Proposed Building No. 2-  
3 Storey Multi-Unit Seniors Residential Development  
153 King Avenue East, Newcastle**

**Project 18811**

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## PART 1 GENERAL

### 1.1 Section Includes

- .1 Work covered by contract documents
- .2 Owner
- .3 Location of the site
- .4 Scheduling requirements
- .5 Site access
- .6 Contractor traffic route
- .7 Work sequence
- .8 Contractor use of premises
- .9 Engineer design
- .10 Hazardous material discovery
- .11 Building smoking environment
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- .13 Site security
- .14 "By Others"
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### 1.2 Work Covered by Contract Documents

- .1 Work of this Contract comprises the construction of the Parkview Seniors Expansion as indicated on the drawings and specifications.

### 1.3 Location of Site

- .1 The Work of this Contract is located at 115 King Avenue East, Newcastle, Ontario

### 1.4 Metric Project

- .1 This project is to be based on The International System of Units (SI). Measurements are expressed in metric (SI) units.
- .2 All dimensions are to be shown in meters and millimeters.

### 1.5 Site Access

- .1 Access to the site to be arranged by the Owner.
- .2 Provide secure construction fencing as specified and where indicated.

### 1.6 Contractor Traffic Route

- .1 Maintain fire department access/control.

### 1.7 Work Sequence

- .1 Construct Work continuously.

### 1.8 Contractors Use of Premises

- .1 Contractor has unrestricted use of site until Substantial Performance.

1.9 Engineer Design

- .1 Where specifications require work to be designed by an engineer, engage an engineer licensed in the Province of Ontario to design such work. Refer to Section 01 78 00.

1.10 Verification

- .1 All dimensions shall be verified on site, and all necessary modifications and adjustments shall be made as necessary to suit.

1.11 Building Smoking Environment

- .1 Smoking and vaping are prohibited in all work places within the Owner's buildings and on the Owner's property.

1.12 Special Conditions

- .1 The following general and special conditions apply:
  - .1 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.13 "By Others"

- .1 The term "by others" where it is used in the contract documents means that work shown or described in the contract documents and labeled with this designation is not included in the specific sub-trade's scope of work but will be required to be done within the General Contractor's contract.

1.14 Use of Drawings

- .1 Drawings are not to be scaled.
- .2 Copies of architectural "issued for construction" drawings in digital format will be made available for the contractors use under the following conditions.
  - .1 Copyright remains with BBA.
  - .2 The drawings will only be used for shop drawings for this project and not be put to any other use.
  - .3 BBA assumes no liability for errors or omissions in the drawings. The Contractor assumes all risk and expenses associated with the use of drawings in the production of his work.
  - .4 References to BBA and other Consultants must be deleted from the title block.
  - .5 The Contractor signs a release available from BBA that addresses the above items in more detail.
- .3 Arrangements for use of sub-consultant drawings must be made with the appropriate sub-consultant.

1.15 Protection of Drawings

- .1 Copyright of electronic document belongs to the Consultant. Electronic documents may not be forwarded to others, transmitted, downloaded or reproduced in any format, whether print or electronic, without the express, written permission of the copyright owner.
- .2 Drawings, specifications and other contract related documents which are posted on Contractor controlled websites for access by sub-trades and suppliers, shall be posted only on password protected and secure websites approved by the Consultant to limit access to those with an

expressed interest in the Project.

.3 Provide Consultant and Owner with access to such websites as noted above.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

## PART 1 GENERAL

### 1.1 Section Includes

- .1 Requests for Substitution (RFS) prior to execution of contract.
- .2 Requests for Substitution (RFS) after execution of contract.

### 1.2 Definitions

- .1 Products Not Available: When all listed manufacturers products in the specification section are no longer manufactured.
- .2 Proprietary specification means a specification which includes one or more proprietary names of products or manufacturers, or both, and may also include descriptive, reference standard, or performance requirements, or any combination thereof.
- .3 Non-proprietary specification means a specification which includes descriptive, reference standard or performance requirements, or any combination thereof, but does not include proprietary names of products or manufacturers.
- .4 Substitution means a product or manufacturer not specified by proprietary name, which may be acceptable in place of a product or manufacturer which, is specified by proprietary name.

### 1.3 Subcontractor Procedures

- .1 Product Options:
  - .1 For products specified by non-proprietary specification:
    - .1 Select any product by any manufacturer, which meets requirements of Contract Documents.
    - .2 Substitute an unnamed product or manufacturer in accordance with Substitutions – Manufacturers article of this Section.
  - .2 For products specified by proprietary specification:
    - .1 Select any product or manufacturer named, or
    - .2 Substitute an unnamed product or manufacturer in accordance with Substitutions – Manufacturers article of this Section.
  - .3 For products specified by proprietary specification and accompanied by words indicating that substitutions will not be accepted:
    - .1 Select any product or manufacturer named; substitutions are not permitted.
- .2 Substitution Requests Prior to Execution of Contract: Submit substitutions requests to Consultant no later than the time stated in the Instructions to Bidders.

### 1.4 Substitutions – Products

- .1 Substitute Products: Where substitute products are permitted, unnamed products may be accepted by the Consultant, subject to the following:
  - .1 Substitute products shall be the same type as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the specified products.
  - .2 Substitutions for Cause: Changes proposed by Subcontractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - .3 Substitutions for Convenience: Changes proposed by Subcontractor or Contractor that are not required in order to meet other Project requirements but may offer advantage to Contractor or Subcontractor.

1.5 Substitutions – Manufacturers

- .1 Substitute Manufacturers: Where substitute manufacturers are permitted, unnamed manufacturers will be accepted by the Consultant, subject to the following:
  - .1 Substitute manufacturers shall have capabilities comparable to those of the named manufacturers.
  - .2 In making a substitution Contractor and the Subcontractor represents that they have:
    - .1 Investigated substitute product or manufacturer, or both, and determined it meets or exceeds the criteria of the specified product, and;
    - .2 Will provide the same warranty for the Substitution as for the specified product.
    - .3 Will make any changes to the Work necessitated by substitution as required for Work to be complete in all respects, and;
    - .4 Waives claims for additional costs and time caused by substitution which may subsequently become apparent.
    - .5 Will reimburse Consultant's services for review or redesign, additional studies, investigations, review of submittals, and associated contract administration.
    - .6 Received necessary approvals of authorities having jurisdiction.
    - .7 Investigated the proposed substitute to determine if license fees and royalties are pending.
    - .8 If accepted, the substitution will not adversely affect the Construction Schedule.
  - .3 Do not order or install requested Substitutions without Consultant's acceptance.
  - .4 If, in the Consultant's opinion, a substitution does not meet requirements of Contract Documents, Subcontractor shall, at no extra cost to Owner, provide a product which, in the Consultant's opinion, does meet requirements of Contract Documents.

1.6 Proprietary Specifications

- .1 Notwithstanding specified proprietary names of either or both products or manufacturers, products provided shall meet other applicable requirements of Contract Documents. Modify products if necessary, to ensure compliance with all requirements of Contract Documents.

1.7 Changes to Accepted Products and Manufacturers

- .1 Products and manufacturers accepted by the Consultant for use in performance of Work of Contract shall not be changed without Consultant's written consent. .
- .2 Submit requests to change accepted products and manufacturers to Consultant in writing, including product data indicated in Product Data article.

1.8 Product Data

- .1 When requested by the Consultant, submit complete data substantiating compliance of a product with requirements of Contract Documents. Include the following:
  - .1 Product identification, including manufacturer's name and address.
  - .2 Manufacturer's literature providing product descriptions, applicable reference standards, performance and test data, in form consistent with the Contract Documents and readily comparable with product being substituted and can provide the specified and indicated requirements.
  - .3 Samples, as applicable.
  - .4 Name and address of projects on which product has been used and date of each installation.
  - .5 Itemized comparison of substitution with named product(s). List significant variations.
  - .6 Designation of availability of maintenance services and sources of replacement materials
  - .7 Completed Substitutions Request Form. Incomplete forms will be rejected.



1.9 Consultant Procedure

- .1 In reviewing the supporting data submitted for substitutions, Consultant will use, for purposes of comparison, all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Specifications.
- .2 Consultant will review supporting data and will determine that the substitution in the Consultant's opinion is or is not able to meet or exceed the standards of quality, appearance and performance to the material specified.
- .3 Consultant will sign, date and issue the RFS indicating acceptance or refusal, with applicable pre-contract or contract documentation, to affected participants.

1.10 Contractor Procedure

- .1 Contractor will review Request for Substitution (RFS) form and accept or reject substitution.
- .2 Contractor to sign and date RFS.
- .3 Such acceptance from the Contractor shall not relieve Subcontractor from complying with the requirements of the Drawings and Specifications.
- .4 Subcontractor shall be responsible for costs of changes resulting from Subcontractor's proposed substitutions which affect other parts of the Work.

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 Requests for Information
- .2 Submittal procedures
- .3 Screening of RFI's
- .4 Response to RFI's
- .5 Response Timing

### 1.2 Request for Information (RFI)

- .1 A request for information (RFI) is a formal process used during the Work to obtain an interpretation of the Contract Documents or to obtain additional information.
- .2 An RFI shall not constitute notice of claim for a delay.

### 1.3 Submittal Procedures

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.
- .3 Submit one distinct subject per RFI form. Do not combine unrelated items on one form.
- .4 RFI form:
  - .1 Submit a draft "Request for Information" form to be approved by the Owner and Consultant.
  - .2 Submit RFI's to the Consultant on approved "Request for Information" form. The Consultant shall not respond to an RFI except as submitted on this form.
  - .3 Where RFI form does not have sufficient space to provide complete thereon, attach additional sheets as required.
  - .4 Submit with RFI form all necessary supporting documentation.
- .5 RFI log:
  - .1 Maintain log of RFI's sent to and responses received from the Consultant, complete with corresponding dates.
  - .2 Submit updated log of RFI's at each construction meeting and with each application for payment submission.
- .6 Submit RFI's sufficiently in advance of affected parts of the Work so as not to cause delay in the performance of the Work. Costs resulting from failure to do so will not be paid by the Owner.
- .7 Only the Contractor shall submit RFI's to the Consultant.
- .8 RFI's submitted by Subcontractors or Suppliers directly to the Consultant will not be accepted.

### 1.4 Screening of RFI's

- .1 Contractor shall satisfy itself that an RFI is warranted by undertaking a thorough review of the Contract Documents to determine that the claim, dispute, or other matters in question relating to the performance of the Work or the Interpretation of the Contract Documents cannot be resolved by direct reference to the Contract Documents. Contractor shall describe in detail this review on the RFI form as part of the RFI submission. RFI submittals that lack such detailed review

description, or where the detail provided is, in the opinion of the Consultant, insufficient, shall not be reviewed by the Consultant and shall be rejected.

1.5 Response to RFI's

- .1 Consultant shall review RFI's from the Contractor submitted in accordance with this section with the following understandings:
  - .1 Consultant's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Price or Contract Time or changes in the Work.
  - .2 Only the Consultant shall respond to RFI's. Responses to RFI's received from entities other than the Consultant shall not be considered.

1.6 Response Timing

- .1 Allow 5 Working Days for review of each RFI by the Consultant.
- .2 Consultant's review of RFI commences on date of receipt of RFI submission by the Consultant from Contractor and extends to date RFI returned by Consultant.
- .3 When the RFI submission is received by Consultant before noon, review period commences that day. When RFI submittal is received by Consultant after noon, review period begins on the next Working Day.
- .4 If, at any time, the Contractor submits a large enough number of RFI's or the Consultant considers the RFI to be of such complexity that the Consultant cannot process these RFI's within 5 Working Days, the Consultant will confer with the Contractor within 3 Working Days of receipt of such RFI's, and the Consultant and the Contractor will jointly prepare an estimate of the time necessary for processing same as well as an order of priority among the RFI's submitted. The Contractor shall accommodate such necessary time at no increase in the Contract Time and at no additional cost to the Owner.

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 Submittals
- .2 Schedules
- .3 Format
- .4 Submission
- .5 Critical Path Scheduling
- .6 Submittals Schedule

### 1.2 Submittals

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

### 1.3 Schedules Required

- .1 Submit schedules as follows:
  - .1 Construction Progress Schedule.
  - .2 Submittal Schedule for Shop Drawings and Product Data.
  - .3 Submittal Schedule for Samples.
  - .4 Product Delivery Schedule.
  - .5 Cash Allowance Schedule for purchasing Products.
  - .6 Shutdown or closure activity.

### 1.4 Format

- .1 Prepare schedule in form of a horizontal bar chart using Microsoft Project 2016 or later.
- .2 Provide a separate bar for each major item of work, trade or operation.
- .3 Split horizontally for projected and actual performance.
- .4 Provide horizontal time scale identifying first work day of each week.
- .5 Format for listings: chronological order of start of each item of work.
- .6 Identification of listings: By Systems description.

### 1.5 Submission

- .1 Submit initial format of schedules within 10 working days after award of Contract.
- .2 Submit schedules in electronic format, by email as PDF files.
- .3 Consultant will review schedule and return review copy within 10 days after receipt.
- .4 Resubmit finalized schedule within 7 days after return of review copy.
- .5 During progress of Work revise and resubmit schedule as directed by Consultant.
- .6 Submit revised progress schedule with each application for payment.

- .7 Distribute copies of revised schedule to:
  - .1 Job site office.
  - .2 Subcontractors.
  - .3 Other concerned parties.
  - .4 Instruct recipients to report to Contractor within 10 days, any problems anticipated by timetable shown in schedule.
- .8 Table current and up to date schedule at each regular site meeting.

#### 1.6 Critical Path Scheduling

- .1 Include complete sequence of construction activities.
- .2 Schedules shall represent a practical plan to complete the work within the Contract period, and shall convey the plan to execute the work. Schedules as developed shall show the sequence and interdependencies of activities required for complete performance of the work.
- .3 The submittal of schedules shall be understood to be the Contractor's representation that the schedule meets the requirements of the Contract Documents and that the work will be executed in the sequence and duration indicated in the schedule.
- .4 Failure to include any element of work required for performance of the Contract or failure to properly sequence the work shall not excuse the Contractor from completing all work within the Contract Time.
- .5 All schedules shall be developed utilizing industry standard 'best practices' including, but not limited to:
  - .1 No open-ended activities.
  - .2 No use of constraints other than those defined in the Contract Documents without the prior approval of the Consultant.
  - .3 No negative leads or lags.
  - .4 No excessive leads or lags without prior justification and approval from the Consultant.
  - .5 For individual schedule construction activities, do not exceed 14 days in duration without prior approval of the Consultant. Subdivide activities exceeding 14 days in duration to an appropriate level.
  - .6 Sufficiently describe schedule activities to include what is to be accomplished in each work area. Express activity durations in whole days. Clearly define work that is to be performed by subcontract.
  - .7 Create the schedule in conformance with the work-hours and constraints set forth in these Contract Documents.
- .6 Include dates for commencement and completion of each major element of construction.
- .7 Show projected percentage of completion of each item as of first day of month.
- .8 Indicate progress of each activity to date of submission schedule.
- .9 Show changes occurring since previous submission of schedule:
  - .1 Major changes in scope.
  - .2 Activities modified since previous submission.
  - .3 Revised projections of progress and completion.
  - .4 Other identifiable changes.

- .10 Provide a narrative report to define:
  - .1 Problem areas, anticipated delays, and impact on schedule.
  - .2 Corrective action recommended and its effect.
  - .3 Effect of changes on schedules of other prime contractors.

1.7 Submittals Schedule

- .1 Include schedule for submitting shop drawings, product data, and samples. Indicate manufacture and delivery lead times into the shop drawing submittal schedule.
- .2 Indicate dates for submitting, review time, resubmission time, and last date for meeting fabrication schedule.

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 Administrative
- .2 Requests for Information (RFI's)
- .3 Shop Drawings and Product Data
- .4 Interference Drawings
- .5 Samples
- .6 Mock-Ups
- .7 Certificates and Transcripts

### 1.2 Administrative

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

### 1.3 Requests for Information (RFI's)

- .1 Refer to Section 01 26 15 – Requests for Information

### 1.4 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, product data and other data which the Contractor provides to illustrate details of a portion of Work.
- .2 Coordinate each submission with requirements of work and Contract Documents. Individual

submissions will not be reviewed until all related information is available.

- .3 Submit shop drawings bearing stamp and signature of qualified professional Engineer registered or licensed in the Province of Ontario where required by the individual specification sections. Each submittal and each resubmittal must bear the stamp of the Engineer
- .4 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.
- .5 Prior to submission to Consultant, review all submitted drawings. By this review, Contractor represents to have determined and verified field measurements, site conditions, materials, catalogue number and similar data and to have checked and coordinated each drawing with the requirements of Work and of Contract Documents. Contractor's review of each drawing shall be indicated by stamp, date and signature of a responsible person.
- .6 At time of submission, notify Consultant in writing of any deviations in drawings from the requirements of the Contract Documents.
- .7 Allow ten (10) days for Consultant's review of each submission.
- .8 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .9 Make any changes in submitted drawings which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.
- .10 Accompany submissions with transmittal letter containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .11 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.
  
- .12 After Consultant's review, distribute copies.
  
- .13 Submit 3 prints plus one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
  
- .14 Submit electronic copy in PDF format of product data sheets or brochures for requirements requested in Specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
  
- .15 Delete information not applicable to project.
  
- .16 Supplement standard information to provide details applicable to project.
  
- .17 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
  
- .18 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.
  
- 1.5 Interference Drawings
  - .1 Prepare interference drawings to coordinate the installation of the work of all sections, within available space. Conflicts between trades which could be determined beforehand, by the careful coordination and preparation of interference drawings, shall be corrected at no expense to the Owner.
  
  - .2 Prepare interference drawings of all buried services as necessary to avoid conflicts with structures, foundations or services.
  
  - .3 Submit interference and equipment placing drawings as specified in Section 01 71 00, when requested by the Consultant.
  
- 1.6 Samples
  - .1 Submit for review samples as requested in respective specification Sections. Label samples with origin, manufacturer, product information, applicable specification section, and intended use.
  
  - .2 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

- .3 Where colour, pattern or texture is criterion, submit full range of manufacturer's samples.
- .4 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .5 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.7 Mock-Ups

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

1.8 Certificates and Transcripts

- .1 Immediately after award of Contract, Submit Workplace Safety and Insurance Board Experience Report.

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 Administrative
- .2 Fires
- .3 Disposal of Wastes
- .4 Drainage
- .5 Site Clearing and Plant Protection
- .6 Pollution Control
- .7 Unanticipated Soil Contamination

### 1.2 References

- .1 Statutes of Canada 1999 Chapter 33.
  - .1 Canadian Environmental Protection Act 1999.
  - .2 SOR/2003-289. Federal Halocarbon Regulations, 2003.
  - .3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
- .2 OPSS 805 "Construction Specification for Temporary Erosion and Sediment Control Measures".

### 1.3 Administrative

- .1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including those referenced above.
- .2 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.
- .3 It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.
- .4 It is the Contractor's responsibility to obtain and abide by permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.
- .5 All hazardous materials are to be stored with secondary containment

### 1.4 Fires

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

### 1.5 Disposal of Wastes

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.6 Drainage

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing deleterious substances into waterways, sewer or drainage systems.
- .3 Protect storm drains against entry by sediment, debris, oil, or chemicals.
- .4 Control disposal or runoff of water containing deleterious substances or other harmful substances

in accordance with local authority requirements.

1.7 Site Clearing and Plant Protection

- .1 Protect trees and plants on site and adjacent properties.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
- .4 Restrict tree removal to areas indicated.
- .5 Minimize stripping of topsoil and vegetation.
- .6 Prevent unnecessary disturbance of top soil and underlying soil from vehicles and heavy equipment.

1.8 Pollution Control

- .1 Maintain, inspect, and repair temporary erosion and pollution control features installed under this contract on a weekly basis. Submit inspection logs to the Owner when requested.
- .2 Control emissions from equipment and plant to conform to federal, provincial, and municipal requirements.
- .3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .4 Take all measures necessary to prevent material and mud tracking on adjacent roads and streets.
- .5 Use mechanical sweepers as often as necessary to keep adjacent roads and streets clean of material and mud that is deposited from this project.
- .6 On site disposal or clean out of concrete trucks is not permitted. Any spillage of concrete onto asphalt or other surfaces must be cleaned up before spillage sets.

1.9 Unanticipated Soil Contamination

- .1 Should unanticipated soil contamination be discovered:
  - .1 Stop work and assess the situation for safety.
  - .2 If situation does not appear to be safe, evacuate workers from area.
  - .3 If safe to do so, take immediate steps to control any spread of contamination, in accordance with Contractor's spill prevention and response plan.
- .4 Immediately contact the Consultant.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

## PART 1 GENERAL

### 1.1 Section Includes

- .1 References.
- .2 Owner's Regulations.
- .3 Standards and Definitions.
- .4 Designated Substances.
- .5 Hazardous Materials.
- .6 Spills Reporting.
- .7 Protection of Water Quality.
- .8 Potable Water Systems.
- .9 Access for Inspection and Testing.
- .10 Other Regulatory Requirements.

### 1.2 References

- .1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CSA C22.1-18, including all Supplements and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Where a material is designated in the Contract Documents for a certain application, unless otherwise specified, that material shall conform to standards designated in the Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards invoked by the aforementioned Code.
- .3 Meet or exceed requirements of:
  - .1 Contract documents.
  - .2 Specified standards, codes and referenced documents.
  - .3 Manufacturer's instructions.
- .4 Where requirements of Contract Documents exceed Code requirements provide such additional requirements.
- .5 Where the Building Code or the Contract Documents do not provide all information necessary for complete installation of an item, then the manufacturer's instructions for first quality workmanship shall be strictly complied with.

### 1.3 Owner's Regulations

- .1 Conform to requirements, regulations and procedures of the Owner.

### 1.4 Standards and Definitions

- .1 Where a reference is made to specification standards produced by various organizations, conform to latest edition of standards, as amended and revised to date of Contract.
- .2 Have a copy of each specified standard which relates to your work available on the site to be produced immediately on Consultant's request.

### 1.5 Designated Substances

- .1 Stop work immediately when material resembling asbestos, mould or any other designated substance which is not identified in the Designated Substance Report is encountered during the

course of the work. Notify Owner and Consultant immediately.

- .2 The Owner will arrange for independent testing of suspected designated substances and removal of such substances encountered on the site during the course of the work which are not identified in the Designated Substance Report.

#### 1.6 Hazardous Materials

- .1 Definition: "Hazardous Material" is material, in any form, which by its nature, may be flammable, explosive, irritating, corrosive, poisonous, or may react violently with other materials, if used, handled or stored improperly. Included are substances prohibited, restricted, designated or otherwise controlled by law.
- .2 Provide SDS for all materials brought to the Place of Work.
- .3 Hazardous Materials will not be introduced for experimental or any other use prior to being evaluated for hazards.
- .4 Make known to the Consultant those hazardous materials or designated substances intended to be used in the workplace and receive permission to use before introducing to the Owner's property.
- .5 Many common construction materials such as asbestos pipe and various insulations are designated substances and shall not be used under any circumstances. Such materials are banned from the Owner's facilities.

#### 1.7 Spills Reporting

- .1 Spills or discharges of pollutants or contaminants under the control of the Contractor, and spills or discharges of pollutants or contaminants that are a result of the Contractor's operations that cause or are likely to cause adverse effects shall forthwith be reported to the Consultant. Such spills or discharges and their adverse effects shall be as defined in the Environmental Protection Act R.S.O. 1999.
- .2 All spills or discharges of liquid, other than accumulated rain water, from luminaries, internally illuminated signs, lamps, and liquid type transformers under the control of the Contractor, and all spills or discharges from this equipment that are a result of the Contractor's operations shall, unless otherwise indicated in the Contract, be assumed to contain PCB's and shall forthwith be reported to the Consultant.
- .3 This reporting will not relieve the Contractor of his legislated responsibilities regarding such spills or discharges.

#### 1.8 Protection of Water Quality

- .1 No waste or surplus organic material including topsoil is to be stored or disposed of within 30 metres of any watercourses. Run-off from excavation piles will not be permitted to drain directly into watercourses. Where this measure is not sufficient or feasible to control sediment entering the watercourses, sedimentation traps or geo-textile coverage will be required.
- .2 If de-watering is required, the water shall be pumped into a sedimentation pond or diffused onto vegetated areas a minimum of 30 metres from any watercourses and not pumped directly into the watercourses.
- .3 Provide all de-watering and sedimentation control required to properly complete the work of this contract.

- .4 Supply, install and maintain silt/sediment control fencing along the edge of the site to intercept construction runoff silt, to the satisfaction of the Owner.

1.9 Potable Water Systems

- .1 Potable water systems in completed buildings must meet criteria and guidelines established by Provincial and Municipal authorities, prior to occupancy by the Owner.
- .2 Upon completion, submit testing certificates verifying water quality and water systems meets all applicable Provincial and Legislated Standards

1.10 Access for Inspection and Testing

- .1 Cooperate fully with and provide assistance to, all outside authorities including Building Inspectors, utilities, testing agencies and consultants, with the inspection of the Work.

1.11 Other Regulatory Requirements

- .1 Conform to the requirements of the Ontario Ministry of Transportation, Regional and Local authorities regarding transportation of materials.
- .2 Obtain required road occupancy permits.
- .3 Pay any required roadway damage deposits required by the local municipality.
- .4 Conform to the requirements of the Ontario Ministry of the Environment.
- .5 Conform to the requirements of the Ontario Ministry of Labour.
- .6 Conform to the requirements of the local Conservation Authority.
- .7 Conform to all applicable local by-laws, regulations and ordinances.

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
- .2 Independent Inspection Agencies.
- .3 Access to Work
- .4 Procedures
- .5 Rejected Work
- .6 Reports
- .7 Contractors Responsibilities
- .8 Tests and Mix Designs
- .9 Mock-Ups
- .10 Equipment and Systems.

### 1.2 Inspection

- .1 Contractor is responsible for Quality Control (QC).
- .2 Allow Owner and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
- .4 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.
- .5 Consultant will order 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 Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor and paid from the cash allowances specified in Section 01 21 13. Refer to Section 01 29 83.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

### 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 Owner and Consultant 48 hours in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples

1.6 Rejected Work

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

1.7 Reports

- .1 Submit electronic pdf format inspection and test reports to Consultant.
- .2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.8 Contractors Responsibilities

- .1 Be responsible for the execution of the Construction Quality Plan and is to pay all costs for the execution of the Construction Quality Plan. Designate an experienced site representative for carrying out the Construction Quality Plan.
- .2 Provide the Owner with a completed quality product for the Work. Contractor shall be responsible for any costs associated with re-testing and reperforming the Work as a result of the Contractor's poor performance or workmanship or other failure to comply with the Contract Documents.
- .3 All Work shall be done by persons qualified in their respective trades, and the workmanship shall be first-class in every respect. Contractor is responsible for ensuring employees are appropriately trained. All materials and equipment furnished shall be the best of their respective kinds for the intended use and unless otherwise specified, same shall be new and of the latest design.
- .4 The Consultant will have the authority to reject Work that does not conform to the Contract Documents or may require special inspection or testing, whether or not such Work is to be then fabricated, installed or completed.
- .5 Failure by a Contractor to conduct its operations, means and methods and coordinate proper sequencing of the Work may cause the Owner to withhold payment or any other means deemed necessary to correct non-conforming Work.

- .6 The Owner shall engage a testing firm to perform such engineering laboratory services and on-site inspection as deemed necessary by the Owner. The testing firm will determine compliance with the requirements of the Contract Documents. This Work will not be a service to the Contractors for the performing of tests and checking of materials required of the Contractors.
  - .7 Copies of test and inspection reports will be furnished to the Contractor. The laboratory and its representatives will be instructed to promptly call to the attention of the Contractor, any instance of non-compliance with the requirements of the Contract Documents. Failure to so notify the Contractor shall not relieve the Contractor of any of its responsibilities for compliance or making good workmanship or materials which are not in compliance with the requirements of the Contract Documents. The agency shall notify the Consultant and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services
  - .8 Contractor's construction materials, procedures and work shall be subject to specified testing procedures and shall be in conformance with the Contract Documents as verified by Testing Agency.
  - .9 Cooperate with the testing firm and provide labor to assist with sample preparations where applicable.
  - .10 Except where specifically indicated to be provided by another entity as identified, inspections, tests, and similar quality control services including those specified to be performed by independent agency are the Contractor's responsibility, and costs thereof are not to be included in contract sum.
  - .11 Cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to Work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at Project site.
  - .12 Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of Work and without the need of removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests, taking of samples, and similar activities is Contractor's responsibility.
  - .13 Where sampling and testing is required for Sections of Work listed in the Contract Documents, the tests shall be performed by an independent testing lab and paid for by the Contractor.
  - .14 Test procedures to be used shall be submitted for approval of the Consultant where other than those specified are recommended by the testing agency.
  - .15 Testing Agency Duties: The independent Testing Agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Owner, the Consultant and Contractors in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
  - .16 Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.
- 1.9 Tests and Mix Designs
- .1 Furnish test results and mix designs as requested.

1.10 Mock Ups

- .1 Prepare mock-ups for Work specifically requested in specifications.
- .2 Construct in locations acceptable to Consultant.
- .3 Prepare mock-ups for Consultant's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 Mock-ups may remain as part of Work unless indicated otherwise.

1.11 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 and controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

### 1.3 Dewatering

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

### 1.4 Water Supply

- .1 Provide continuous supply of potable water for construction use.
- .2 Arrange for connection with local utility company and pay all costs for installation, maintenance and removal.
- .3 Pay all utility charges.
- .4 Conveniently locate water supply for use by all sections of the work. Protect water lines from freezing.
- .5 Water shall be potable and shall meet the requirements of the technical sections of the specifications.

### 1.5 Temporary Heating and Ventilation

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted, unless prior approval is given by the Consultant.
- .3 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.
- .4 Maintain temperatures of minimum 10° C in areas where construction is in progress.
- .5 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.

- .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.
- 
- .6 Permanent heating system of building may not be used when available, unless there are savings to the contract price and Consultant's written permission is obtained stating conditions of use, provisions relating to guarantees on equipment and operation and maintenance of system. Be responsible for damage to heating system if use is permitted.
  - .7 On completion of Work for which permanent heating system is used, replace filters.
  - .8 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.
  - .9 Pay costs for maintaining temporary heat, when using permanent heating system.
  - .10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
    - .1 Conform to applicable codes and standards.
    - .2 Enforce safe practices.
    - .3 Prevent abuse of services.
    - .4 Prevent damage to finishes.
    - .5 Vent direct fired combustion units to outside.
  - .11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

#### 1.6 Temporary Power and Light

- .1 Provide and pay for all temporary power during construction.
- .2 Arrange for connection with utility company. Pay all costs for installation, maintenance and removal.
- .3 Provide and maintain temporary lighting throughout project. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas. Lighting levels at floors and stairs not within work areas shall be not less than 160 lux at all times during construction activity.
- .4 All equipment used shall be CSA approved.
- .5 Wiring and method of installation shall conform to local power requirements and shall be reviewed by a licensed inspector prior to use.

#### 1.7 Temporary Communication Facilities

- .1 Provide and pay for temporary telephone, fax, data hook up, lines and equipment necessary for own use.

### 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 Site storage.
- .3 Parking
- .4 Offices
- .5 Equipment and Material Storage.
- .6 Sanitary facilities.
- .7 Signage.
- .8 Shoring

### 1.2 References

- .1 CSA Group (CSA)
  - .1 CAN/CSA Z321-96 (R2006) Signs and Symbols for the Workplace

### 1.3 Installation and Removal

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

### 1.4 Scaffolding

- .1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

### 1.5 Hoisting

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment.
- .2 Hoists and cranes shall be operated by qualified operator.

### 1.6 Site Storage/Loading

- .1 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.

### 1.7 Construction Parking

- .1 Parking will be permitted on site at areas designated by the Owner provided it does not disrupt performance of Work or ongoing Owners operations.
- .2 Provide and maintain adequate access to project site.

### 1.8 Offices

- .1 General Contractor and Subcontractors may provide their own offices as necessary and subject to site constraints. Direct location of these offices.

### 1.9 Equipment, Tool and Material Storage



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

#### 1.10 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.

#### 1.11 Construction Signage

- .1 Direct requests for approval to erect a Contractor signboard to Consultant.
- .2 Signs and notices for safety and instruction shall be in English. Graphic symbols shall conform to CAN/CSA Z321.
- .3 Post "Construction Zone" signage outside barrier and entrance to all work areas.
- .4 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project.
- .5 Install signage to direct site traffic and deliveries to the Construction work areas.

#### 1.12 Shoring

- .1 Contractor shall formulate his own conclusions as to the extent of the shoring required.
- .2 The method of shoring shall be according to the Contractor's and his Engineer's directions.
- .3 All shoring and frame braces must be supplied with a safe load rating which must not be exceeded. Install in accordance with manufacturer's recommended procedures and safety guidelines. Ensure that the safe load conditions of the shoring are not exceeded by dead, live or construction loads.
- .4 The failure or refusal of the Consultant to suggest the use of shoring, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of the work or of any of their obligations under the Contract, nor impose any liability on the Owner or their agents; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Owner, or their agents, or employees, relieve the Contractor from necessity of properly and adequately protecting the structure from collapse or damage, nor from and of his obligations under the Contract relating to injury to persons or property, nor entitle him to any claims for extra compensation or an extension in schedule.

### 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 Traffic Controls.
- .4 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 Site Fencing

- .1 Contractor's lay-down area indicated on the drawings must be secure and there must be no access by unauthorized persons. Provide temporary fencing around whole work site. Use modular free-standing fencing: galvanized, minimum 1.8m high, chain link or welded steel mesh, pipe rail. Provide one lockable truck entrance gate and at least one pedestrian door as directed. Equip all gates with locks and keys. Maintain fence in good repair.

### 1.4 Hoarding

- .1 Erect temporary site enclosure using new solid plywood hoarding, minimum 1.8 metres high. Provide gates as necessary. Maintain hoarding in good repair.

### 1.5 Guard Rails and Barricades

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

### 1.6 Traffic Barriers

- .1 Where indicated, provide precast concrete Jersey Barriers conforming to ASTM C825 - 06(2011) Standard Specification for Precast Concrete Barriers.
- .2 Provide sufficient barriers as necessary to protect the public and Owner from construction traffic.
- .3 Remove barriers on completion.

### 1.7 Weather Enclosures

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

### 1.8 Dust Tight Screens

- .1 Provide dust tight screens or 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.

1.9 Access to Site

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

1.10 Public Traffic Flow

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

1.11 Fire Routes

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

1.12 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

1.13 Protection of Building Finishes

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Consultant locations and installation schedule 3 days prior to installation.
- .4 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 Utilities

### 1.2 Quality

- .1 Products, materials, equipment and articles 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 Consultant based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

### 1.3 Availability

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

### 1.4 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.

- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Consultant.
- .9 Touch up damaged factory finished surfaces to Consultant's satisfaction. Use touch up materials to match original. Do not paint over name plates.

1.5 Transportation

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor shall be responsible for the unloading, handling and storage of such products.

1.6 Manufacturer's Instructions

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

1.7 Quality of Work

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

1.8 Coordination

- .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 Consultant if there is interference. Install as directed by Consultant.

#### 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 Consultant of conflicting installation. Install as directed.

#### 1.12 Fastenings

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

#### 1.13 Fastenings – Equipment

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

#### 1.14 Protection of Work in Progress

- .1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in

providing such protection is to be removed and replaced, or repaired, as directed by Consultant, at no increase in Contract Price or Contract Time.

- .2 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 Consultant.

1.15 Existing Utilities

- .1 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.

1.16 Hazardous Materials

- .1 Report any found or suspected hazardous materials to the Owner.

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 Field Engineering survey services to measure and stake site.
- .2 Survey services to establish and confirm inverts for Work.
- .3 Recording of subsurface conditions found.

### 1.2 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 On request of Consultant, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

### 1.3 Examination of Work and Site

- .1 Examine the site and completed portions of Work to be fully informed of their particulars as related to the Work.
- .2 Verify dimensions of completed Work in place before fabrication of Work to be incorporated with it. Ensure that all necessary job dimensions are taken for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions.
- .3 No claims for extra payment will be paid for extra work made necessary or for difficulties encountered due to conditions of the site which were visible or reasonably inferable from an examination of the site at the time prior to tender closing date and furthermore, failure of the Contractor to visit and examine the site shall be deemed a waiver of all claims for extra payment due to any condition of the site existing prior to tender closing date.

### 1.4 Qualifications of Surveyor

- .1 Qualified registered land surveyor, licensed to practice in Place of Work.

### 1.5 Survey Reference Points

- .1 Existing control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Consultant.
- .4 Report to Consultant when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

### 1.6 Survey Requirements

- .1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement and landscaping features.
- .4 Stake slopes and berms.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards for foundations.
- .7 Establish foundation and floor elevations.
- .8 Establish lines and levels for mechanical and electrical work.

1.7 Existing Services

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings. The Contractor is responsible for coordination of all utility locates.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut off points as directed by Consultant.
- .3 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.
- .4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .5 Install temporary drain plugs to prevent construction debris from blocking pipes downstream of the work.

1.8 Location of Services, Equipment and Fixtures

- .1 Location of services, equipment, fixtures and outlets indicated on drawings or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Consultant of impending installation and obtain approval for actual location.
- .4 Location of site services where required, is approximate and is based on information provided by the Owner. Undertake all locates to determine exact locations of existing services and lay out new services to avoid any conflicts with new building elements, including site improvements, building foundations and other new or existing services.
- .5 Submit field drawings and interference drawings to indicate relative position of various services and equipment. Refer to requirements for interference drawings specified elsewhere.
- .6 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.

- .7 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus and connections are coordinated.
- .8 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance and access are indicated and maintained.
- .9 Submit interference drawings to Owner and Consultant in accordance with Section 01 33 00.

1.9 Records

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

1.10 Subsurface Conditions

- .1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in Work.

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 Requirements and limitations for cutting and patching the Work.

### 1.2 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit written request and obtain Consultant's approval 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

### 1.3 Materials

- .1 As specified and required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 25 00 - Substitution Procedures.
- .3 Requests for change in materials shall include documentation indicating conformance to project requirements and intent.

### 1.4 Definitions

- .1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- .2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 General: Comply with requirements specified in other Sections.
- .2 In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
- .3 If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Consultant for the visual and functional performance of in-place materials.

## PART 3 EXECUTION

### 3.1 Preparation

- .1 Inspect existing conditions.
- .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.

### 3.2 General

- .1 Carry out all cutting and patching required for the work of the Contract.
- .2 Repair all wall and floor surfaces where items have been removed.
- .3 Make good all finishes as required.
- .4 Repaint damaged wall surfaces.
- .5 Fit several parts together, to integrate with other Work.
- .6 Uncover Work to install ill-timed Work.
- .7 Remove and replace defective and non-conforming Work.
- .8 Provide cutting and patching of all openings in non-structural elements of Work as necessary to complete installation of mechanical and electrical Work. Include complete removal and replacement of such elements as necessary to provide construction access.
- .9 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .10 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .11 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools are not allowed on masonry work without prior approval.
- .12 Restore work with new products in accordance with requirements of Contract Documents.
- .13 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .14 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with "ULC approved firestopping material, full thickness of the construction element.
- .15 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

### 3.3 Cutting and Patching

- .1 General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- .2 Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- .3 Temporary Support: Provide temporary support of work to be cut.
- .4 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- .5 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 - Summary of Work.
- .6 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - .4 Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - .5 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - .6 Proceed with patching after construction operations requiring cutting are complete.
- .7 Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - .1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - .2 Restore damaged pipe covering to its original condition.
  - .3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - .1 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  - .4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - .5 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- .8 Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint,

mortar, oils, putty, and similar materials from adjacent finished surfaces.

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.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Owner. Do not burn waste materials on site.
- .3 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use clearly marked separate bins for recycling.
- .7 Clean interior areas prior to start of finishing work and maintain areas free of dust and other contaminants during finishing operations.
- .8 Store volatile waste in covered metal containers and remove from premises at end of each working day.
- .9 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

## PART 2 PRODUCTS

### 2.1 Products

- .1 All cleaning materials and products shall be low VOC type. Submit list of cleaning products including SDS for approval prior to commencement of cleaning operations.
- .2 Use only cleaning materials recommended by manufacturer of surface to be cleaned and recommended by cleaning material manufacturer.

## PART 3 EXECUTION

### 3.1 Final Cleaning

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.



- .3 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.
- .4 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.
- .5 Clean lighting reflectors, lenses, and other lighting surfaces.
- .6 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .7 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .8 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .9 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .10 Broom clean and wash exterior paved areas, walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Clean and sweep roofs. Clear all drains.
- .13 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .14 Remove snow and ice from access to building.

End of Section

## PART 1 GENERAL

### 1.1 Section Includes

- .1 References.
- .2 Submittals.
- .3 Definitions.
- .4 Waste Management Goals for the Project.
- .5 Documents.
- .6 Waste Management Plan.
- .7 Waste Audit.
- .8 Waste Reduction Work Plan.
- .9 Materials Source Separation Program.
- .10 Disposal of Wastes.
- .11 Scheduling.
- .12 Storage, Handling and Protection.
- .13 Application.
- .14 Diversion of Materials.

### 1.2 References

- .1 O. Reg. 102/94, Waste Audits and Waste Reduction Work Plans.

### 1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit a completed Waste Management Plan (WMP) including Waste Reduction Workplan (WRW) and Materials Source Separation Program description prior to project start-up.

### 1.4 Definitions

- .1 Waste Management Plan (WMP): Contractor's approved overall strategy for waste management including waste audit, waste reduction workplan and materials source separation program.
- .2 Waste Audit (WA): Relates to projected waste generation. Involves measuring and estimating quantity and composition of waste, reasons for waste generation, and operational factors which contribute to waste.
- .3 Waste Reduction Work Plan (WRW): Written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .4 Materials Source Separation Program (MSSP): Consists of a series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .5 Waste Management Coordinator (WMC): Designate individual who is in attendance on-site, full-time. Designate, or have designated, individuals from each Subcontractor to be responsible for waste management related to their trade and for coordinating activities with WMC.
- .6 Separate Condition: Refers to waste sorted into individual types.

1.5 Waste Management Goals for the Project

- .1 The Owner has established that this Project shall generate the least amount of waste possible and that processes shall be employed that ensure the generation of as little waste as possible including prevention of damage due to mishandling, improper storage, contamination, inadequate protection or other factors as well as minimizing over packaging and poor quantity estimating.
- .2 Of the waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling. Waste disposal in landfills or incinerators shall be minimized.

1.6 Documents

- .1 Maintain at job site, one copy of following documents:
  - .1 Waste Audit
  - .2 Waste Reduction Workplan
  - .3 Material Source Separation Plan

1.7 Waste Management Plan

- .1 Waste Management Plan: Within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner, submit a Waste Management Plan. The Plan shall contain the following:
  - .1 Analysis of the proposed job site waste to be generated, including the types of recyclable and waste materials generated (by volume or weight). In the case of demolition, a list of each item proposed to be salvaged during the course of the project should also be prepared
  - .2 Alternatives to Land Filling: Contractor shall designate responsibility for preparing a list of each material proposed to be salvaged, reused, or recycled during the course of the Project.
- .2 Post WMP or summary where workers at site are able to review its content.

1.8 Waste Audit

- .1 Prepare Waste Audit prior to project start-up.
- .2 Record, on Waste Audit , extent to which materials or products used consist of recycled or reused materials or products

1.9 Waste Reduction Work Plan

- .1 Prepare WRW prior to project start-up.
- .2 Reduce construction and demolition waste in compliance with O. Reg. 102/94.
- .3 Reduction will involve action to minimize quantity of waste at source. Reuse products which would become waste where practical. Recycling will involve collection and source separation at the site, of materials for use as feedstock in manufacturing of new products.
- .4 Conform to local Municipal and Regional Landfill Solid waste management requirements. Consider reduction, reuse and recycling of waste generated during construction such as dimensional lumber, clean drywall, concrete, brick, scrap metal and corrugated cardboard.

1.10 Materials Source Separation Program

- .1 The Waste Management Plan shall include a Source Separation Program for recyclable waste, and shall be in accordance with the established policies currently in place at the local Municipality, and the requirements of O. Reg. 102/94.
- .2 Prepare MSSP and have ready for use prior to project start-up.
- .3 Implement MSSP for waste generated on project in compliance with approved methods and as approved by Consultant.
- .4 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials.
- .5 Provide containers to deposit reusable and/or recyclable materials.
- .6 Locate containers to facilitate deposit of materials without hindering daily operations.
- .7 Locate separated materials in areas which minimize material damage.
- .8 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.

1.11 Disposal of Wastes

- .1 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .2 Provide appropriate on-site containers for collection of waste materials and debris.
- .3 Provide and use clearly marked separate bins for recycling.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .5 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .6 Do not permit waste to accumulate onsite.
- .7 Burying of rubbish and waste materials is prohibited.
- .8 Disposal of waste into waterways, storm, or sanitary sewers is prohibited.

1.12 Scheduling

- .1 Coordinate work with other activities at site to ensure timely and orderly progress of the Work.

1.13 Storage, Handling and Protection

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Owner.
- .2 Materials from building demolition to be salvaged or re-used are to be removed and salvaged.

- .3 Unless specified otherwise, materials for removal become Contractor's property.

## PART 2 PRODUCTS

### 2.1 Not Used

- .1 Not used

## PART 3 EXECUTION

### 3.1 Application

- .1 Do work in compliance with Waste Management Plan.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
- .3 Source separate materials to be reused/recycled into specified sort areas.

### 3.2 Designated Substances

- .1 All designated substances abatement, removal and disposal shall be completed in accordance with O. Reg 278/05 and all other applicable legislation.

### 3.3 Diversion of Materials

- .1 Separate materials from general waste stream and stockpile in separate piles or containers, to approval of Owner, and consistent with applicable fire regulations. Mark containers or stockpile areas. Provide instruction on disposal practices.
- .2 On-site sale of materials is not permitted.

End of Section

## PART 1 GENERAL

### 1.1 Section Includes

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

### 1.2 References

- .1 Canadian Construction Documents Committee CCDC 2-2008, Stipulated Price Contract including Supplementary Conditions.
- .2 OAA/OGCA Document 100 - Recommended procedures regarding Substantial Performance of Construction Contracts and Completion Takeover of Projects.
- .3 The Construction Lien Act.

### 1.3 Inspection and Declaration

- .1 Contractor's Inspection: The Contractor shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Owner and Consultant.
  - .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  - .2 Request Consultant's review.
- .2 Consultant's Review: Consultant and Contractor will perform review 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 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, TSSA and other regulatory agencies have been submitted.
  - .5 Operation of systems have been demonstrated to Owner's personnel.
  - .6 Work is complete and ready for Final Review by the Consultant.
- .4 Final Inspection: when items noted above are completed, request final review of Work by Consultant, and Contractor. If Work is deemed incomplete by the Consultant, complete outstanding items and request re-review.
- .5 Declaration of Substantial Performance: when Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article GC 5.4 - Substantial Performance of Work and the Construction Lien Act for specifics to application.
- .6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment: When Consultant considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2, General Conditions Article GC 5.7 for specifics to application.
- .8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an

application for payment of holdback amount in accordance with CCDC 2, General Conditions Article 5.5

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 and bonds.
- .7 Final site survey.

### 1.2 Submittals

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

### 1.3 Submission

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 At least 2 weeks prior to commencement of scheduled commissioning activities, submit 2 copies of the DRAFT Operating and Maintenance Manuals, for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor 1 DRAFT copy, with review comments, for revision. Submit 1 copy of the revised Operating and Maintenance for approval prior to the production of FINAL copies. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the FINAL Operating and Maintenance Manuals.
- .3 Building will not be deemed ready for use unless the draft copies of the Operating and Maintenance Manuals and the "As-built" Record Documents have been submitted and reviewed by the Consultant.
- .4 Building will not be deemed ready for use unless the completed and submitted Operating and Maintenance Manuals and "As-built" Record Documents have been accepted by the Consultant.
- .5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .6 If requested, furnish evidence as to type, source and quality of products provided.
- .7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

### 1.4 Format

- .1 Organize data in the form as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.



- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by 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.
- .9 Provide 1:1 scaled CAD files in .dwg format on CD.

#### 1.5 Contents Each Volume

- .1 Table of Contents: provide title of project;
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Consultant and 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 identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control

#### 1.6 Occupant Manual

- .1 Submit Occupant Manual to Consultant's requirements.
- .2 Occupant Manual to include:
  - .1 General building information.
  - .2 Building management.
  - .3 Building operations.
  - .4 Safety.
  - .5 Security.
  - .6 Environmental considerations.
  - .7 Communications.
  - .8 Contact List.
  - .9 Other/Miscellaneous.

### 1.7 As Builts and Samples

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

### 1.8 Recording Actual Site Conditions

- .1 Record information on set of drawings, provided by Consultant.
- .2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured depths of elements of foundation in relation to finish first floor datum.
  - .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .4 Field changes of dimension and detail.
  - .5 Changes made by change orders.
  - .6 Details not on original Contract Drawings.
  - .7 References to related shop drawings and modifications.
- .4 Submit following drawings:
  - .1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic "as-built" records on disk using latest version of AutoCad. Annotate "AS-BUILT RECORD" in each drawing title block.
  - .2 All changes shall be shown on a separate drawing layer named "as-built".
  - .3 At least 2 weeks prior to commencement of scheduled commissioning activities, submit one copy of the DRAFT "As-built" Project Record Documents for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor the DRAFT copy, with review comments, for revision. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the FINAL "As-built" Project Record Documents

and disk of "as-built" record drawings.

- .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

#### 1.9 Final Survey

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

#### 1.10 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 co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control
- .15 Additional requirements: as specified in individual specification sections.

1.11 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.

1.12 Spare Parts

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Spare parts as identified in individual sections are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.
- .4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.13 Maintenance Materials

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Maintenance materials are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.
- .4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.14 Special Tools

- .1 Provide special tools, in quantities specified in individual specification section.

- .2 Provide items with tags identifying their associated function and equipment.
- .3 Special tools are to be delivered to the Owner prior to the application for Substantial Performance.
- .4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.15 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.
- .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 Consultant.

1.16 Warranties and Guarantees

- .1 Separate each warranty or guarantee with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and guarantees, 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 and guarantees until time specified for submittal.

1.17 Independent Specialty Engineers Sign-Off

- .1 Prior to Substantial Performance, provide copies of signed and stamped engineers review and sign-off letters stating that the work has been built in accordance with their drawings and designs. Conditional or vague letters of sign-off will not be accepted. All specialty design engineers for all sub-contractors and suppliers will be required to review the work in progress at appropriate intervals to ensure compliance with their designs and drawings and shall provide final sign-off letters. Provide copies of all field reports issued by specialty engineers. Carry all costs associated with full compliance with this requirement.

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 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 09 67 72 Concrete Floor Sealer

### 1.3 References

- .1 CSA Group (CSA)
  - .1 CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction.
  - .2 CSA A23.2-14, Methods of Test for Concrete.
  - .3 CSA A23.3-14 Design of Concrete Structures
  - .4 CSA-A23.4-16 Precast Concrete-Materials and Construction.
  - .5 CSA-A3000-13, Cementitious Materials Compendium
  - .6 CSA G30.18-09 (R2014) Carbon Steel Bars for Concrete Reinforcement.
  - .7 CSA G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .8 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .9 CSA G279-M1982 (R1998) Steel for Prestressed Concrete Tendons
  - .10 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
  - .11 CSA W59-18 Welded Steel Construction (Metal-Arc Welding).
  - .12 CSA W186-M1990 (R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 American Concrete Institute (ACI)
  - .1 ACI 347, Guide to Formwork for Concrete
  - .2 ACI 232.1R-12, Use of Raw or Processed Natural Pozzolans in Concrete

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
  - .1 Prepare and submit fully detailed shop and erection drawings to the consultant for review.
  - .2 Show all pertinent information in regard to the fabrication and erection of the precast concrete stairs including:
    - .1 Details of stairs bearing on different landings to a scale of 1:50 (minimum), showing all dimensions, to match landing details proposed on Architectural Drawings.
    - .2 Location of each unit in the completed structure and identifying marks for each unit.
    - .3 Size and dimensions of each stair and complete details of connections.
    - .4 Reinforcing details, grade of reinforcement, concrete strength and admixtures.
    - .5 Locations and details for lifting hooks and handling points.
    - .6 Sequence of erection and special instructions that may be required in handling, setting and temporary bracing.
  - .3 Shop drawings to bear the seal and signature of an Engineer registered to practice in the place of the Work, employed by the precast contractor and to include complete design calculations for the stair certifying to the adequacy of the stairs to meet code requirements

and to safely support the superimposed loads without failure.

- .3 Provide certificates of testing for the period of manufacture. Testing to be performed by a professional testing company based on standard procedures set out in ACI codes.
  - .1 Provide duplicate copies of reports showing 7 day and 28 day compressive strength for each unit.

#### 1.5 Design Requirements

- .1 Design stair units, brackets and anchorage devices to meet requirements of the Ontario Building Code, CSA A23 Series and CAN3-S16.1, to withstand handling stresses, live and dead loads.
- .2 In addition to the gravity loads and forces required by governing codes, design work to include the effects caused by moisture and temperature changes, shrinkage, creep in component materials and handling, within deflection limitations governing structural design.
- .3 Match details of stair bearing on landings shown on Drawings without compromising the structural integrity of the connection.
- .4 Design connections and anchorage to transfer forces to structure and in conformity with structural and architectural constraints. Reinforce bearing areas against diagonal tension, splitting, rupture and flexure. Place extra ties, stirrups and reinforcing bars at support points. Do not allow bearing pressure in edges of unreinforced sections.
- .5 Design units with maximum deflection of L/360 fully loaded.
- .6 Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with the Ontario Building Code.
- .7 Design connections to provide means of compensating for deviations of the building structure, minimize width of joints and gaps to allow for backing and sealing.
- .8 Allow for expansion and contraction in both panels and structure, within fastening system.
- .9 Allow for structural deflection of span/360 due to live load and distortion of structure, under design criteria conditions, without imposing load on stair assembly.
- .10 Where required, design precast stair units to withstand all stresses from attachment of guardrails. Note OBC requirements for design loading on guardrails and make adequate provision.

#### 1.6 Qualifications

- .1 Fabricate and erect precast concrete elements using manufacturing plant certified by CSA Group in appropriate categories to CSA A23.4.
- .2 Precast concrete manufacturer to be certified in accordance with CSA's certification procedures for precast concrete plants.
- .3 Only precast elements fabricated in such certified plants to be acceptable, and plant certification to be maintained for duration of fabrication, erection until warranty expires.

#### 1.7 Quality Assurance

- .1 Fabricate work in accordance with CSA-A23.4, and CPCI Architectural Precast Concrete Manual.



- .2 Design all precast concrete members and connectors not already designed by the Consultant, under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Ontario
- .3 Welding: to CSA W59 and CSA W186.
- .4 Welders: Certified to CSA-W47.1. Submit certificates for each welder.
- .5 Tolerances: Comply with the more stringent tolerances limits set out in ACI 347 and CAN3 A23.4.
- .6 In addition to quality control test requirements of CAN/CSA A23.4, an independent inspection and testing company may be appointed by the Owner to verify compliance with this specification. Cooperate with Inspector to facilitate his work.
- .7 Coordination: Provide other Sections with detailed drawings and setting information so that connection material can be readily erected in its require location, special precautions to be taken by other Sections affecting work of this Section

#### 1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Design lifting devices for the stair units to ensure that they will be safely and efficiently handled and not produce distortion, cracking or deflection nor strain or adversely affect the unit.
- .4 Support precast stair unit uniformly while curing. Keep a daily check to discover development of warpage or other distortion. Rearrange supports as required to compensate for warpage or distortion, if required.
- .5 Precast stair units to be handled and adequately protected during fabrication, curing, storage and transport by methods that will prevent damage, warping, cracking, breakage, chipping, staining or other disfigurement. Units shall not be permitted to contact the earth or be stored so as to be exposed to splashing of earth, mud, and the like.
- .6 Precast stair units to be delivered to the site clearly marked in an acceptable manner as indicated on the shop drawings, showing final position on the building. The sequence of delivery to the site to conform to an erection schedule. The timing of the delivery to be scheduled to suit the storage space available and the handling and erection operations.
- .7 Allow for storage and protection of fabricated stair units in the plant at no extra cost until units are required at the job site to meet construction schedule.

#### 1.9 Project Conditions

- .1 Maintain ambient and surface temperatures at minimum 5° C during grouting and until grout has cured.

#### 1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.11 Warranty

- .1 Warrant that the precast elements will not spall or show visible evidence of cracking, for a period of five years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 The precast concrete manufacturer shall be certified in accordance with CAN/CSA A251, Qualification Code for Manufacturers of Architectural and Structural Precast Concrete, certification procedures for precast concrete plants prior to submitting his bid and shall specifically verify as part of his bid that his plant is currently certified in the appropriate categories. Only precast elements fabricated in such certified plants shall be acceptable. Precast plant certification shall be maintained for the duration of the fabrication and erection for this project. Provide evidence of certification to Consultant for review within five (5) days of Consultant's request.

2.2 Materials

- .1 Supply materials meeting or exceeding the requirements of CAN/CSA A23.4 and generally as follows:
  - .1 Cement: grey Portland, Type 10, to CAN/CSA-A5.
  - .2 Aggregates: to requirements of CAN/CSA-A23.1.
  - .3 Reinforcement: to requirements of CAN/CSA-A23.1, galvanized if less than 25 mm cover.
  - .4 Steel inserts, anchors, plates and rods: to CAN/CSA-A23.1.
  - .5 Non-slip inserts: Extruded aluminum base with aluminum oxide abrasive, complete with cast in anchors, Type 610 by Wooster Stair Products, back-painted with bituminous paint, or acceptable equivalent. Standard Colour.
  - .6 Non-shrink grout: non-metallic material aggregate grout non-shrinking, damp-pack application to ASTM C-1107. Products by Sternson or Meadows.
  - .7 Sealer: as specified in Section 09 67 72.

2.3 Concrete Mix Design

- .1 Design concrete mix for normal weight concrete having a minimum 35 MPa at 28 days to CSA A23.4-16, and as required to meet design criteria.

2.4 Finishes

- .1 Ensure exposed-to-view finish surfaces of precast concrete members are uniform in colour and appearance.
- .2 Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as uniformity, staining, or surface cracking.
- .3 Finish: as cast using smooth steel form liners
- .4 Finish members to:
  - .1 CSA A23.4 Clause 26 Finish Grade A; Remove fins and protrusions, grind edges and ends, flat face surfaces.
  - .2 Ensure exposed-to-view finish surfaces are uniform in colour and appearance.

## 2.5 Fabrication

- .1 Make thorough examination of drawings details, check interfacing with work of other Sections and other factors influencing the design and performance of the work and be fully cognizant of the requirements.
- .2 Match details of stair bearing on landings shown on Drawings without compromising the structural integrity of the connection.
- .3 Consult reviewed shop drawings relating to interface elements and confirm exact location of inserts and anchors required to be cast in precast units to receive such items.
- .4 Fabricate precast concrete stairs to the requirements specified in CAN/CSA A23.4 and to riser and tread dimensions for the various stairs as called for on the Drawings.
- .5 Cast in non-slip inserts in accordance with manufacturer's instructions.
- .6 All forms to be steel, accurately constructed, well braced and stiffened to avoid deformations under pressure of wet concrete and vibrators. All surfaces to have smooth finish without pinholes, form marks or rough edges. The quality of forms to be such that all dimensional tolerances and exposed concrete quality can be consistently maintained.
- .7 Aluminum forms to be manufactured to produce raised non-slip continuous parallel ridges near the tread nosing. Nosing to be rounded and junction of tread and riser coved.
- .8 Accurately set reinforcing steel and weld at intersections. Weld lifting hooks and inserts to reinforcement. Vibrate continuously during casting of concrete.
- .9 Bearing areas to be reinforced against diagonal tension, splitting, rupture and flexure. Extra ties, stirrups and reinforcing bars to be placed at support points.
- .10 Design reinforcing to permit all necessary drilling for the installation of hand rail pickets without spalling, cracking or damage to the stair finish.
- .11 Provide minimum 19 mm concrete cover over reinforcing steel.
- .12 Cast in lifting devices required for erection of the precast concrete stair units. Ensure that lifting devices used externally or cast into units are capable of supporting the precast units in all positions that the units may be in during course of manufacture, transportation and installation. Ultimate capacity of lifting devices to be sufficient to resist forces obtained by applying load factor of 2.5 to weight of precast concrete work.
- .13 The underside of all precast stairs to have a smooth trowel finish (no type of screed finish is acceptable).
- .14 Apply coat of sealer to finished stair units to assist in easy cleanup of stairs at completion of project.
- .15 Mark each precast unit to correspond to identification mark on shop drawings for location.
- .16 Mark each precast unit with date cast.
- .17 Markings shall be on part of unit which will not be exposed.

### PART 3 EXECUTION

#### 3.1 General

- .1 Do precast concrete work in accordance with CSA A23.4 and CSA A23.3.

#### 3.2 Examination

- .1 Verify that site conditions and supporting materials are ready to receive work and field measurements are as indicated on reviewed shop drawings.
- .2 Ensure bearing surfaces are clean, smooth and level, and provision has been made for proper anchorage.

#### 3.3 Preparation

- .1 Provide and install sufficient temporary bracing to brace precast components adequately, at all stages of construction, so that precast components will safely withstand loads to which they may be subjected. This temporary bracing shall remain in position until required connections have been completed.
- .2 Supply anchors for precast components required to be cast into the concrete for installation. Provide such items in ample time to meet construction program. Supply layout drawings locating all cast-in items to be installed by other Sections.

#### 3.4 Installation

- .1 Non-cumulative erection tolerances in accordance with CAN/CSA A23.4.
- .2 Before final connection is made, set elevations between units to within allowable tolerances before connecting units.
- .3 Install units level, straight, plumb, square and true. Shim as required using acceptable materials and methods.
- .4 Fasten precast units in place as indicated on reviewed shop drawings.
- .5 Do not weld or secure bearing details at sliding joints.
- .6 Clean field welds with wire brush and touch-up (shop primer with primer) (galvanized finish with zinc-rich primer).
- .7 Fill joints between ends of stairs and cast in place landings with non-shrink grout flush to top and underside.
- .8 Allow min. 13 mm space between walls and stairs for caulking specified in Section 07 92 00.

#### 3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean surfaces exposed to view after joint treatment is complete and grout has cured.
- .3 Use fibre brushes, water and mild cleaning agents as recommended by manufacturer of the precast concrete units.

- .4 Remove deposit of foreign material, dirt, soil and stains. Do not use materials, tools or methods which will damage the units. Rinse thoroughly with clean water after cleaning.
- .5 Protect adjoining work from damage during cleaning.

3.6 Defective Work

- .1 Repair damaged units, where permitted by Consultant, in accordance with the recommendations of the manufacturer using a mix design to match the adjacent area and applied with an approved bonding agent.

3.7 Protection

- .1 Protect components from damage caused by field welding or erection operations performed by work of this trade.
- .2 Provide non-combustible shields during welding operations.

3.8 Certificates

- .1 Certificates shall be provided by a Professional Engineer registered in the Province of Ontario verifying that all precast elements have been erected as designated on the shop drawings.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 09 65 19 Resilient Tile Flooring

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C1708/C1708M-16 Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturers product data and installation instructions.

### 1.5 Quality Assurance

- .1 Applicators shall be licensed or approved by material manufacturer and shall use equipment and tools as recommended by manufacturer.
- .2 Underlayment shall meet the following requirements:
  - .1 Self levelling.
  - .2 Free of shrinkage cracks and spalling.
  - .3 Minimum compressive strength 24 MPa.
  - .4 Cementitious based (gypsum based products are not acceptable)

### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver materials in their original unopened packages and protect from freezing, direct sun exposure and exposure to moisture.

### 1.7 Environmental Requirements

- .1 Comply with manufacturer's recommendations for ambient job site conditions.

### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Materials shall conform with ASTM C1708.

- .2 Primer for self levelling underlayment: one of the following:
  - .1 Ardex P-51 by Ardex Inc.
  - .2 Top X Primer by Ultratex.
  - .3 Other product approved by Consultant.
  
- .3 Underlayment: cement based, self levelling, one of the following:
  - .1 Ardex K-15 by Ardex Inc.
  - .2 Top X by Ultratex.
  - .3 Other product approved by Consultant.
  
- .4 Water: clean and potable.

## 2.2 Mixing

- .1 Mix materials to proportions and with equipment as directed by manufacturer.
- .2 Mix thoroughly for a sufficient time to obtain a lump free mixture.

## PART 3 EXECUTION

### 3.1 Preparation

- .1 Clean and prepare substrate in accordance with manufacturer's surface preparation instructions. All surfaces shall be solid, thoroughly clean and properly primed.
- .2 Subfloors shall be free of oil, grease, dirt, curing compound and any other substance which might act as a bond breaker.
- .3 Prime substrates with primer. Apply evenly. Do not leave any bare spots. Remove puddles and excess primer. Allow to dry to clear thin film.

### 3.2 Underlayment, Self Levelling

- .1 Pour liquid underlayment where indicated; spread in place with suitable spreader. Use smoother for featheredge and touch up.
- .2 Workmen shall wear footwear with cleats to avoid leaving marks in underlayment.
- .3 Pour underlayment to thickness required. Apply multiple layers if necessary. Provide forms where required to retain underlayment.

### 3.3 Protection

- .1 Provide protection to allow underlayment to cure for length of time recommended by manufacturer before allowing installation of finish flooring.

### 3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 03 41 23 Precast Concrete Stairs
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 06 20 00 Finish Carpentry
- .4 Section 09 21 23 Interior Painting
- .5 Section 14 21 23 Electric Traction Passenger Elevator

### 1.3 References

- .1 The Ontario Building Code.
  - .1 MMAH Supplementary Standard SB-8, September 14, 2012. Design, Construction and Installation of Anchorage Systems for Fixed Access Ladders.
- .2 ASTM International, (ASTM)
  - .1 ASTM A53/A53M-12 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
  - .2 ASTM A123/A123M-12 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  - .3 ASTM A153/A153M-16 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - .4 ASTM A307-10 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - .5 ASTM A325 - 04 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  - .6 ASTM A385/A385M-15 Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
  - .7 ASTM A1008/A1008M-12 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
  - .8 ASTM A1011/A1011M-12a Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
  - .9 ASTM C1107/C1107M-17 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  - .10 ASTM D1187/D1187M-97(2011)e1 Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
  - .11 ASTM D6386-10 Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
  - .12 ASTM F3125/F3125M-15a Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
- .3 CSA Group (CSA)
  - .1 CSA G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
  - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA-S16.1-M Limit States Design of Steel Structures.
  - .4 CSA S136-12 Cold Formed Steel Structural Members.
  - .5 CSA W47.1-09 (R2014) Certification of Companies for Fusion Welding of Steel Structures.



- .6 CSA W59-18 Welded Steel Construction
- .7 CSA W178.1-18 Certification of Welding Inspection Organizations
- .8 CSA W178.2-18 Certification of Welding Inspectors
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer
  - .2 CAN/CGSB 1.181-99 Ready Mixed, Organic Zinc Rich Coating.
- .5 Canadian Sheet Steel Building Institute (CSSBI)
- .6 Steel Structures Painting Council, Systems and Specifications Manual.
  - .1 CISC/CPMA 1-73a-1975 A Quick drying One-coat Paint for Use on Structural Steel.
  - .2 CISC/CPMA 2-75-1975 A Quick Drying Primer for Use on Structural Steel.

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit Shop and Erection Drawings for review.
  - .2 Verify site dimensions before proceeding with shop fabrication and to suit field conditions and field openings.
  - .3 Show and describe in detail all the work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as all other pertinent data and information, including type, size and description of all fasteners and anchors.
  - .4 Indicate connections to building structure.
  - .5 Shop drawings for all metal fabrications shall be stamped and signed by a Professional Engineer registered in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.

#### 1.5 Qualifications

- .1 Work of this Section shall be executed by a firm thoroughly conversant with laws and regulations which govern and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work and having a minimum ten (10) years proven experience in the fabrication of high quality metal fabrications. Use workmen skilled in work of this Section.
- .2 Welding shall be performed by trades persons certified by The Canadian Welding Bureau under CSA Standard W47.1.

#### 1.6 Design Requirements

- .1 Design metal handrail, guardrail and ladder construction and connections to OBC vertical and horizontal live load requirements.
- .2 Design service access ladders and guards to Ministry of Labour requirements.
- .3 All access ladders shall be designed to the minimum requirements noted on the drawings and MMAH Supplementary Standard SB-8, whichever is more stringent. This shall include through-bolting anchors at masonry walls.

#### 1.7 Examination

- .1 All dimensions shall be taken from the drawings and checked against the building. Be responsible for the correctness of such measurements and report to the Consultant in writing all discrepancies between measurements at building and those shown on drawings prior to commencing work. Verify location of anchor bolts and embedded steel and ensure that work prepared by other trades is at a proper elevation, on line, level and true.

#### 1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Label, tag or otherwise mark work supplied for installation by other Sections to indicate its function, location and shop drawing description.
- .3 Protect work from damage and deliver to a location at the site in order to meet the scheduling requirements.

#### 1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 Structural Steel Sections and Steel Plate: CSA G40.20-13/G40.21-13, Grade 350W.
- .2 Architectural and Miscellaneous Mild Steel: CSA G40.20-13/G40.21-13, Grade 300W.
- .3 High Strength Bolts and Nuts: ASTM A325. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.
- .4 Sheet Steel: (Commercial Quality) ASTM A1008 stretcher leveled or temper rolled.
- .5 Steel Pipe: ASTM A53 Schedule 40, Grade B.
- .6 Welding Materials: CSA W59.
- .7 Welding Electrodes: CSA W48 Series.
- .8 Composite Metal Deck: As specified in Section 05 31 00.
- .9 Sulphur: Commercial Grade for setting of steel posts.
- .10 Grout: non-shrink, non-metallic, non-stain, flowable, to ASTM C1107, 15 MPa at 24 hours.
- .11 Isolation Coating: Alkali resistant bituminous paint to ASTM D1187.
- .12 Gaskets: Noprene, minimum 5.00 mm thick x 25 mm wide.
- .13 Trench Drain Gratings: galvanized, welded steel, of adequate strength and stiffness to support the loadings given on the structural drawings with a maximum deflection of 1/180 of the span. Type WB, welded steel as manufactured by Borden Metal Products (Canada) Ltd. 63.5 x 4.76 mm bearing bars unless otherwise noted or required to support design loads.

- .14 Perforated Metal Screens: 10 gauge steel with 6 mm diameter round holes. Holes to be staggered with 8 mm stagger (centre to centre) Sheet size to suit drawings. Finished end pattern with 25 mm edgings per detail. As manufactured by Unalloy-IWRC or approved equal.
- .15 Adhesive Anchors: HILTI or Rawl Epoxy Adhesive Anchors sized to suit loading conditions, suitable for substrate. Adhesive to be low VOC type (maximum 250 g/l) to SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

## 2.2 Finishes

- .1 Primers: All primers for metal fabrications are to be factory applied under the requirements of this Section. Refer to Finish Schedules in Section 09 91 23 for types of primers required for each application.
- .2 Pre Paint Finish: For galvanized surfaces to be exposed and finish painted, to ASTM D6386.
- .3 Galvanizing: hot dipped with zinc coating to CAN/CSA G164 or ASTM A123.
- .4 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CAN/CSA G164-M or ASTM A153.
- .5 Galvanized coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips: Galvanized after all welding and grinding complete. No welding or grinding of galvanized products allowed.
- .6 Zinc Rich Primer: zinc rich, organic, ready mix to CAN/CGSB 1.181. Low VOC type.
- .7 High Build Epoxy Coating: to CAN/CGSB - 1.153.

## PART 3 EXECUTION

### 3.1 General

- .1 Fabricate to reviewed shop drawings and in general to details, sizes and materials indicated on drawings and specified herein.
- .2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .3 Fabricate work complete with all components required for anchoring; bolting or welding to structural frame; standing free or resting in frames or sockets; in a safe and sure manner.
- .4 Where possible fit and shop assemble various sections of the work and deliver to site in largest practicable sections. Where shop fabricating is not possible, make trial assembly in shop.
- .5 Ensure exposed welds are continuous for length of each joint.
- .6 Grind and fill all welds after inspection and acceptance and leave ready for prime painting.
- .7 Fill all open joints, depressions, seams with metallic paste filler or by continuous brazing or welding and grind smooth to true sharp arises and profiles.
- .8 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings.
- .9 Supply all fastenings, anchors, accessories required for fabrication and erection of work of this Section. Make thread dimensions such that nuts and bolts will fit without re-threading or chasing

threads.

- .10 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.
- .11 Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two (2) or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.
- .12 Appearance, quality of welds made, methods of correcting defective work shall be in accordance with CSA W59.

### 3.2 Shop Painting

- .1 Cleaning Steel:
  - .1 Clean steel, whether it is to be painted or not, to the degree required by CISC/CPMA 1-73a, except as specified below.
  - .2 Prepare galvanized items scheduled to be painted in accordance with the requirements of Section 09 91 23, and ASTM D6386.
  - .3 Steel to receive a shop or field paint finish shall be cleaned in accordance with Sections 09 91 23 or SSPC SP6, whichever produces a surface which has less rust and mill scale.
  - .4 Clean steel which is specified to be painted to CISC/CPMA 2-75 in accordance with that Standard.
  - .5 Clean steel which is specified to receive an organic zinc-filled epoxy primer, or zinc-rich paint, or inorganic zinc primer, in accordance with SSPC-SP 6, Commercial Blast Cleaning.
  - .6 Clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.
- .2 The following surfaces shall not be painted:
  - .1 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least two inches on all sides of the joint, to ensure proper fusion of the metal.
  - .2 The contact surfaces of friction type connections assembled by high strength bolts.
  - .3 Portions of steel members which are to be encased in or in contact with concrete or masonry.
  - .4 Galvanized items not specifically indicated to be painted.
- .3 Preparation and priming of all metal work which will be exposed to view and which is scheduled to be finish painted, shall be in accordance with the requirements of Section 09 91 23.
- .4 All other concealed or unpainted ferrous metal work shall be given one prime paint coat type CGSB 1.40 and in accordance with CISC/CPMA 2-75. Work paint into all corners and all joints. Metal parts in contact shall be primed before shop assembly. Priming damaged during erection or through lack of protection shall be cleaned and touched up.
- .5 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 ° C.
- .6 Metals in contact with other dissimilar metals, concrete or masonry materials shall be insulated or separated from one another to prevent corrosion, staining or electrolysis by use of bituminous paint.

### 3.3 Galvanizing

- .1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G164 or ASTM A123.
- .2 Prepare metals to be galvanized and painted in accordance with requirements of ASTM D6386.
- .3 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CAN/CSA G164 or ASTM A153.
- .4 Coating Requirements:
  - .1 Weight: the weight of the galvanized coating shall conform to Table 1 of CAN/CSA G164, ASTM A123 or ASTM A153 (as appropriate).
  - .2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article. The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
  - .3 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

#### 3.4 Miscellaneous Framing and Supports

- .1 General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- .2 Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - .1 Fabricate units from slotted channel framing where indicated.
  - .2 Furnish inserts for units installed after concrete is placed.
- .3 Galvanize miscellaneous framing and supports where indicated.
- .4 Prime miscellaneous framing and supports with primer specified in Section 09 91 13 - Exterior Painting or Section 09 91 23 -Interior Painting.

#### 3.5 Angle Lintels

- .1 Provide all loose steel angle lintels required to support openings and recesses in masonry walls, whether indicated on the drawings or not. Refer to Architectural, Structural and Mechanical drawings for locations of openings. Lintels shall be as scheduled on the Structural drawings.
- .2 Steel angles: CSA G40.21, Grade 300W, sizes indicated for openings. Provide 150 mm minimum bearing at ends unless otherwise indicated.
- .3 Weld or bolt back-to-back angles to profiles as indicated.
- .4 Supply for installation by Sections 04 22 00 and 04 27 00.
- .5 Lintels shall be prime painted unless otherwise indicated.

#### 3.6 Railings

- .1 Definition: the term railing shall be taken to mean balustrades, guards, rails and handrails.
- .2 Design and fabricate railings to conform to all applicable Ontario Building Code requirements.

- .3 Unless otherwise indicated, fabricate railings as follows:
  - .1 Fabricate handrails and guardrails as detailed.
  - .2 Pipe rails shall have an outside diameter of not more than 38 mm. Close open ends of tubular members with welded steel plugs.
  - .3 Extend handrails horizontally at top and bottom of each flight of stairs as shown on the drawings but not less than 305 mm beyond stair nosing at top of stair and 610 mm at bottom of stair.
  - .4 Turn handrails down at exposed ends or turn into wall as detailed.
  - .5 Support railings at each end, and at maximum 1070 mm centres unless indicated otherwise or required to meet loading requirements of the Ontario Building Code.
  - .6 Minimum wall thicknesses of tubular railings: 2.5 mm.
  - .7 At corners, angles and intersections, cope or mitre railings, weld and grind smooth.
  - .8 Pickets shall be minimum 13 mm diameter solid steel bars at 100 mm centres.
  - .9 Connect railing assemblies to wood stair stringers as detailed.

### 3.7 Ladders

- .1 Conform to Ministry of Labour and Ontario Building Code requirements where applicable.
- .2 Unless otherwise detailed, construct ladders as follows:
  - .1 Stringers shall be minimum 19 x 38 mm steel bar extending from 150 mm above floor or roof, to minimum 1220 mm above top rung.
  - .2 Rungs shall be 19 mm solid steel bars, 400 mm long, spaced at 300 mm o.c. vertically and welded to stringers.
  - .3 Attach stringers to walls with 10 mm x 38 mm steel bar yokes, U-shaped, spaced at maximum 1220 mm o.c. vertically. Locate centre line of rungs not less than 150 mm from face of walls.
  - .4 Provide safety cages to Ministry of Labour standard details where indicated.
  - .5 Where indicated, provide horizontal and vertical returns or stringers.
  - .6 Exterior ladders shall be galvanized.
  - .7 Interior ladders shall be prime painted.
- .3 Provide elevator pit access ladder to meet requirements of Elevator supplier and extending a minimum of 1220 mm above the sill of the lowest access door, with 300 mm vertically between rungs. Ladder width shall be 400 mm. Ladder location indicated on elevator shop drawings. Ladder and attachments shall sustain a minimum load of 135 kg. Prime paint.

### 3.8 Structural Steel Door Frames

- .1 Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 16 x 38 mm steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 254 mm o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.
  - .1 Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
- .2 Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
- .3 Galvanize exterior steel frames.

### 3.9 Metal Roof Screens

- .1 Fabricate metal roof screens as detailed with perforated metal panels on steel framing.

- .2 Frame to be galvanized.

### 3.10 Scupper Drains

- .1 Fabricate steel scupper drains as detailed, using 102 x 102 x 6.4 mm HSS.
- .2 Scupper drains shall be hot dip galvanized.
- .3 Supply for installation with roofing systems.

### 3.11 Installation

- .1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts is cause for rejection of base plates.
- .2 Provide all bracing and shoring required to support the work of this Section during installation.
- .3 Work shall be fabricated and erected square, plumb and true, straight, level and accurately fitted to size detailed on reviewed Shop Drawings. All joints shall be welded unless otherwise indicated. Exposed welds shall be ground smooth and/or flush. Exposed work shall be finished smooth and even, close joints and neat connections. Exposed welds continuous for full length of joints.
- .4 Where anchors or fastenings, sleeves, have to be built in by other trades, supply all necessary templates, instructions and supervision to ensure satisfactory installation.
- .5 Do all drilling, cutting and fitting necessary to attach this work to adjoining work and make it complete.
- .6 Provide all components required for anchoring. Make anchoring in concealed manner where possible. Exposed anchors shall be approved by the Consultant, shall be neat, and of the same material, colour, texture and finish of base metal on which they occur. Exposed fastenings shall be evenly spaced.
- .7 Grind all field welds smooth.
- .8 Touch up shop coat of prime paint where damaged by field erection.
- .9 Touch up galvanized finishes with zinc rich paint.

### 3.12 Fasteners and Anchors

- .1 Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
- .2 Securely anchor components in place. Unless otherwise indicated, anchor components as follows:
  - .1 To concrete and solid masonry with expansion or epoxy adhesive type anchors.
  - .2 To hollow construction with toggle bolts.
  - .3 To thin metal with screws or bolts.
  - .4 To thick metal with bolts or by welding.
  - .5 Fill space between railing members and sleeves with non-shrink grout.
- .3 Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.

- .4 Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
- .5 Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.

3.13 Schedule

- .1 General:
  - .1 Supply and install all metal fabrications indicated on Drawings, and not included in the work of other Sections.
  - .2 Coordinate and sequence the work to ensure timely delivery to the site, of all items to be built in.
  - .3 Where items are required to be built into masonry, concrete or other work supply such items to respective Sections with all anchors and accessories for building in.
  - .4 All items shall be of sizes and as detailed on drawings.
  - .5 Coordinate with Section 09 91 13 and 09 91 23 for preparation of exposed metal items required to have finish coatings applied in the field.
  - .6 Review all coordination drawings prior to installation of materials, to ensure that no interferences with the work of other Sections will occur.

3.14 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean after installation exposed prefinished and plated as recommended by the metal manufacture and protected from damage until completion of the project.

End of Section



## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 06 20 00 Finish Carpentry
- .3 Section 07 21 13 Building Insulation
- .4 Section 07 24 33 Prefabricated EIFS Wall Panels
- .5 Section 07 26 00 Vapour Retarders
- .6 Section 08 11 00 Metal Doors and Frames
- .7 Section 12 35 30 Residential Casework

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A123/A123M-13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM A653/A653M-15 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
  - .3 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.
  - .4 ASTM F1667 - 17 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- .2 CSA Group (CSA)
  - .1 CSA B111-1974(R2003) Wire Nails, Spikes and Staples.
  - .2 CAN/CSA-O80 SERIES-15 Wood Preservation
  - .3 CSA O86-14 Engineering Design in Wood
  - .4 CSA O112 Series-M1977(R2006) Wood Adhesives.
  - .5 CSA O121-17 Douglas Fir Plywood.
  - .6 CSA O141-05 (R2014) Softwood Lumber
  - .7 CSA O151-17 Canadian Softwood Plywood
  - .8 CSA O153-M1980(R2008), Poplar Plywood.
  - .9 CSA O325-16 Construction Sheathing.
  - .10 CAN/CSA-O437 Series-93 (R2011) Standards on OSB and Waferboard
  - .11 CAN/CSA G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles
  - .12 CSA Z809-16 Sustainable Forest Management
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 19-GP-5M (1984), Sealing Compound, One Component, Acrylic Base, Solvent Curing (Incorporating Amendment No. 1).
  - .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 and amendment.
- .4 Underwriters Laboratories Canada (ULC)
  - .1 ULC 102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .5 National Lumber Grading Authority (NGLA)
  - .1 Standard Grading Rules for Canadian Lumber, Latest Edition.
- .6 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
  - .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
  - .3 FSC Accredited Certified Bodies.

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 When required by authorities having jurisdiction, submit sequential erection drawings indicating all necessary false work, temporary construction bracing and hoisting.

#### 1.5 Quality Assurance

- .1 Sawn lumber shall be identified by the grade stamp of an association or independent grading agency certified by the Canadian Lumber Standards Accreditation Board.
- .2 Pressure treated and fire retardant treated materials shall conform to CAN/CSA-080 SERIES.
- .3 Design of wood floor and roof structural systems including prefabricated wood I joists shall be in accordance with the Ontario Building Code and CSA 086. Design loads shall be as required by the Ontario Building Code, the National Building Code Supplement and as indicated on the drawings.
- .4 Design framing connections to resist uplift loads required by the referenced standards

#### 1.1 Shipping, Handling and Storage

- .1 Materials shall not be delivered before they are required for proper conduct of the work.
- .2 Protect materials, under cover, both in transit and on the site.
- .3 Store materials to prevent deterioration or the loss or impairment of their structural and other essential properties. Do not store materials in areas subject to high humidity and areas where masonry and concrete work are not completely dried out.
- .4 Protect work from damage during storage, handling, installation and until the building is turned over to the Owner. Make good damage and loss without additional expense to the Owner.
- .5 Store sheathing materials level and flat, in a dry location. Protect panel edges from moisture at all times.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 Sustainability Characteristics:
  - .1 Lumber, CSA Z809, SFI or Forestry Stewardship Council (FSC) certified.
  - .2 Plywood, OSB urea-formaldehyde free, CSA Z809, SFI or Forestry Stewardship Council (FSC) certified.
- .2 Lumber: softwood, S4S, moisture content S-DRY graded and stamped in accordance with following standards:
  - .1 CSA O141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 Glue end jointed (finger jointed) material is not acceptable.
  - .4 Framing and board lumber: in accordance with NBC, except as follows:
    - .1 Studs: (SPF), 121c. STUD.
    - .2 Joists, lintels, beams, collar ties, and plates (SPF), 124b. No. 1 STRUCTURAL.

- .5 Furring, blocking, nailing strips, strapping, grounds, rough bucks, bracing, bridging, cants, curbs, fascia backing and sleepers: SPF, 121c. No. 2 – STRUCTURAL.
- .6 Fitment framing: (SPF), 124b. No. 1 STRUCTURAL.
- .3 Plywood, OSB and wood based composite panels: to CSA O325.
  - .1 Douglas fir plywood: to CSA O121, urea formaldehyde free.
    - .1 Subfloor and roof sheathing: SHG Sheathing Grade. Nominal thickness 19 mm, unsanded surfaces to Tables E-1 and E-2, T&G edge.
    - .2 Wall Sheathing: OSB W grade, Nominal thickness 15.5mm, square edge.
      - .1 Interior basement wall sheathing treatment: BLUWOOD Factory applied, two product DOT and Infusion Film wood component coating. DOT to be fungicide and insecticide that prevents infestation and damage by fungus and wood destroying insects. The Infusion film is a water repellent, vapour permeable film that resists water seeping in while allowing moisture vapor to escape and maintain a normal moisture balance. The infusion Film is treated to resist mold growth on the dried film surface. The DOT and Infusion Film shall be furnished by WoodSmart Solutions, Inc.
    - .2 Plywood used for exposed interior work shall have select grade veneer, one or both faces where exposed, with fire retardant finish. Fire retardant shall be in accordance with CAN/CSA-O80.1, and all treated materials shall bear a ULC approval stamp.
    - .3 Preservative treated plywood: Douglas Fir to CSA O121, G1S good one side, pressure treated with CCA to CAN/CSA-O80.9, minimum retention 4.0 kg/m<sup>2</sup> by assay.
      - .1 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CAN/CSA-O80-Series.
      - .2 Field applied wood preservative: copper naphthenate to AWPA P8, green colour.
    - .4 Fire retardant treated plywood: Douglas Fir to CSA O121, G1S, fire retardant treated to CSA O80.27, maximum flame spread 25, maximum smoke developed 25.
      - .1 Backboard: 19 mm thick, sanded.
  - .4 Interior mat-formed wood particleboard: to ANSI/NPA 208.1.
  - .5 Exterior wood species and grades as specified above; pressure treated with CCA to CAN/CSA-O80-Series, minimum retention 4.0 kg/m<sup>2</sup> by assay.
    - .1 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CAN/CSA-O80-Series.
- 2.2 Accessories
  - .1 Nails, spikes and staples: to CSA B111.
  - .2 Bolts: 12.5 mm diameter, galvanized, complete with nuts and washers.
  - .3 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.
  - .4 Fastener Finishes: Galvanizing: to ASTM A123/A123M use galvanized fasteners for exterior work pressure-preservative and fire-retardant treated lumber and materials in contact with concrete or masonry.
  - .5 General purpose adhesive: to CSA O112 Series.
    - .1 VOC limit 200 g/L maximum to SCAQMD Rule 1168
  - .6 Building Paper: to CAN2-51.32-M, 15# asphalt impregnated paper.

- .7 Air Seal: closed cell polyurethane or polyethylene.
- .8 Fibreglass Insulation: to CSA A101, loose batt type, minimum density of 24.08 kg/m<sup>3</sup>
- .9 Sealants: in accordance with Section 07 92 00.
- .10 Wood Preservative to CAN/CSA-O80 SERIES.
  - .1 Preservative Coating: in accordance with manufacturer's recommendations for surface conditions:
  - .2 Preservative: VOC limit 350 g/L maximum to SCAQMD Rule 1113.
  - .3 Coatings: VOC limit 100 g/L maximum to SCAQMD Rule 1113.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections are acceptable for product installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate and inform Consultant of unacceptable conditions immediately upon discovery.
  - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

#### 3.2 Preparation

- .1 Treat surfaces of material with wood preservative, before installation.
- .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.
- .3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.
- .4 Treat material as indicated and as follows:
  - .1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

#### 3.3 Installation

- .1 Workmanship:
  - .1 Execute work using skilled mechanics according to best practice, as specified here.
  - .2 Lay out work carefully and to accommodate work of other trades. Accurately cut and fit; erect in proper position true to dimensions; align, level, square, plumb, adequately brace, and secure permanently in place. Join work only over solid backing.
- .2 Apply wood preservative to wood in contact with roofing, concrete and masonry.
- .3 Treat surfaces of pressure treated wood and plywood which are cut or bored after pressure treatment with field applied wood preservative.
- .4 Rough Hardware:
  - .1 Work shall include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.

- .5 Provide treated wood nailers, blocking, cants, grounds, furring and similar members where shown and where required for screeding or attachment of other work and surface applied items. Attach to substrate as required to support applied loading.
  - .6 Electrical Equipment Backboard: provide backboards for mounting electrical equipment as indicated. Use 19 mm thick fir face veneer fire retardant softwood plywood on 19 mm x 38 mm furring around perimeter and at maximum of 305 mm intermediate spacing.
    - .1 Install plywood backboards with countersunk screws.
  - .7 Blocking: Provide solid wood backing to support equipment and fixtures as required.
- 3.1 Cleaning
- .1 Clean in accordance with Section 01 74 11.
- 3.2 Protection
- .1 Protect installed products and components from damage during construction.
  - .2 Repair damage to adjacent materials caused by rough carpentry installation.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 92 00 Joint Sealants
- .4 Section 08 11 00 Metal Doors and Frames
- .5 Section 08 14 16 Flush Wood Doors
- .6 Section 08 14 33 Simulated Stile and Rail MDF Wood Doors
- .7 Section 09 21 16 Gypsum Board
- .8 Section 09 91 23 Interior Painting
- .9 Section 10 28 10 Toilet and Bath Accessories.
- .10 Section 12 35 30 Residential Casework

### 1.3 References

- .1 ASTM International, (ASTM)
  - .1 ASTM E1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
  - .2 ASTM F1667 - 17 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 American National Standards Institute (ANSI)
  - .1 ANSI A208.1-2009 Particleboard.
  - .2 ANSI A208.2-2016 Medium Density Fibreboard (MDF) for Interior Applications.
  - .3 ANSI/HPVA HP-1-2016, Standard for Hardwood and Decorative Plywood.
- .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  - .1 Architectural Woodwork Quality Standards Illustrated.
- .4 CSA Group (CSA)
  - .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples.
  - .2 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA O121-17 Douglas Fir Plywood.
  - .4 CSA O141-05 (R2014) - Softwood Lumber
  - .5 CSA O151-17 Canadian Softwood Plywood
  - .6 CSA O153-13 (R2017) Poplar Plywood.
  - .7 CSA Z760-94 (R2001) Life Cycle Assessment
- .5 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-V4-0 FSC Principle and Criteria for Forest Stewardship.
  - .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
  - .3 FSC Accredited Certified Bodies.
- .6 National Hardwood Lumber Association (NHLA)
  - .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
- .7 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2005.
- .8 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
  - .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications

### 1.4 Submittals

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

- .2 Submit shop drawings.
  - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  - .2 Indicate materials, thicknesses, finishes and hardware.
- .3 Samples:
  - .1 Submit duplicate 300 mm long samples of each type of solid wood or 300 x 300 mm square type of plywood to receive stain or natural finish.
  - .2 Submit duplicate 300 mm long samples of each type of casing and trim.

#### 1.5 Quality Assurance

- .1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.
- .3 Wood materials certified by Forestry Stewardship Council.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to 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.

#### 1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### PART 2 PRODUCTS

#### 2.1 Lumber Materials

- .1 Softwood lumber: unless specified otherwise, S4S, S-Dry graded and stamped in accordance with following standards:
  - .1 CSA O141.
  - .2 NLGA Standard Grading Rules for Canadian Lumber.
  - .3 AWMAC premium grade, moisture content 19% or less.
  - .4 Machine stress-rated lumber is acceptable.

#### 2.2 Panel Materials

- .1 Douglas fir plywood (DFP): to CSA O121-M89 (R2003), standard construction.
  - .1 Forestry Stewardship Council (FSC) certified.
  - .2 Urea-formaldehyde free.
- .2 Canadian Softwood Plywood (CSP): to CSA O151-04, standard construction.
  - .1 Forestry Stewardship Council (FSC) certified.
  - .2 Urea-formaldehyde free.
- .3 Particleboard: to ANSI A208.1-99.
  - .1 Forestry Stewardship Council (FSC) certified.

- .2 Urea-formaldehyde free.
- .4 Medium density fibreboard (MDF): to ANSI A208.2-02, density 640-800 kg/m<sup>3</sup>.
  - .1 Forestry Stewardship Council (FSC) certified.
  - .2 Urea-formaldehyde free.
- .5 Standing and Running Trim:
  - .1 Low-emission Medium Density Fiberboard. Paintable.
  - .2 Profile as selected by the Consultant.

### 2.3 Accessories

- .1 Rough Hardware: Bolts, lag screws, anchors, nails and expansion shields required to secure this portion of work. Rough hardware hot dip galvanized conforming to latest edition of CAN/CSA-G164. All fasteners used in damp or wet areas to be suitable for use in corrosive environment. Use hot dipped galvanized or other material approved by the Consultant.
- .2 Nails and staples: to ASTM F1667 galvanized.
- .3 Wood screws: to CSA B35.4 plain type and size to suit application.
- .4 Stainless Steel hardware: Type 316 Stainless steel for exposed or wet locations, tamper proof.
- .5 Splines: wood or metal to suit application.
- .6 Adhesive: recommended by manufacturer, waterproof type, maximum VOC limit 30 g/L SCAQMD Rule 1168 - Adhesives and Sealants Applications.

## PART 3 EXECUTION

### 3.1 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 smooth 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 Interior and exterior frames:
  - .1 Set frames with plumb sides, level heads and sills, and secure.

### 3.2 Fabrication

- .1 General:
  - .1 Field measure all dimensions.
  - .2 Fabricate all finish carpentry items to AWMAC premium grade, and in accordance with the reviewed shop drawings.
  - .3 Set nails and screws, apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.
  - .4 Provide 10 mm thick solid matching wood strip on plywood and particle board edges 13 mm or thicker, exposed in final assembly.



.5 Ease edges of solid lumber components to 1.6 mm radius.

### 3.3 Installation

- .1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
- .2 All fastenings shall be concealed.
- .3 Provide heavy duty grounds as necessary for secure installation of finish carpentry work.
- .4 All wood surfaces shall be sanded smooth, ready to receive finish.
- .5 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.
- .6 Form joints to conceal shrinkage.
- .7 Set and secure materials and components in place, rigid plumb and square.
- .8 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
- .9 Set finishing nails to receive filler. Where screws are used to secure members, countersink screws in round, cleanly cut hole and plug with wood plug to match material being secured.
- .10 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .11 Standing and Running Trim:
  - .1 Butt and cope internal joints of casing and trim to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
  - .2 Fit backs of casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
  - .3 Install trim in single lengths without splicing.
- .12 Apply mildew resistant clear silicone sealant to perimeter of all vanity tops and window stools as specified in Section 07 92 00.

### 3.4 Door Installation

- .1 Install doors in accordance with instructions in Section 08 11 00 and Section 08 14 16 and manufacturer's printed instructions.

### 3.5 Finish Hardware Installation

- .1 Finish hardware will be supplied for installation under this Section.
- .2 Prepare doors and frames in accordance with manufacturer's instructions and templates. Install finish hardware complete in all respects, hang doors and make adjustments necessary.
- .3 Doors shall swing freely. Where thresholds are to be used, door bottom shall be finished to suit thresholds as required.

.4 Where indicated on door schedules or drawings, under-cut doors.

3.6 Miscellaneous

.1 Install Toilet and Bath Accessories as specified in Section 10 28 10.

3.7 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 21 13 Building Insulation
- .2 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C836/C836M-15 Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - .2 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
  - .3 ASTM D570-98(2010)e1 Standard Test Method for Water Absorption of Plastics
  - .4 ASTM D882-12 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
  - .5 ASTM D903-98(2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - .6 ASTM D1876-08(2015)e1 Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
  - .7 ASTM D1970/D1970M-17 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
  - .8 ASTM D3767-03(2014) Standard Practice for Rubber - Measurement of Dimensions
  - .9 ASTM D5385/D5385M-93(2014)e1 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
  - .10 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
  - .11 ASTM E154/E154M-08a(2013)e1 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of waterproofing system.
- .3 Samples: Submit 300 mm square representative samples of the sheet membrane for approval.

### 1.5 Quality Assurance

- .1 Manufacturer: Sheet membrane waterproofing system shall be manufactured by a firm with a minimum of 20 years of experience in the production of self-adhesive sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- .2 Installer: A firm which has at least 3 years of experience in work of the type required by this section.

- .3 Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- .4 Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials and products in labelled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
  - .1 Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
  - .2 Protect mastic and adhesive from moisture and potential sources of ignition.
  - .3 Protect surface conditioner from freezing.

#### 1.7 Project Conditions

- .1 Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- .2 Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.9 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.
- .2 Provide membrane manufacturer's written 5 year material warranty.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 Sheet Membrane Waterproofing System: Bituthene System 4000 Membrane by Grace Construction Products; self-adhesive, cold-applied composite sheet consisting of a thickness of 1.4 mm of rubberized asphalt and 0.1 mm of cross-laminated, high density polyethylene film specially formulated for use with water-based surface conditioner. Provide rubberized asphalt membrane covered with a release sheet which is removed during installation. No special adhesive or heat shall be required to form laps.

- .2 Products which meet the referenced requirements and are manufactured by the following are acceptable subject to acceptance by the Consultant of manufacturer's material data sheets, specifications and installation instructions:
- .1 Ardex
  - .2 Aquaseal
  - .3 Bakor
  - .4 Soprema
  - .5 Tremco
- .3 Sheet Membrane Waterproofing

<b>PHYSICAL PROPERTIES FOR WATERPROOFING MEMBRANE:</b>		
<b>Property</b>	<b>Test Method</b>	<b>Typical Value</b>
Colour		Dark gray-black
Thickness	ASTM D3767 Method A	1.5 mm nominal
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -43°C (-45°F)	ASTM D1970	Unaffected
Tensile Strength, Membrane Die C	ASTM D412 Modified1	2240 kPa minimum
Tensile Strength, Film	ASTM D882 Modified1	34.5 MPa minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D412 Modified1	300% minimum
Crack Cycling at -32°C (-25°F), 100 Cycles	ASTM C836	Unaffected
Lap Adhesion at Minimum Application Temperature	ASTM D1876 Modified2	880 N/m
Peel Strength	ASTM D903 Modified3	1576 N/m
Puncture Resistance, Membrane	ASTM E154	222 N minimum
Resistance to Hydrostatic Head	ASTM D5385	70 m of water
Permeance	ASTM E96, Section 12 – Water Method	2.9 ng/m <sup>2</sup> sPa maximum
Water Absorption	ASTM D570	0.1% maximum

- .4 Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.
- .5 Drainage sheet: Terradrain 600 by Terrafix Geosynthetics Inc. or Mirafi Drainage Composite by TC Mirafi.
- .6 Sealants: as recommended by membrane manufacturer, and compatible with all materials.

**PART 3 EXECUTION**

**3.1 Examination**

- .1 Examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work.

- .2 Do not proceed with work until unsatisfactory conditions are corrected.

### 3.2 Preparation of Substrates

- .1 Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.
- .2 Cast-In-Place Concrete Substrates:
  - .1 Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete).
  - .2 Fill form tie rod holes with concrete and finish flush with surrounding surface.
  - .3 Repair bugholes over 13 mm in length and 6 mm deep and finish flush with surrounding surface.
  - .4 Remove scaling to sound, unaffected concrete and repair exposed area.
  - .5 Grind irregular construction joints to suitable flush surface.
- .3 Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

### 3.3 Installation

- .1 Refer to manufacturer's literature for recommendations on installation.
- .2 Apply surface conditioner at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.
- .3 Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.
- .4 Seal daily terminations with trowelled bead of mastic.
- .5 Install membrane waterproofing in maximum practical sheet sizes and with minimum amount of joints or laps in accordance with manufacturer's printed instructions.
- .6 Commence installation from the base of walls and commence upward. Overlap horizontal joints 200 mm minimum.

### 3.4 Drainage Sheet

- .1 Ensure that waterproof membranes have been inspected and approved prior to placing drainage sheet.
- .2 Place panels with flat side against waterproofed foundation walls and filter fabric facing soil. Secure panels to substrate with two sided tape or adhesive, compatible with substrate material.
- .3 Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. Place flangeless panel edge on top of the flange of the adjacent panel and butt dimple to dimple.

- .4 Complete panel and attachment by pulling the filter fabric back to expose two rows of dimpled core. Place end of the next panel over the two rows of dimples and interlock.
- .5 Complete all connections in single fashion from top to bottom so that moisture will flow with the overlap and not against it.
- .6 Overlap fabric in the direction of water flow. Secure all terminal edges with the filter fabric flap by tucking it behind the core.
- .7 Overlap drain sheet filter fabric over perimeter drain filter fabric.
- .8 Ensure that drainage sheet is covered with backfill within maximum two weeks of its installation.

### 3.5 Schedule

- .1 Apply waterproofing to entire exterior faces of elevator pit foundation walls. Start waterproofing 100 mm below finished grade and terminate waterproofing at top of footings. Extend onto adjacent foundation walls horizontally a minimum of 900 mm beyond the elevator pit area.
- .2 Apply one additional layer of waterproofing membrane to vertical corners and construction joints for a minimum width of 300 mm on each side.
- .3 Seal all penetrations through walls with sealant and install one additional layer of waterproofing membrane for a minimum of 230 mm along the length of any pipes passing through walls.

### 3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.
- .3 Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 13 13 Bituminous Sheet Waterproofing
- .3 Section 07 24 33 Prefabricated EIFS Wall Panels
- .4 Section 07 26 00 Vapour Retarders
- .5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .6 Section 07 52 00 Modified Bituminous Roofing
- .7 Section 07 92 00 Joint Sealants
- .8 Section 08 11 00 Metal Doors and Frames
- .9 Section 08 50 00 Aluminum Doors, Windows and Screens
- .10 Section 33 46 13 Foundation Drainage

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C423-17 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - .2 ASTM C518-17 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - .3 ASTM C578-17a Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - .4 ASTM C612-14 Standard Specification for Mineral Fiber Block and Board Thermal Insulation
  - .5 ASTM C665-17 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
  - .6 ASTM D1621-16 Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  - .7 ASTM D1623-17 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
  - .8 ASTM E1677-11 Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
  - .9 ASTM E84-17a Standard Test Method for Surface Burning Characteristics of Building Materials
- .2 CSA Group (CSA)
  - .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
- .3 Underwriters Laboratories Canada (ULC)
  - .1 ULC 701.1 Standard for Thermal Insulation, Polystyrene Boards
  - .2 ULC 702.1 Standard for Thermal Insulation Mineral Fibre for Buildings
- .4 Canadian General Services Board (CGSB)
  - .1 CGSB 71-GP-24M Adhesive, Flexible, for Bonding to Cellular Polystyrene Insulation.
  - .2 CAN 2-51.32 Sheathing, Membrane, Breather Type.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit insulation manufacturer's product literature including specified physical properties for each type of insulation specified.



1.5 Environmental Requirements

- .1 Insulation shall not be produced with, or contain, any of the regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver material to the site in the original unbroken packages bearing the name of manufacturer.
- .4 Store materials in an approved manner at the site preceding application and protect from damage at all times.
- .5 Remove damaged or deteriorated materials from site.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Rigid Board Insulation

- .1 Rigid insulation at perimeter of ground floor slab and below grade: extruded expanded polystyrene to ULC S701.1 TYPE 4. Thickness as detailed, 400 x 2440 mm boards with butt edges. Material shall have the following characteristics when tested to the reference standards:
  - .1 Compressive Strength: ASTM D1621: 207 kPa.
  - .2 Water Absorption: ASTM D2842: maximum 0.7% by volume.
  - .3 Water Absorption: ASTM C272: maximum 0.3% by volume.
  - .4 Water Vapour Permeance, ASTM E96: 90 ng/Pa•s•m<sup>2</sup>
  - .5 Coefficient of Linear Thermal Expansion, ASTM D696: 6.3 x 10<sup>-2</sup> mm/m• °C
  - .6 Thermal resistance RSI: ASTM C518: 0.87/25 mm
  - .7 Material: Styrofoam SM Insulation as manufactured by Dow Chemical Canada.

3.1 Mineral Wool Wall Insulation

- .2 Batt Insulation for exterior metal stud walls: To CAN/ULC-S702, Type 1.
  - .1 Fire performance:
    - .1 Non-combustibility: To CAN/ULC S114.
    - .2 Surface Burning Characteristics: To CAN/ULC S102.
      - .1 Flame spread: 0.
      - .2 Smoke developed: 0.
  - .2 Thermal resistance: To ASTM C518.
    - .1 RSI value/25.4 mm at 24 °C: 0.71 m<sup>2</sup>K/W.
  - .3 Density: 32 kg/m<sup>3</sup> to ASTM C167.
  - .4 Recycled content: 40 % minimum.
  - .5 Material: Rockwool Comfortbatt

## 2.2 Concrete Faced Insulated Perimeter Wall Panels

- .1 Panel Performance:
  - .1 Wall Panel System Fire Test:
    - .1 Meets Uniform Building Code (UBC) 17-5 - Room Fire Test Standard for Interior of Foam Plastic Systems.
    - .2 Equivalent to current UL 17-15 and UBC 97 revised.
  - .2 Construction: Perimeter Foundation Insulation: Extruded polystyrene board to ASTM C578 (ULC 701.1) Type IV, rigid, closed cell, with integral high density skin, c/w integral 8 mm thick latex-modified concrete facing.
    - .1 Board Size: 610 mm by 1219 mm by thickness indicated.
    - .2 Edges: Tongue and groove sides, square edge ends.
    - .3 Thermal Resistance ASTM C518: Long term aged R-value of 0.03 sm K/W per mm.
    - .4 Foam Compressive Strength, ASTM D1621, minimum: 240 kPa.
    - .5 Compressive Strength: to ASTM D1621, minimum 275.6 kPa
    - .6 Water Absorption ASTM D2842: <0.1 (0.7% by volume maximum).
    - .7 Water VapoUr Permeance (ASTM E96): 50 ng/Pas m.
    - .8 Coefficient of Lineal Thermal Expansion (ASTM D696, mm/m x degree C: 6.3 x 10<sup>-</sup>.
  - .3 Material: WallGUARD Concrete Faced Insulated Perimeter Wall Panels as manufactured by FinPan.
  - .4 Accessories:
    - .1 Metal Cap Flashing: 0.61mm galvanized steel J-channel; 57mm wide, 102 mm long leg and 57mm short leg; prefinished in colour as selected.
    - .2 Clips and Fasteners: corrosion-resistant type, sized to suit application; as supplied by insulation manufacturer.

## 2.3 Batt Insulation

- .1 Fibreglass friction fit batts to CSA A101-M, Type 1 or mineral fibre to ULC 702.1 Type 1 for wall application, width and thickness as shown on details:
  - .1 Owens Corning Fibreglass Batt Insulation, unfaced.
  - .2 Roxul Batt Insulation.

## 2.4 Spray Foam Insulation

- .1 Spray Foam Insulation: one component expanding polyurethane or polyisocyanurate foam, ULC approved and compatible with rigid insulating materials, with Class 1 fire rating to ASTM E84 for window and door frame application:
  - .1 Ultra Seal PF-100 Gun Foam by Nuco Inc.
  - .2 Handi-Foam by Fomo Products Inc.
  - .3 Pinkseal by Owens Corning.

## 2.5 Accessories

- .1 Adhesives: As recommended by material manufacturer, compatible with insulation and substrate membrane, waterproof, conforming to CGSB 71-GP-24M.
  - .1 Air-Bloc 21 by Monsey Bakor
  - .2 Shur Stik 99 by The GH Company
  - .3 PL Premium by LePage

- .2 Primer for concrete and masonry surfaces recommended by the adhesive manufacturer for the materials to be adhered.
- .3 Sealing Tape: minimum 65 mm width, polypropylene sheathing tape with acrylic adhesive.
- .4 Rough Hardware: Nails and staples as required for installation of insulation and membrane materials, galvanized to CSA B111 and B34.
- .5 Mechanical Fastening: galvanized screw type fasteners with 25 mm galvanized plate washers. Screws shall be 13 mm longer than the combined thickness of the insulation and sheathing.
- .6 Vapour Retarder: As specified in Section 07 26 00.

### PART 3 EXECUTION

#### 3.2 Installation – General

- .1 Install insulation of types indicated, or, where not indicated, as appropriate, to provide a continuously un-interrupted building envelope in accordance with the requirements of the reference standards.
- .2 Install insulation after building substrate materials are dry.
- .3 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .4 Fit insulation tightly around all structural angles, penetrations and other protrusions.
- .5 Cut and trim insulation neatly to fit spaces. Butt joints tightly; offset vertical joints. Use only
- .6 Insulation board materials free from chipped or broken edges.
- .7 Sizes of materials shall be consistent with the module of the system.
- .8 Do not enclose or conceal insulation until it has been inspected by the Consultant.

#### 3.3 Perimeter Insulation

- .1 Do not proceed with installation until concrete surfaces are dry and cured, and water proofing membranes have been inspected and approved.
- .2 Install perimeter insulation vertically just prior to backfilling.
- .3 Prime porous concrete surfaces.
- .4 Apply adhesive in gobs or pads to the back of the insulation board in accordance with manufacturer's instructions. Joints shall be left dry with joints brought into tight contact. Apply insulation to the wall with a slight sliding motion to ensure good contact.
- .5 Protect insulation from damage until time for backfilling.
- .6 Following backfilling and prior to placement of underslab vapour barriers, install horizontal insulation. Install rigid insulation at perimeter of all exterior walls and for extent as indicated. Tightly butt joints.

### 3.4 Concrete Faced Insulated Perimeter Wall Panel Installation

- .1 Perimeter Insulation Substrate Examination
  - .1 Verify that the insulation boards and adjacent materials are compatible
  - .2 Verify that the substrate is flat, sound, clean and remove any masonry irregularities or jagged surfaces on the foundation wall.
- .2 Perimeter Insulation Installation:
  - .1 Layout concrete-faced insulation boards to maximize board sizes. Do not use boards less than 152 mm wide.
  - .2 Install concrete-faced insulation board system in orientation as indicated or to maximize full sheets. Complete with fastening clips and cap flashing in accordance with manufacturer's installation guidelines

### 3.5 Mineral Wool Wall Insulation

- .1 Install insulation in accordance with manufacturer's written recommendations.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Do not compress insulation to fit into spaces.
- .4 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .5 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of chimneys and vents.
- .6 Do not enclose insulation until before inspection and receipt of Consultant's written approval.

### 3.6 Batt Insulation

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces. Ensure that insulation is kept dry and not compressed.
- .2 Install insulation in spaces as shown on drawings.
- .3 Insulation shall be placed in all metal stud and header assemblies that will be inaccessible after their installation into the wall. Refer to Section 05 41 00.
- .4 Install batt insulation in built up wood roof curbs where detailed.
- .5 Pack loose insulation insulation in crevices between exterior masonry and door and window frames and about lintels, frames, beams around ducts at holes and other places where shown or required to eliminate air infiltration.
- .6 Pack loose insulation into voids around mechanical and electrical pipes and ducts where they pass through walls and slabs.

### 3.7 Spray Foam Insulation

- .1 Completely fill all joints and penetrations in exterior walls, at door and window frames and where indicated, with expanding spray foam insulation, in accordance with manufacturer's instructions.

3.8 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- |    |                  |  |
|----|------------------|--|
| .1 | Section 06 10 00 | Rough Carpentry                        |
| .2 | Section 07 13 13 | Bituminous Sheet Waterproofing         |
| .3 | Section 07 21 13 | Building Insulation                    |
| .4 | Section 07 24 33 | Prefabricated EIFS Wall Panels         |
| .5 | Section 07 27 13 | Modified Bituminous Sheet Air Barriers |
| .6 | Section 07 50 00 | Modified Bituminous Roofing            |
| .7 | Section 07 92 00 | Joint Sealants                         |
| .8 | Section 09 21 16 | Gypsum Board                           |

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
  - .2 ASTM E154/E154M-08a(2013)e1 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
  - .3 ASTM E1643-11 (2017) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
  - .4 ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
  - .5 ASTM F1249-13 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet, for Use in Building Construction
- .3 American Concrete Institute (ACI)
  - .1 ACI 302.1R Guide for Concrete Floor and Slab Construction

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's product data including certification that materials meet the requirements of the reference standards, and application instructions.

### 1.5 Project Conditions

- .1 Products specified are not intended for uses subject to abuse or permanent exposure to the elements.
- .2 Do not apply membranes on frozen ground.

### 1.6 Quality Assurance

- .1 Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.
- .2 Obtain vapour retarder materials from a single manufacturer regularly engaged in manufacturing

the product.

- .3 Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

#### 1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- .4 Store materials in a clean dry area in accordance with manufacturer's instructions. Stack membrane on smooth ground or wood platform to eliminate warping.
- .5 Protect materials during handling and application to prevent damage or contamination.
- .6 Ensure membrane is stamped with manufacturer's name, product name, and membrane thickness at intervals of no more than 220 cm.

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### PART 2 PRODUCTS

#### 2.1 Sheet Vapour Barrier

- .1 Polyethylene film: to CAN/CGSB-51.34, 0.15 mm thick.
- .2 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50 mm wide for all lap joints and perimeter seals.
- .3 Mastic: as recommended by membrane manufacturer and compatible with substrate.
- .4 Sealants and Adhesives: as specified in Section 07 92 00, compatible with vapour barrier and substrate.
- .5 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

#### 2.2 Sheet Vapour Barrier for Below Concrete Slabs on Grade

- .1 Vapour retarder membrane below slabs on grade shall be manufactured from virgin polyolefin resins and shall meet or exceed all requirements of ASTM E1745, Class A.
  - .1 Maximum Water Vapor Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B or ASTM F1249)
    - .1 As received: 0.0063 perms.
    - .2 After Wetting and Drying: 0.0052 perms.
    - .3 Resistance to Plastic Flow and Temperature: 0.0057 perms.
    - .4 Effect Low Temperature and Flexibility: 0.0052 perms

- .5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0052 perms.
- .6 Puncture Resistance (ASTM D1709): >3,200 grams.
- .7 Tensile Strength ASTM E154, Section 9: 72 Lb. Force/Inch
- .2 Thickness of Retarder (plastic), ACI 302.1R-96, not less than 15 mils.
- .3 Acceptable product: Sealtight Perminator HP, as manufactured by W.R. Meadows or Stego Wrap Vapor Barrier by Stego Industries LLC.
  
- .2 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm. Perminator Tape by W.R. Meadows or Stego Tape by Stego Industries LLC.
  
- .3 Pipe Collars: Construct pipe collars from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

### PART 3 EXECUTION

#### 3.1 Vapour Retarders in Walls

- .1 Ensure services are installed and inspected prior to installation of vapour retarder.
- .2 Use sheets of largest practical size to minimize joints. Install horizontally on wall surfaces.
- .3 Adhere membrane to metal studs with continuous ribbons of mastic.
- .4 Tape all joints.
- .5 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 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.
- .6 Seal lap joints of sheet vapour barrier as follows:
  - .1 Attach first sheet to substrate using sealant/adhesive.
  - .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.
- .7 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
  - .1 Install moulded box vapour barrier.
  - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.
- .8 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.
- .9 Refer to building elements schedule on the drawings and details for locations of vapour retarders.

#### 3.2 Vapour Retarders Below Slabs

- .1 Install vapour retarder below all concrete slabs on grade.
- .2 Prepare surfaces in accordance with manufacturers recommendations.



- .3 Level, tamp, or roll earth or granular material beneath the slab base.
- .4 Install vapour retarder below floor slab immediately prior to concrete reinforcement placement and in accordance with ASTM E1643
- .5 Unroll vapour retarder with the longest dimension parallel with the direction of the pour.
- .6 Lap vapour retarder over footings and seal to foundation walls.
- .7 Overlap joints 150 mm and seal with manufacturer's tape.
- .8 Seal all penetrations (including pipes) with manufacturer's pipe boot.
- .9 No penetration of the vapour retarder is allowed except for reinforcing steel and permanent utilities.
- .10 Repair damaged areas by cutting patches of vapour retarder, overlapping damaged area 150 mm and taping all four sides with tape.
- .11 Restrict traffic over vapour retarder.
- .12 Prior to placing concrete inspect vapour retarder and repair all tears and punctures.

### 3.3 Inspection

- .1 Arrange for inspection of vapour retarders immediately prior to covering, by local building department and Consultant.
- .2 Make all required repairs identified during inspection.

### 3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 24 33 Prefabricated EIFS Wall Panels
- .4 Section 07 52 00 Modified Bituminous Roofing
- .5 Section 07 62 00 Sheet Metal Flashing and Trim
- .6 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 ASTM International, (ASTM)
  - .1 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  - .2 ASTM D624-00 (2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  - .3 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
  - .4 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
  - .5 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  - .6 ASTM E783-02 (2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
  - .7 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
  - .8 ASTM E2178-13 Standard Test Method for Air Permeance of Building Materials
  - .9 ASTM E2357-18 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- .2 Canadian General Standards Board (CGSB)
  - .1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing.
- .3 National Air Barrier Association (NABA)
  - .1 National Air Barrier Association's (NABA) Quality Assurance Program (QAP)

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit manufacturer's complete set of standard details for air barriers.
- .4 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

### 1.5 Performance Requirements

- .1 Select and install wall components and assemblies to resist air leakage caused by static air pressure across exterior wall assemblies, including windows, glass, doors, and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.01 L/s.m<sup>2</sup> when subjected to pressure differential of 75 Pa as measured in accordance with ASTM E783, and ASTM E330.
- .2 Select and install wall components and assemblies to resist air leakage caused by dynamic air pressure across exterior wall assemblies, including windows, glass, doors and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.013 L/s.m<sup>2</sup> when subjected to hourly wind design loads in accordance with NBC, using 1 in 10 year probability, as measured in accordance with ASTM E783 and ASTM E330.
- .3 If ongoing testing is required throughout air barrier system installation, perform qualitative testing methods in accordance with ASTM E1186 and ASTM D4541.
- .4 Provide continuity of air barrier materials and assemblies in conjunction with materials described in other Sections.

### 1.6 Quality Assurance

- .1 Quality Assurance Program: Submit evidence of current Contractor accreditation and Installer certification under the National Air Barrier Association's (NABA) Quality Assurance Program (QAP).
- .2 Preconstruction Meeting: Convene a minimum of two weeks prior to commencing work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
- .3 Mock-Ups: Build mock-up representative of primary air barrier assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Consultant. Mock-up shall be dimensions no less than 2.5 metres long by 2.5 metres high and include the materials and accessories proposed for use in the exterior wall assembly. Mock-ups shall be suitable for testing as specified in the following paragraph.
- .4 Mock-Up Tests for Air and Water Infiltration: The third party testing agency shall test the mock-up for air and water infiltration in accordance with ASTM E1186 (air leakage location), ASTM E783 (air leakage quantification) at a pressure difference of 75 Pa, and ASTM E1105 (water penetration). Use smoke tracer to locate sources of air leakage. If deficiencies are found, the air barrier Contractor shall reconstruct mock-up for retesting until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.
  - .1 Perform the air leakage test and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements.
- .5 Mock-Up Tests for Membrane Adhesion: Test mock-up for transition membrane adhesion in accordance with ASTM D4541 (modified), using a type II pull tester except that the membrane shall be cut through to separate the material attached to the disc from the surrounding material. Perform test after curing period recommended by the material manufacturer. Record mode of failure and area where the material failed in accordance with ASTM D4541. When the material

manufacturer has established a minimum adhesion level for the product on the substrate, the inspection report shall indicate whether this requirement has been met. Where the material manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.

1.7 Sequencing

- .1 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of three years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 Materials: as required to achieve specified performance criteria; meeting specified reference standards and functionally compatible with adjacent materials and components.
- .2 Air barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 Membranes

- .1 Self-adhered air barrier transition membrane shall SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, and having the following physical properties:
  - .1 Thickness: 1.0 mm minimum.
  - .2 Air leakage: <0.01 L/s.m<sup>2</sup> @ 75 Pa to ASTM E283
  - .3 Vapour permeance: 1.6 ng/Pa.m<sup>2</sup>.s to ASTM E96
  - .4 Low temperature flexibility: -30° C to CGSB 37-GP-56M
  - .5 Elongation: 200% to ASTM D412.
- .2 Acceptable Products:
  - .1 Blueskin SA by Henry Company.
  - .2 Perm-A-Barrier by W.R. Grace & Co.
  - .3 Air Shield by W.R. Meadows
  - .4 ExoAir 110 by Tremco
  - .5 Soprseal Stick 1100T by Soprema

2.3 Adhesive and Primers

- .1 As recommended by manufacturer.

2.4 Mastics & Termination Sealants

- .1 As recommended by manufacturer.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 General

- .1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 Examination

- .1 Examine all surfaces to ensure conformance to the manufacturer's recommended surface conditions.

3.4 Preparation

- .1 Prepare substrate surfaces in accordance with air barrier material manufacturer's instructions.
- .2 All surfaces which are to receive flexible air barrier must be smooth, clean, dry, frost-free and in sound condition. All moisture, frost, grease, oils, loose mortar, dust, or other foreign materials which may impede the adhesion of the air barrier must be removed.
- .3 New mortar must be cured 14 days and must be dry before air barrier membrane is applied.
- .4 Concrete must be cured 28 days and dry before air barrier membrane is applied.
- .5 Remove any and all sharp protrusions and repair any defects such as spalled or loose aggregate areas.
- .6 Do not proceed with air barrier application until all substrate defects are repaired.

3.5 Installation

- .1 Install air barrier materials continuously over substrate in accordance with manufacturer's instructions. Partial application is not acceptable, and the insulation specified elsewhere is not intended to perform as the sole air barrier.
- .2 Prime surfaces and apply membrane in strict accordance with manufacturer's printed directions.
- .3 Primed surfaces not covered by air barrier membrane during the same working day must be reprimed.

- .4 Apply membrane by heating the surface in contact with the substrate with a trigger-activated propane torch, type as recommended by the manufacturer.
- .5 Cut sheet membrane into manageable sizes, position membrane for alignment prior to removing protective film.
- .6 Install membrane horizontally, in a shingle fashion starting at lowest point. Position membrane and remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll the membrane surface and all laps with a counter top roller to ensure proper surface bond and effect the seal.
- .7 Tie-in to window frames, door frames, roofing systems, wall cladding, concrete walls, and at the interface of dissimilar materials as indicated or as necessary to achieve a continuous air seal throughout the building envelope. Seal with air barrier tape. Refer to manufacturer's standard details.
- .8 Ensure all projections are properly sealed with a trowel or caulk application of specified sealant.

### 3.6 Inspection and Repair

- .1 Inspect membrane thoroughly before covering and make any corrections to punctures, tears, voids and other obvious defects which would impede the membrane from performing as intended.
- .2 Notify Consultant when sections of work are complete so as to allow for review prior to installation of insulation. Remove, replace or repair materials not satisfactory to the Consultant and wait for re-inspection before covering work.

### 3.7 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.
- .3 Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the material manufacturer.
- .4 Clean adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 26 00 Vapour Retarders
- .4 Section 07 27 13 Modified Bituminous Sheet Air Barriers.
- .5 Section 07 24 33 Prefabricated EIFS Wall Panels
- .6 Section 07 52 00 Modified Bituminous Roofing
- .7 Section 07 62 00 Sheet Metal Flashing and Trim
- .8 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 The National Building Code of Canada.
- .2 ASTM International (ASTM)
  - .1 ASTM A653/A653M-18 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM A792/A792M-10 (2015) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .3 ASTM D1005-95 (2013) Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers.
- .3 CSA Group (CSA)
  - .1 CSA S136-07 Cold Formed Steel Structural Members
- .4 Canadian Sheet Steel Building Institute (CSSBI)
  - .1 CSSBI 20M-2008, Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.
  - .2 CSSBI B14-93, Steel Roofing and Siding Installation Guide.
  - .3 CSSBI-B15-1993, Snow, Wind and Earthquake Load Design Criteria for Steel Building Systems
  - .4 CSSBI B16-1994, Prefinished Sheet Steel for Building Construction.
- .5 Canadian Institute of Steel Construction (CISC)
  - .1 CISC Standard Code of Practice (2009).

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings including plans, elevations and details.
  - .1 All dimensions must be verified in the field prior to submittal of shop drawings.
  - .2 Show profile, size, lap dimensions and details, connections, attachments, anchorage, caulking, and closure details.
  - .3 Indicate details of complete wall assembly including sub-framing, exterior panel, flashing, trim and accessories.
  - .4 Shop drawings shall be stamped and signed by a registered Professional Engineer registered in the Province of Ontario.
- .3 Submit full range of manufacturer's colours.
- .4 Submit duplicate samples of each type of fastener proposed to be used.

- .5 Submit engineering design calculations for all materials and assemblies when requested by the Consultant.
- .6 Provide maintenance data for metal cladding for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00.

1.5 Design

- .1 Design metal cladding and assemblies to sustain all applied loads as required by the National Building Code of Canada.
- .2 Design metal cladding and fasteners for a positive wind load of 0.96 kPa and a negative wind load of 0.56 kPa and a maximum deflection of 1/180 of the span at maximum load.
- .3 Spacing of sub-framing system shall be not greater than 1200 mm centres.
- .4 Stress shall not exceed 144 MPA for Grade A steel.
- .5 Design shall be performed by a professional Engineer licensed to practice in Ontario.

1.6 Pre-Installation Conference

- .1 Arrange a pre-installation conference to review with all affected trades, requirements for metal wall systems installation.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.9 Warranty

- .1 Submit manufacturer's warrantee that pre finished materials will not lose chip, crack or lose film integrity for 40 years and will not chalk or fade for 30 years following date of Substantial Performance.

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet Metal: To ASTM A635M-09b and CSA136-07, galvanized sheet steel, commercial quality with a minimum yield stress of 230 MPA, and a working stress of 144 MPA. Material shall have Z275 designation zinc coating unless noted otherwise.
- .2 Metal Cladding: Exterior Wall Panel:
  - .1 Vicwest AD300-R. 300 mm x 38 mm deep.
  - .2 C.N.T. 0.76 mm.
  - .3 Zinc Coating Designation Z275.



- .3 Metal Cladding: Roof Screens:
  - .1 Vicwest Channel Wall CL508
  - .2 C.N.T. 0.76 mm.
  - .3 Zinc Coating Designation Z275.
  
- .4 Z Bars and Sub-framing Systems:
  - .1 Zinc coated steel minimum 1.22 mm base steel thickness.
  - .2 Depth as indicated or required by engineering design.
  
- .5 Flashings and Trim:
  - .1 Flat Sheet.
  - .2 Minimum C.N.T. 0.48 mm (26 gauge).
  - .3 Zinc coating designation of Z275.
  - .4 Colour to match cladding colour.

## 2.2 Finishes

- .1 Prefinished material shall be colour coated with manufacturer's standard finish system equivalent to Valspar WeatherXL coating system, utilizing silicone modified polyester resin, minimum dry film thickness of 1.0 ± 0.1 mils when tested to ASTM D1005.
  
- .2 Cladding Colour shall be WeatherXL Charcoal, WXA0097L

## 2.3 Fasteners

- .1 Fasteners: Panel fastened with exposed self-tapping "confas" or Tapcon screws, prefinished nylon hat to match colour of cladding. Interior sheets and sub-girts fastened with type "AB" hex head cadmium plated high carbon steel, self-tapping sheet metal screws.

## 2.4 Accessories

- .1 Closures: Unifoam PVC closures to profile of cladding.

## 2.5 Sealants

- .1 Sealants: Refer to Section 07 92 00 - Joint Sealants.

## 2.6 Fabrication

- .1 Fabricate all metal flashing, starter strips, closures, and trim as required for complete installation of wall cladding. Hem all exposed edges minimum 13 mm for appearance and stiffness. Mitre and seal corners with sealant.
  
- .2 Fabricate flashings and trim to suit existing material profile and configuration.

## PART 3 EXECUTION

### 3.1 Examination

- .1 Examine building frame and substrate, take field measurements and examine other work which may affect this work.

- .2 Check the accuracy and alignment of the building substrate. If not within tolerances set forth in the CISC Standard Code of Practice, the matter shall be brought to the attention of the Consultant before proceeding with erection of the metal cladding.
- .3 Ensure that all air barrier membranes and air seals are in place and have been accepted by the Consultant.
- .4 Do not proceed with cladding installation until work which will be concealed has been inspected and approved.
- .5 Commencement of work implies acceptance of existing conditions.

### 3.2 Installation

- .1 Erection shall be carried out by the manufacturer's trained erection crews or their approved erector, in accordance with the manufacturer's specifications.
- .2 Install all flashings and seal to provide a weather-tight structure.
- .3 Fasteners or method of attachment shall withstand all loads of wind or of suction as may be imposed on the metal cladding. Exposed fasteners shall have pre-coated or nylon coated heads to match colour of the metal wall cladding.
- .4 Installation shall be in accordance with the reviewed shop drawings, the manufacturer's printed instructions and the referenced standards.
- .5 Install sub-framing, girts, trim, flashings, insulation and metal cladding as indicated. Coordinate installation of wall insulation with Section 07 21 13.
- .6 Fasten sub-framing to backup with self-tapping screws or masonry anchors of sufficient length to penetrate a minimum of 19 mm into the structure. Locate sub framing at maximum 1200 mm centres but not more than required to support applied wind loads.
- .7 Fasten cladding to support framing at roof screens in accordance with reviewed shop drawings.
- .8 Apply a continuous bead of caulking on faces of all supports and at top, bottom and ends of cladding to provide a complete seal.
- .9 On lapped joints, caulk continuously between laps to provide a complete water seal.
- .10 Bed all flashings, closures and corner pieces in sealant to provide a weather tight installation.
- .11 Caulk all openings, joints and around perimeter to provide a weathertight installation.
- .12 Complete all air seals between metal cladding and other systems or materials as detailed. Air barrier membranes are specified under Section 07 27 13.
- .13 Provide expansion joints required by shop drawings complete with metal closures, flashings, trim and caulking, to provide a weather tight installation.
- .14 Provide all matching trim, fasteners and accessories to make building weathertight.

- .15 There shall be no apparent difference between face sheets of same colour when viewed from a minimum distance of 15 metres. Remove and replace off-colour sheets as directed by the Consultant.

### 3.3 Touch Up

- .1 Repair and touch up with colour matching high grade enamel minor surface damage, only where permitted by the Consultant and only where appearance after touch-up is acceptable to Consultant.
- .2 Replace damaged panels and components that, in opinion of the Consultant, cannot be satisfactorily repaired.

### 3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean all exposed panel surfaces in accordance with manufacturer's instructions.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .3 Section 07 62 00 Sheet Metal Flashing and Trim
- .4 Section 07 71 00 Roof Specialties and Accessories
- .5 Section 07 76 16 Roof Decking Pavers
- .6 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C209-15 Standard Test Methods for Cellulosic Fiber Insulating Board
  - .2 ASTM C518-17 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - .3 ASTM C726-17 Standard Specification for Mineral Wool Roof Insulation Board
  - .4 ASTM C1289-15 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
  - .5 ASTM C1396/C1396M-14a Standard Specification for Gypsum Board
  - .6 ASTM D312/D312M-15 Standard Specification for Asphalt Used in Roofing
  - .7 ASTM D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
  - .8 ASTM D5147/D5147M-14 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
  - .9 ASTM D6162/D6162M-00A(2015)e1 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
  - .10 ASTM D6163/D6163M-00(2015) e1 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
  - .11 ASTM E96/E96M-16 Standard Test Methods for Water Vapor Transmission of Materials
  - .12 ASTM E108-11 Standard Test Methods for Fire Tests of Roof Coverings
- .2 CSA Group (CSA)
  - .1 CSA A123.3-05 (R2015), Asphalt Saturated Organic Roofing Felt.
  - .2 CSA A123.4-04 (R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S704-11 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
  - .2 CAN/ULC-S102-10 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .3 CAN/ULC-S107-10 Methods of Fire Tests of Roof Coverings
- .4 Canadian General Services Board (CGSB)
  - .1 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
  - .2 CGSB 37-GP-9Ma, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.

- .3 CGSB 37-GP-15M, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
- .4 CGSB 37-GP-19M, Cement, Plastic, Cutback Tar.
- .5 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound.
- .6 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .7 CAN/CGSB 51.33-M, Vapour Barrier, Sheet, Excluding Polyethylene, for Use in Building Construction.
- .5 Canadian Roofing Contractors Association (CRCA) Metric Specification Manual.

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Provide manufacturer's specification data sheets for each product.
- .3 Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- .4 Provide a sample of each insulation type.
- .5 Shop Drawings
  - .1 Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
- .6 Certification
  - .1 Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
  - .2 Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

#### 1.5 Quality Assurance

- .1 The roofing Contractor shall be of recognized standing with a proven record of satisfactory installations and shall be a member in good standing of the Canadian Roofing Contractors Association and shall be acceptable to the roofing product manufacturer.
- .2 All roofing work shall be carried out by applicators fully experienced in this type of work.
- .3 Roofing shall be executed under the full time supervision of a competent foreman.
- .4 Hold a pre-installation meeting prior to start of roofing works, with the Consultant, the Owner, the General Contractor, the independent inspection and testing agency inspector and the manufacturers roofing inspector. The purpose of this meeting is to review particular installation conditions. Prepare and distribute a report for this meeting.
- .5 Fire Classification:
  - .1 Manufacturer's Certificate: Certify that roof coverings furnished are approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in

accordance with ASTM E108 for external fire and meet local or nationally recognized building codes.

1.6 Manufacturer's Design Responsibility

- .1 Provide total roofing assembly confirmation of conformity to "ULC Class A" design criteria. Confirmation to include project specific Uniform Wind Uplift Load Capacity (required for each roof section). Installed roof system shall withstand negative (uplift) design wind loading pressures complying with site specific conditions and all local buildings codes. It is the responsibility of the manufacturer to provide the contractor with a detailed report endorsing the attachment methods proposed.
- .2 The roofing contractor must receive written authorization from the roofing inspector to proceed.

1.7 Manufacturer's Inspections

- .1 Report progress and quality of the work as observed. Progress reports must be published and distributed to all project stakeholders weekly.
- .2 Provide periodic (minimum of 3 days per week) roofing installation inspections: Inspections must include; photographic documentation of work in-progress and written statements of compliance with details/shop drawings. Full time inspector for manufacturer on site 1 out of every 2 days that roof is being installed.
- .3 Report to the Consultant in writing any failure or refusal of the contractor to correct unacceptable practices called to the contractor's attention.
- .4 Prior to commencement of roof membrane application, the manufacturer's roofing inspector shall review the installation of the insulation substrate including all tapered insulation to confirm that the finished roof system will have no flat or negatively sloped areas which will affect the performance of the roof or will adversely impact or void the roofing warranty.
- .5 Confirm after project completion that the manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Provide and maintain adequate facilities or access to facilities to take receipt of and store roofing materials so that the materials are ready to be built in.
- .4 Deliver and store materials undamaged in original unopened containers with manufacturer's label and seals intact. Containers shall be stored upright, and roofing membrane shall be stored on end to prevent flattening. All materials shall be protected from moisture at all times. No material shall be placed in direct contact with the earth.
- .5 Store adhesives and emulsion-based waterproofing mastics at a minimum +5°C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.

- .6 All materials must be stored in a dry area and protected from water and direct sunlight. Damaged materials shall be replaced at roofing Contractor's expense.
- .7 Storage of insulation and roofing materials on the roof is prohibited.
- .8 Do not store adhesive containers with opened lids due to the loss of solvent which will occur from flash off.

1.9 Protection

- .1 Provide adequate protection of materials and work of this trade from damage by weather, traffic and other causes. Schedule roofing installations in such a manner that traffic over the completed portions of roofing will be avoided. At the end of each day's work seal exposed edges of roofing membrane. Protect work of other trades from damage resulting from the work of this trade. Make good such damage at no additional expense to the Owner and to the satisfaction of the Consultant.

1.10 Environmental Requirements

- .1 Apply roofing in periods only approved by the roofing inspector.
- .2 Concrete must be cured for a minimum of 90 days prior to commencement of roofing.

1.11 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.12 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.
- .2 Defects to include but not be restricted to leaking, failure to stay in place, undue expansion, lifting, deformation, loosening and splitting of seams, joint deformation, failure to adhere, deterioration, blisters, etc.
- .3 Manufacturer's Extended Warranty: Provide manufacturers extended twenty (20) year warrantee to cover repair or replacement costs for Labour, Materials and Workmanship required to restore roof or system to watertight condition, after a leak has occurred, due to defective materials or system related failures. Warranty shall be Non Pro Rated and must be covered to the original installation cost for the full twenty (20) years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Roofing products and systems manufactured or supplied by the following only will be acceptable subject to approval by the Consultant of all technical data, warranty information, materials and assemblies:
  - .1 Firestone
  - .2 Garland
  - .3 Henry Company

.4 Tremco

- .2 Compatibility between roofing system components is essential. All materials used on the roof shall be endorsed for compatibility by the applicator and the materials manufacturer.
- .3 All packed materials shall bear the manufacturer's name brand, weight and applicable specification number and printed instructions for storage and application. Materials not identified shall be removed off the site.

## 2.2 Systems

- .1 Provide Modified SBS Bituminous roof systems as indicated complete with all materials and accessories required for a complete installation.
- .2 All roof areas shall have a minimum slope of 2% to drains. Provide tapered insulation where indicated and where required to provide the necessary slope. Flat roof areas or negatively sloped areas which retain standing water are not permitted.

## 2.3 Materials

- .1 Gypsum Board Substrate: To ASTM C1396/C1396M, Type M/R with water resistant core, 12.7 mm thick.
- .2 Vapour Retardant:
  - .1 Self-adhered vapour barrier membrane consisting of an SBS rubberized asphalt compound integrally laminated to a cross-laminated polyethylene film. Minimum 0.8 mm thickness.
  - .2 Primer: as recommended by the vapour retardant manufacturer and suitable for the specified substrates.
  - .3 Adhesive: as recommended by the vapour retardant manufacturer and suitable for the specified substrates.
  - .4 Product: Blueskin Vapor Bloc SA self-adhesive vapour barrier membrane by Henry Co. or equivalent.
- .3 Base Layer Polyisocyanurate Insulation: to ASTM C1289 and CAN/ULC-S704-11 Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
  - .1 Thickness: 100 mm
  - .2 R-Value: 23.6
  - .3 1220 x 2440 mm boards.
  - .4 Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1.
- .4 Fasteners: Corrosion resistant screw and plate fastener as recommended by roof membrane manufacturer.
  - .1 Factory Mutual Tested and Approved with 76 mm coated disc for I-90 rating, length required to penetrate metal deck 25 mm.
- .5 Top Layer Mineral Wool Insulation: to ASTM C726 and CAN/ULC S102 and S107 high density bitumen coated stone wool insulation board.
  - .1 Top layer rigid stone wool insulation boards shall meet the following performance criteria:
    - .1 Board thickness: 100 mm
    - .2 1219 x 1219 boards.
    - .3 Thermal resistance to ASTM C518:



- .1 R 3.8 hr.ft<sup>2</sup>.F/Btu / RSI 0.68 m<sup>2</sup>K/W at 25 °C.
- .2 R 4.3 hr.ft<sup>2</sup>.F/Btu / RSI 0.72 m<sup>2</sup>K/W at - 4 °C.
- .3 R 3.6 hr.ft<sup>2</sup>.F/Btu / RSI 0.64 m<sup>2</sup>K/W at 43 °C.
- .4 Non-combustible in accordance with CAN/ULC S114 Standard Method of Test for Determination of Non-Combustibility in Building Materials, 1-NCC (non-combustible core) rated roof insulation in accordance with FM Approval 4450/4470,
- .5 Water absorption of less than 1.0 % in accordance with ASTM C209,
- .6 Recycled content: 40 % minimum,
- .7 Hail damage resistance: Class 1-SH in accordance with FM 4470,
- .8 Impact resistance: Class 4 in accordance with FM 4473, and UL 2218.
- .2 Toprock DD Plus, Rockwool, Soprarock DD Plus or equivalent.
  
- .6 Tapered Insulation: Stone wool insulation, compatible with roofing system and as recommended by roof insulation manufacturer, slope as indicated on the drawings but not less than 2%, starting thickness of 0 mm, factory tapered and coated.
  
- .7 Protection Board: 13 mm thick high density fibreboard. Board size 1220 mm x 1524 mm.
  
- .8 Asphalt: ASTM D312, Type III Steep Asphalt.
  
- .9 Fiber Cant and Tapered Edge Strips: torchable, performed rigid insulation units of sizes/shapes indicated. Match insulation board. Bitumen coated.
  
- .10 SBS Modified Bitumen Base Sheet: 110 mil thickness modified bitumen membrane with dual fiberglass reinforcement sandwiched between SBS rubber in a high penetrating index asphalt mixture, minimum tensile strength 17.5 kN/m, minimum tear strength 2200 N, and low temperature flexibility -40C.
  
- .11 SBS Modified Bitumen Cap Sheet: 170 mil thickness modified bitumen membrane sheet consisting of two laminated layers of polyester and fiberglass scrim reinforcement sandwiched by SBS in a high penetration index asphalt mixture, minimum 150 kN/m, minimum tear strength 7000 N, and low temperature flexibility -40C.
  
- .12 SBS Modified Bitumen Base Flashing: 110 mil thickness modified bitumen membrane with dual fiberglass reinforcement sandwiched between SBS rubber in a high penetrating index asphalt mixture, minimum tensile strength 17.5 kN/m, minimum tear strength 2200 N, and low temperature flexibility -40C.
  
- .13 SBS Modified Bitumen Cap Flashing: 195 mil thickness modified bitumen membrane reinforced with a high strength polyester/fiberglass reinforced scrim, minimum tensile strength 50 kN/m, minimum tear strength 2200 N, and low temperature flexibility -40C.
  
- .14 Mastics: Asphalt mastic conforming ASTM D312.
  
- .15 Bituminous Materials:
  - .1 Asphalt Primer: Unfilled asphalt conforming to CGSB 37-GP-9Ma.
  - .2 Cutback Asphalt Plastic Cement: Fibrated cut back type plastic asphalt compound.
  - .3 Rubberized Asphalt Sealing Compound.
  - .4 Bituminous Paint: To CGSB 1-GP-108M.
  
- .16 Pitch Pockets: Lexsuco Spun Aluminum Mastic Pans.

- .17 Pourable Sealer: 2 part polyurethane sealer intended for use by the manufacturer to seal pitch pans and other penetrations.
- .18 Stack jacks (vent pipe flashings): Lexsuco or Thaler standard mill finish aluminum insulated vent stack covers applicable at all plumbing vent pipes. Rubber sleeves and sleeves supplied by other trades will not be acceptable.
- .19 Roof Drains: As specified on mechanical drawings.
- .20 Overflow Scuppers: As specified in Section 07 62 00.
- .21 Rain Collars and Clamps: Fabricated from same material as exhaust stacks, with continuously soldered seams and extending a minimum of 50 mm down face of sleeve. Allow 6 mm gap all around between rain collar and sleeve or pitch pockets. Clamps to be fabricated from same material as collar.

### PART 3 EXECUTION

#### 3.1 Manufacturer's Instructions

- .1 Perform all work in accordance with membrane manufacturer's material installation printed instructions for specified system installation and as specified herein.

#### 3.2 Examination

- .1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to installation.
- .2 Verify roof penetrations and drains are present in quantity required. Verify roof drains are securely clamped in place.
- .3 Verify wood blocking is securely anchored to deck and nailers match thickness of anticipated roof insulation.
- .4 Examine substrate for compliance of conditions that affect installation and performance of roof system.
- .5 Concrete must be cured for a minimum of 90 days prior to commencement of roofing.

#### 3.3 Workmanship

- .1 Workmanship shall be of the highest quality. Use only competent mechanics and execute work in accordance with drawings and specifications.
- .2 Regard the manufacturer's printed recommendations and specifications as the minimum requirement for materials, methods and workmanship not otherwise specified.
- .3 Maintain roofing equipment in good working order.
- .4 Unsuitable or damaged materials shall immediately be removed from the site.
- .5 Materials shall not be applied during inclement weather. Do not apply roofing over wet decks, or where frost or snow is present.

- .6 Install roofing elements on clean, dry surfaces.
- .7 Use torch types recommended by roof membrane manufacturer.

### 3.4 Substrate Board (Metal Deck)

- .1 Install gypsum board substrate over metal deck using VOC compliant adhesive as recommended by manufacturer. Tightly brace all joints,

### 3.5 Vapour Retarder

- .1 Vapour retardant membrane shall be adhered directly to clean roofing decks.
- .2 Prime concrete and gypsum board substrates in accordance with manufacturers recommendations.
- .3 Apply in straight lines, free from wrinkles, tears or open laps.
- .4 Lap vapour retardant membrane 50 mm on both side and end laps. Position membrane for alignment with protective film in place. Roll back, remove protective film and press firmly in place. When membrane is entirely in place, apply firm pressure over entire surface in contact with substrate to ensure full contact. Orient laps shingle fashion to shed water.
- .5 Seal end laps according to manufacturer's instructions.
- .6 At perimeters, vertical walls and curbs, etc. apply a 300 mm wide strip of vapour retardant and seal to air barrier membrane.
- .7 No more vapour retardant shall be applied in any one working day than can be covered with insulation and properly "dried in".
- .8 Vapour retardant shall not be installed to bridge across expansion joints or similar devices.

### 3.6 Insulation

- .1 Keep insulation dry at all times. Insulation showing evidence of having been dampened since its manufacture or separation of laminations shall not be used. Lay insulation panels with all joints staggered. Insulation shall be laid with the longest side parallel to the flutes unless the manufacturer stipulates otherwise. Lay board in tight contact to prevent gaps and resulting loss of thermal insulation value. Cut boards to fit neatly around projections through roof.
- .2 Attachment of Base Layer Insulation with Mechanical Fasteners (Metal Deck):
  - .1 Base layer of insulation board shall be fully attached to the metal deck with an approved mechanical fastening system. As a minimum, the amount and spacing of fasteners shall be in accordance with manufacturer's recommendation and reviewed shop drawings and meeting FM I-90 classification. Placement of any fastener from edge of insulation board shall be a minimum of 76 mm, and a maximum of 152 mm.
  - .2 Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than 0.4 m<sup>2</sup>.
  - .3 Minimum penetration into deck shall be as recommended by the fastener manufacturer but not less than 25mm.

- .4 Install top layer insulation over base layer in full mopping of hot asphalt in accordance with manufacturer's instructions. Fit boards tight. Stagger joints.
  - .3 Attachment of Base Layer with Adhesive (Concrete Deck):
    - .1 Install insulation to vapour retarder in full mopping of hot asphalt in accordance with manufacturer's instructions.
    - .2 Install top layer insulation over base layer in full mopping of hot asphalt in accordance with manufacturer's instructions. Fit boards tight. Stagger joints.
  - .4 At roof drains and scupper drains, reduce the insulation thickness by 26 mm for 600 mm from the centre of the drain.
  - .5 Protect all exposed edges of insulation where roofing temporarily terminates at the end of a working day by forming a water cut off. Water cut off shall extend from the surface of the roof membrane minimum 200 mm onto the deck. Ensure water cut off is continuously secured to the deck and is removed prior to proceeding with work the following day.
  - .6 Install tapered insulation in a full mopping of hot asphalt where indicated and where required and in accordance with the reviewed shop drawings. The entire roof areas shall have not less than a 2% slope in any location.
  - .7 Insulation shall not be installed to bridge across control joints.
- 3.7 Cant Strip
- .1 Install cant strip at junction with vertical surfaces in accordance with manufacturer's instructions.
- 3.8 Protection Board
- .1 Offset and stagger coverboard joints with insulation joints.
  - .2 Install protection board in a full mopping of hot asphalt. Use a 34 kg roller to press the coverboard for full and continuous contact to insulation.
  - .3 At drains ensure sump depth is kept to a minimum of 13 mm below finished roof surface.
- 3.9 Base Sheet
- .1 Base sheet membrane must be unrolled on dry substrate for alignment.
  - .2 Unroll base sheet onto the substrate and allow to relax before re-rolling. Base sheet is to be applied to properly prepared substrate at a rate of no less than 25 lbs. of type III asphalt per 100 square feet. The roll is to push a puddle of asphalt ensuring that there is adequate "asphalt bleed-out" at all side and end laps.
  - .3 Base sheet shall have side laps of 90 mm and end laps of 150 mm.
  - .4 Ensure the membrane is properly adhered, without air pockets, wrinkles, fishmouths, or tears.
  - .5 Base sheet is to extend to the top of the cant at all vertical to horizontal transitions.

3.10 Canopy Roofs (Unheated Below)

- .1 Prime concrete deck with asphalt primer at a rate of 1.9 kg per 9 m<sup>2</sup>.
- .2 Install one layer of SBS Torch Base Sheet to primed concrete deck. Shingle in proper direction to shed water. Using a roofing torch, heat surface of the coiled portion until the burn-off backer melts away. Base sheet shall have side laps of 90 mm and end laps of 150 mm.
- .3 Install one layer of SBS Torch Cap Sheet over SBS Torch Base Sheet. Commence installation from the low point of the roof, heat surface of the coiled portion until the burn-off backer melts away, at this point the material is hot enough to lay into the base membrane fully adhering entire roll. Base sheet shall have side laps of 90 mm and end laps of 150 mm.

3.11 Base Sheet Stripping (Flashing)

- .1 Primer coating must be dry before application of the base sheet stripping.
- .2 Base sheet stripping to be laid in strips one metre wide to the vertical surfaces, extending on to the flat surface of the roof a minimum of 155 mm. Side laps to be 90 mm and staggered a minimum of 200 mm with the laps of the base sheet.
- .3 Base sheet stripping to be torch-welded directly on its support from bottom to top. Torch-welding must soften the underside of the base sheet without overheating, resulting in a uniform adhesion over the entire surface. When allowed by the support, the base sheet top edge must be nailed on 300 mm centres.

3.12 Cap Sheet

- .1 Following application of base sheet and stripping, inspect for defects before installing cap sheet.
- .2 Cap sheet membrane shall be unrolled and allowed to relax. Commence installation from the low point of the roof. Care must be taken to ensure alignment of the first roll (parallel with the edge of the roof).
- .3 Cap sheet shall be fully adhered using type III asphalt on to the base sheet membrane at a rate of no less than 11.3 kg of asphalt per 9 m<sup>2</sup>. The roll is to push a puddle of asphalt ensuring that there is adequate "asphalt bleed-out" at all side and end laps.
- .4 Base sheet and cap sheet seams shall be offset a minimum of 300 mm.
- .5 Cap sheet must have side laps of 90 mm and end laps 150 mm.
- .6 After installation of the cap sheet, inspect all lap seams on the cap sheet for full adhesion and evidence of bleed out.
- .7 Cap sheet is to extend to the top of the cant at all vertical to horizontal transitions.

3.13 Cap Sheet Stripping (Flashing)

- .1 Cap sheet stripping to be laid in strips one metre wide. Side laps to be 90 mm and to be staggered a minimum of 200 mm from cap sheet laps.

- .2 Using a chalk line, lay out a straight line on the cap sheet surface, parallel to roof edge, 150 mm inside the roof from the base of the cant strip.
- .3 Using a torch and round-nosed roofing trowel, embed the surface granules into the heated and soft bitumen, from the chalk line to the edge of the cap sheet.
- .4 Cap sheet stripping shall be torch-welded directly on its base sheet, proceeding from bottom to top. Torching shall soften the two membranes to ensure a uniform weld.
- .5 Cap sheet stripping shall be applied to extend down the outside face of exterior edge, across top of parapet, down interior vertical surface and on to flat roof a distance of 230 mm, to the extent of area of embedded granules. Cut roll into required lengths and use width of roll down length of roof, maintaining specified 90 mm side laps.

#### 3.14 End Laps

- .1 Only pre-finished end laps will be accepted.

#### 3.15 Metal Flashing

- .1 Metal flashings shall be completed in accordance with Section 07 62 00.

#### 3.16 Roof Drains

- .1 Flash in drain flange with three plies of glass felt in Type II asphalt. Extend first ply a minimum of 300 mm beyond the edge of the flange and each succeeding ply 150 mm beyond underlying ply.
- .2 Install clamping ring and aluminum strainer over raised bosses and install screws to tighten ring against membrane flashing until secure.

#### 3.17 Mechanical and Electrical Equipment

- .1 All electrical conduits and gas lines must be sufficiently supported as directed by the Consultant. Use treated wood blocking supported on concrete pavers resting on PVC pedestals.
- .2 Install rain collars complete with clamping rings over all pitch pockets and stacks where vandal proof caps cannot be installed.
- .3 Provide purpose made stack jack flashings at all plumbing vents.
- .4 Seal flashing sleeves in accordance with manufacturer's directions and CRCA standard details.

#### 3.18 Testing and Inspection

- .1 Inspect completed membrane and flashings for punctures, tears and discontinuous seams. Apply additional layer of membrane over punctures and tears, extending minimum 50 mm beyond damaged area in all directions.
- .2 Independent Inspection and testing shall be performed as specified under Section 01 45 00 – Quality Control and shall be paid from the Cash Allowances. Provide necessary facilities and cooperate with designated inspection and testing agency.

3.19 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 24 33 Prefabricated EIFS Wall Panels
- .3 Section 07 52 00 Modified Bituminous Roofing
- .4 Section 07 71 00 Roof Specialties and Accessories
- .5 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A653/A653M-18 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM D523-14 (2018) Standard Test Method for Specular Gloss
- .2 CSA Group (CSA)
  - .1 CSA B111 Wire Nails, Spikes and Staples.
  - .2 CSA 136-16 North American Specification for the Design of Cold-Formed Steel Structural Members
- .3 Canadian General Services Board (CGSB)
  - .1 CAN/CGSB 1.108-M Bituminous Solvent Type Paint.
  - .2 CAN/CGSB-37.5 Cutback Asphalt Plastic Cement.
  - .3 CAN/CGSB-51.32 Sheathing, Membrane, Breather Type.
- .4 Canadian Sheet Steel Building Institute (CSSBI)
  - .1 CSSBI - Standard Practice for Sheet Steel Cladding.
  - .2 CSSBI 20M-91 Sheet Steel Cladding for Architectural and Industrial Applications.
  - .3 CSSBI B16-94 Prefinished Sheet Steel for Building Construction.
- .5 Canadian Roofing Contractors Association (CRCA) Roofing Specifications Manual.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate 300 x 300 mm samples of each type of sheet metal material, colour and finish when requested by the Consultant.

### 1.5 Design and Performance Requirements

- .1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.
- .2 Effects of Wind: resist positive and negative wind pressures without detrimental effects.
- .3 Water Control: prevent passage of water.
- .4 Thermal Movement: accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.



- .5 Compatibility: components shall be compatible with dissimilar metals and materials with which they are in contact or fastened to so as to prevent corrosion, staining and other detrimental effects. If required, treat or separate contact surfaces with inert and non-staining insulation material to achieve compatibility.

1.6 Quality Assurance

- .1 Work of this Section shall be performed by a qualified sheet metal contractor with a minimum of 5 years of experience in the type of work required and specified. Submit proof of experience where requested by the Consultant.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Materials shall be handled and stored on the job in such a manner that no damage shall be done to the material or the structures.
- .3 Materials showing evidence of improper handling and storage shall be rejected and removed from the site at no additional expense to the Owner.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.9 Warranty

- .1 Submit manufacturer's warrantee that pre-finished materials will not lose film integrity for 25 years and will not chalk or fade for 20 years following date of Substantial Performance.

PART 2 PRODUCTS

2.1 General

- .1 Ensure compatibility of all materials in contact with roof membrane.

2.2 Materials

- .1 Sheet Metal: 0.48 mm thick galvanized sheet steel, commercial quality to ASTM A653 Grade 'A' with a minimum yield stress of 230 MPA, and a working stress of 144 MPA, to CSA S136. Material shall have Z275 designation zinc coating.
- .2 Prefinished material shall be colour coated with manufacturer's standard finish system equivalent to Valspar WeatherXL coating system, utilizing silicone modified polyester resin, minimum dry film thickness of  $1.0 \pm 0.1$  mils when tested to ASTM D1005.
  - .1 Colour for all sheet metal flashing and trim shall be as selected by the Consultant from full range of manufacturer's standard colours.
- .3 Continuous hook on strips and metal bellows: 0.65 mm galvanized sheet steel, zinc coating designation ZF275.
- .4 Isolation Coating: Alkali resistant exterior bituminous paint to CAN/CGSB 1.108-M.
- .5 Plastic Cement: To CAN/CGSB 37.5.

- .6 Nails, Bolts, Screws and Other Fastenings: same metal finish as sheet metal being used to CSA B111. The size of fastenings shall suit the applicable conditions.
- .7 Underlay: No. 15 perforated asphalt felt to CSA A123.3-M or dry sheathing, breather type, to CAN/CGSB-51.32
- .8 Cleats: Of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

### PART 3 EXECUTION

#### 3.1 General

- .1 Install sheet metal work in accordance with CRCA specifications and as detailed.
- .2 Use concealed fastenings except where approved before installation.

#### 3.2 Fabrication

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA specifications and as indicated.
- .2 Form pieces in 2440 mm maximum lengths.
- .3 Hem exposed edges on underside 13 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 (two coats) to metal surfaces to be in contact with concrete or mortar or dissimilar metals.
- .6 Install underlay under sheet metal in accordance with CRCA "FL" series details. Lap joints 100 mm.
- .7 All seams shall be of the "slip lock type" that permit adequate movement without resulting in deformation or loosening of metal flashings. Lapped joints or exposed raw edges will not be accepted. Exposed edges shall be "double back" at least 13 mm. At eaves and parapets, metal shall be hooked over continuous starter strips minimum 1 gauge thicker than the metal used for flashing. Secure starter strips at 300 mm on centre or closer as required.
- .8 Where metal terminates under fascia boards, secure metal at 610 mm centres using specified fasteners. At curbs to openings or at sleepers, provide locked or standing seams at corners. Solder mitred corners, pop rivet or form standing seams.
- .9 All flashings shall be installed in straight lines. Irregular or badly fitted work will not be accepted. Exposed fastenings will only be permitted where concealed fastening is not possible. Provide neoprene washers for exposed fasteners.
- .10 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.
- .11 Fabricate and install scuppers as detailed and in accordance with CRCA specifications and standards.

3.3 Caulking of Flashings

- .1 Sealants shall be as specified in Section 07 92 00 - Joint Sealants.
- .2 Caulk all joints in flashing.
- .3 Dissimilar metals in contact, or metals in contact with adjacent surfaces shall be separated from one another to prevent corrosion, staining, or electrolysis by use of approved methods and materials.
- .4 Do caulking between metal flashing and concrete.
- .5 Caulking compound shall be applied in strict accordance with the manufacturer's application instructions. Use proper surface primers where necessary.
- .6 Colour of caulking compound shall be the integral colour of the abutting material.

3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 52 00 Modified Bituminous Roofing
- .3 Section 07 62 00 Sheet Metal Flashing and Trim
- .4 Section 07 76 16 Roof Decking Pavers
- .5 Section 07 92 00 Joint Sealants

### 1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings and manufacturers literature:
  - .1 Indicate size and description of components and materials, arrangement of hardware, operating mechanism, required clearances, fasteners, anchoring, and finishes.

### 1.4 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

### 1.5 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

## PART 2 PRODUCTS

### 2.1 Roof Access Hatch

- .1 Basis-of-Design Manufacturer: The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.bilco.com.
- .2 Metal Roof Hatch Bilco Type E-50TB, 914mm x 762mm. Single leaf, pre-assembled from the manufacturer.
- .3 Performance characteristics:
  - .1 Curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
  - .2 Cover shall be reinforced to support a minimum live load of 195kg/m<sup>2</sup> with a maximum deflection of 1/150th of the span or 97kg/m<sup>2</sup> wind uplift.
  - .3 Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
  - .4 Operation of the cover shall not be affected by temperature.
  - .5 Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- .4 Cover: Aluminum extrusion with built in drainage channel and polycarbonate dome. Cover shall

have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

- .5 Curb: Shall be 305mm in height and of 2.3mm aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 140mm flange with 11mm holes provided for securing to the roof deck. The curb shall be equipped with an integral metal cap flashing of the same gauge and material as the curb, fully welded at the corners, including stamped tabs, 153mm on center, to be bent inward to hold single ply roofing membrane securely in place.
- .6 Curb insulation: Shall be 75mm thick polyisocyanurate with an R-value = 20.3 (U=0.279 W/m<sup>2</sup>K).
- .7 Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
- .8 Hardware
  - .1 Heavy stainless steel pintle hinges.
  - .2 Cover shall be equipped with a spring latch with interior and exterior turn handles
  - .3 Interior and exterior padlock hasps.
  - .4 The latch strike shall be a stamped component bolted to the curb assembly.
  - .5 Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 25mm diameter red vinyl grip handle to permit easy release for closing.
  - .6 Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
  - .7 Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- .9 Provide roof hatch with 35 mm diameter safety bar coated with 20 mil. PVC colour coated roof safety green. Safety bar shall be mounted so as to not impede operation of door.
- .10 Finishes: Factory finish shall be mill finish aluminum.

### PART 3 EXECUTION

#### 3.1 Roof Hatch

- .1 Install in accordance with manufacturers printed instructions.
- .2 Secure hatches to curbs with bolts to meet the manufacturer's specifications.
- .3 Shim and level all curbs to suit roof slopes.
- .4 Erect hatch level and plumb and in proper alignment.
- .5 Ensure continuity of building envelope air barrier and vapour retarder systems.
- .6 Adjust and seal assembly with provision for expansion and contraction of components.
- .7 Install telescoping safety post, securely anchored to curb with tamper proof screws or bolts and according to manufacturer's instructions.

3.2 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 50 00 Modified Bituminous Roofing
- .2 Section 07 71 00 Roof Specialties and Accessories

### 1.3 References

- .1 CSA Group (CSA)
  - .1 CSA A231.1-14/A231.2-14 (R2018) Precast Concrete Paving Slabs/Precast Concrete Pavers

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Samples: Four pedestal samples.
- .3 Laboratory test reports certifying compliance of the paving slabs with CSA A231.1-14.
- .4 Manufacturer's catalog literature for the safe handling of the specified materials and products.

### 1.5 Quality Assurance

- .1 Provide paving slabs that are free of cracks, seams, and defects impairing appearance, structural integrity or function.

### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Delivery: Deliver materials to project site in manufacturer's original, unopened, undamaged packaging with identification labels intact.
  - .1 Deliver concrete paving slabs to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
  - .2 Unload slabs at job site in such a manner that no damage occurs to the product.
- .4 Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials.

### 1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

## PART 2 PRODUCTS

### 2.1 Manufacturer

- .1 Supplied by: Brooklin Concrete Products
- .2 Precast concrete paving stones to CSA A231.1-14/A231.2-14:
  - .1 Fabricated for exterior use with textured non-slip finish.
  - .2 460 x 460 x 50 mm thick.
  - .3 Colour: Grey.
- .3 Meet the following required technical specifications:
  - .1 Compressive Strength: Average compressive strength shall not be less than 55 MPa with no individual unit less than 50 MPa when tested not less than 28 days from the date of production in accordance with CSA A231.1.
  - .2 Flexural Strength: Average flexural (transverse) strength shall be at least 4.5 MPA with no individual unit below 4.0 MPA when tested in accordance with CSA A231.1.
  - .3 Water Absorption: Average water absorption shall not be greater than 5% with no individual unit greater than 7%, when tested in accordance with CSA A231.1-14.
  - .4 Scaling Resistance: Specimen shall not have an average loss of mass greater than 300 g/m<sup>2</sup> of the total inundated surface area of the individual paving slab after 28 cycles of freezing and thawing, or 800 g/m<sup>2</sup> after 49 cycles. Specimens with an architectural finish shall not have an average loss of mass greater than 500 g/m<sup>2</sup> of the total inundated surface area of the individual paving slab after 28 cycles of freezing and thawing, or 1200 g/m<sup>2</sup> after 49 cycles, when tested in accordance with CSA A231.1-14.
  - .5 Dimensions: Dimensions of paving slabs, and concave or convex warpage shall not differ from those specified by more than the following amounts:
    - .1 Length and width: - 1.0 mm to + 2.0 mm
    - .2 Height: + 3.0 mm
    - .3 Concave or convex warpage in one dimension by the following amounts:
      - .1 Up to 450 mm, 2.0 mm; or
      - .2 Over 450 mm, 3.0 mm
      - .3 Dimensions are based on manufacturer's standard drawing for particular shape identified.
  - .6 Center Point Load Test of Pedestal-supported Slabs: 810 kgs.
  - .7 Manufactured in a plant where paving products are certified by ICPI as having passed manufacturer designated CSA requirements in this specification.

### 2.2 Pedestals

- .1 Pedestals and leveling plates made of high density polyethylene with integral spacer ribs on upper surface.
  - .1 Pavel Paver Pedestals, model 5X as supplied by EnviroSpec Inc.

## PART 3 EXECUTION

### 3.1 Examination and Preparation

- .1 Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
- .2 Verify that the roof membrane installation is completed.



- .3 Verify that all defects in the roof membrane have been repaired to the satisfaction of the roof membrane manufacturer prior to installation of paving slabs.
- .4 Verify that all surfaces, membranes, protection board, insulation, drains, are free from dirt, oil, grease or any deleterious substances and debris which may prevent installation, drainage, and stability of the paving slab installation.
- .5 Do not begin paving work until such conditions have been corrected.
- .6 Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free substrate.

### 3.2 Installation

- .1 Install pavers accurately aligning and maintaining uniform spacing, with straight joints from end to end. Seat the edges of the slab paver tightly against the spacing rib of the pedestal in accordance with manufacturer's recommendations and architectural layout.
- .2 Shim as necessary to provide support for all four corners of each paver.
- .3 Install paving slabs to vary not more than 2 mm in elevation between adjacent paving slabs or more than 2 mm variation from surface plane elevation of any individual paver.
- .4 Field cutting: Use masonry saws to cut paving slabs. Produce lines cut straight and true, with edges eased slightly to prevent chipping. Do not cut on top of other paving slabs.
- .5 All electrical conduits and gas lines must be sufficiently supported as directed by the Consultant. Use treated wood blocking supported on concrete pavers resting on PVC pedestals.
- .6 Install service walkways where indicated.

### 3.3 Cleaning and Protection

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 81 23 Intumescent Fireproofing
- .2 Section 07 84 00 Firestopping

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials
  - .2 ASTM E119-18ce1 Standard Test Methods for Fire Tests of Building Construction and Materials
  - .3 ASTM E605/E605M-93(2015)e1 Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
  - .4 ASTM E736/E736M-17 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
  - .5 ASTM E759/E759M-92(2015)e1 Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
  - .6 ASTM E760/E760M-92(2015)e1 Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
  - .7 ASTM E761/E761M-92(2015)e1 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
  - .8 ASTM E859/E859M-93(2015)e1 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
  - .9 ASTM E937/E937M-93(2015)e1 Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
  - .10 ASTM G21-15 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- .2 Underwriters Laboratories Inc. (ULC)
  - .1 Fire Resistance Directory (Latest Edition)
  - .2 ULC 101 2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
  - .3 ULC 102 2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .3 Uniform Building Code (UBC)
  - .1 UBC Standard No. 7-6 – Thickness and Density Determination for Spray Applied Fireproofing
  - .2 UBC Standard No. 7-7 – Methods for Calculating Fire Resistance of Steel, Concrete and Wood Construction
- .4 Association of the Wall and Ceiling Industry (AWCI)
  - .1 AWCI Technical Manual 12-A: Standard Practice for the Testing and Inspection of Spray Applied Fire-Resistive Materials.
  - .2 AWCI Technical Manual 12: Design Selection Utilizing Spray Applied Fire-Resistive Materials.

### 1.4 Submittals

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

- .2 Submit manufacturer's instructions for proper application of aggregate slurry fireproofing.
  - .3 Fire Testing: Submit evidence that the aggregate slurry fireproofing has been subjected to full-scale UL 263/ASTM E119 fire testing at Underwriters Laboratories Inc., or another accredited laboratory, by the manufacturer.
  - .4 Submit test results in accordance with ULC 101 for fire endurance and ULC 102 for surface burning characteristics.
  - .5 Test Data: Independent laboratory test results for fireproofing shall be submitted for the following performance criteria:
    - .1 Compressive Strength per ASTM E761
    - .2 Bond Strength per ASTM E736
    - .3 Deflection per ASTM E759
    - .4 Bond Impact per ASTM E760
    - .5 Air Erosion per ASTM E859
    - .6 Corrosion Resistance per ASTM E937
    - .7 Abrasion Resistance
    - .8 Impact Penetration
    - .9 High Speed Air Erosion per ASTM E859
    - .10 Surface Burning Characteristics per ASTM E84
    - .11 Combustibility per ASTM E1354 Cone Calorimeter
    - .12 Mould Resistance per ASTM G21
  - .6 Thickness Schedule: Provide schedule indicating material to be used, structural elements to be protected with spray applied fireproofing, hourly rating and material thickness provided and appropriate references.
  - .7 For assemblies not tested and rated, submit engineered proposals based on related designs using accepted fireproofing design criteria. Criteria must include statement that building structures and structural elements have been reviewed, and are included in the design of the proposed fire proofing. Proposals shall be prepared by an Engineer registered in the province of Ontario.
- 1.5 Quality Control
- .1 Refer to Section 01450 Quality Control.
  - .2 Cooperate with inspection and testing agency and repair or restore all areas of fireproofing removed by the agency for laboratory analysis.
  - .3 Testing will be in accordance with AWCI Publication: Inspection Procedure for Field Applied Sprayed Fire Protection Materials and ASTM E605
- 1.6 Qualifications of Applicator
- .1 Licensed by manufacturer of fireproofing materials.
- 1.7 Quality Assurance

- .1 Fireproofing work shall be performed by a firm acceptable to the aggregate slurry fireproofing material manufacturer.
- .2 Products, execution, and fireproofing thicknesses shall conform to the applicable code requirements for the required fire-resistance ratings.
- .3 Contractor, fireproofing subcontractor and independent testing laboratory shall attend a pre-installation conference to review the substrates for acceptability, method of application, applied thicknesses, inspection procedures and other issues.
- .4 Submit evidence that the aggregate slurry fireproofing has been tested per ASTM E119 by Underwriters Laboratories Inc or another accredited testing laboratory. Include evidence that the fire testing was sponsored by the manufacturer and that the material tested was produced at the manufacturer's facility under the supervision of laboratory personnel.
- .5 Mock-up
  - .1 Apply fireproofing to approximately 5 square metres of surface to be treated, including deck and steel structure.
  - .2 Allow 24 hours for inspection of mock-up by Testing Agency and Consultant before proceeding with fireproofing work.

#### 1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials in original unopened packages, fully identified as to manufacturer, brand or other identifying data and bearing the proper independent testing laboratory labels for Surface Burning Characteristic and Fire Resistance Classification.
- .4 Store material off the ground, under cover, and in a dry location until ready for use. All bags that have been exposed to water before use shall be found unsuitable and discarded. Stock of material is to be rotated and used prior to its expiration date.

#### 1.9 Protection

- .1 Ensure the work area is adequately ventilated, in compliance with manufacturer's requirements.
- .2 Ensure continuous and proper ventilation of the work area, through a fresh air intake and the extraction of foul air, during the course of the application process and for 24 hours thereafter.
- .3 Install temporary partitions in order to prevent any overspray outside of the work area from the sprayed-on insulation material.
- .4 Protect all adjacent surfaces and equipment against any damage that may be caused by dispersion and overspray of insulation material beyond prescribed limits.
- .5 Ensure all structures are well protected, in accordance with the manufacturer's recommendations.
- .6 Clean equipment in areas designated for this purpose.

#### 1.10 Project Conditions

- .1 Ensure all concrete and masonry materials are cured.
- .2 A minimum air and substrate temperature of 4 °C shall be present before application of spray applied fireproofing. Maintain a minimum air and substrate temperature of 4 °C during and for 24 hours after application of the fireproofing. Provide enclosures with heat to maintain temperature.
- .3 Provide ventilation to achieve a minimum total fresh air exchange rate of 4 times per hour until the material is substantially dry.

#### 1.11 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.12 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

### PART 2 PRODUCTS

#### 2.1 Systems

- .1 Cementitious fireproofing shall be aggregate slurry mixture Monokote type MK-6/ED, RG or MK-6/HY as manufactured by GCP Applied Technologies Inc.
- .2 ULC labelled and listed cementitious fireproofing, asbestos free, qualified for use in specified standards as manufactured by one of the following is acceptable subject to submission and review of proposed materials, technical data and application procedures:
  - .1 Cafco Industries Inc.
  - .2 A/D Fire Protection Systems

#### 2.2 Materials

- .1 Fireproofing material shall meet the following physical performance standards:
  - .1 Dry Density: The field density shall be measured in accordance with ASTM Standard E605. Minimum average density shall be that required by the manufacturer, or as listed in the UL Fire Resistance Directory for each rating indicated, or as required by the authority having jurisdiction, or a minimum average 240 kg/m<sup>3</sup> whichever is greater.
  - .2 Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.
  - .3 Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.
  - .4 Bond Strength: Fireproofing, when tested in accordance with ASTM E736, shall have a minimum average bond strength of 9.6 kN/m<sup>2</sup> and a minimum individual bond strength of 7.2 kN/m<sup>2</sup>.
  - .5 Air Erosion: Maximum allowable total weight loss of the fireproofing material shall be 0.00 g/m<sup>2</sup> when tested in accordance with ASTM E859. Sample surface shall be “as applied” (not pre-purged) and the total reported weight loss shall be the total weight loss over a 24 hour period from the beginning of the test.
  - .6 High Speed Air Erosion: Materials to be used in plenums or ducts shall exhibit no continued erosion after 4 hours at an air speed of 12.7 m/s when tested per ASTM E859.

- .7 Compressive Strength: The fireproofing shall not deform more than 10% when subjected to compressive forces of 71 kPa when tested in accordance with ASTM E761.
- .8 Abrasion Resistance: No more than 15 cm<sup>3</sup> shall be abraded or removed from the fireproofing substrate when tested in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
- .9 Impact Penetration: The fireproofing material shall not show a loss of more than 6 cm<sup>3</sup> when subjected to impact penetration tests in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
- .10 Surface Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
  - .1 Flame Spread 0
  - .2 Smoke Development 0
- .11 Corrosion Resistance: Fireproofing applied to steel shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.
- .12 Resistance to Mould: The fireproofing material shall be formulated with a mould inhibitor. Fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mould growth for a period of 28 days for general use.
- .13 Combustibility: Material shall have a maximum total heat release of 20 MJ/m<sup>2</sup> and a maximum 125 kw/m<sup>2</sup> peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E1354 at a radiant heat flux of 75 kw/m<sup>2</sup> with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.
- .14 Fire Resistance Classification: The spray applied fireproofing material shall have been tested and reported by Underwriters Laboratories of Canada, or another accredited laboratory, in accordance with the procedures of ANSI/ASTM E119 and shall be listed in the Underwriters Laboratories Fire Resistance Directory.

- .2 Mixing water shall be clean, fresh, potable and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material. Provide water with sufficient pressure and volume to meet the fireproofing application schedule.

### 2.3 Accessories

- .1 Provide accessories to comply with manufacturer's recommendations and to meet fire resistance design and code requirements. Such accessories include, but are not limited to, any required or optional items such as bonding agents, mechanical attachments; application aids such as metal lath, scrim, or netting; and accelerator.

## PART 3 EXECUTION

### 3.1 Inspection

- .1 All surfaces to receive spray applied fireproofing shall be provided free of oil, grease, loose mill scale, dirt or other foreign substances which may impair proper adhesion of the fireproofing to the substrate. Where necessary, cleaning or other corrections of surfaces to receive fireproofing shall be the responsibility of the supplier of the incompatible surface.
- .2 Application of the fireproofing shall not begin until the contractor, applicator and fireproofing testing laboratory (inspector) have examined surfaces to receive fireproofing and determined that the surfaces are acceptable to receive the fireproofing material.

### 3.2 Preparation

- .1 Prior to application of the fireproofing material, a bonding agent, approved by the fireproofing material manufacturer, shall be applied to all substrates to receive fireproofing.
- .2 Other trades shall install clips, hangers, support sleeves and other attachments required to penetrate the fireproofing, prior to application of the fireproofing materials.
- .3 Other trades shall not install ducts, piping, equipment or other suspended items until the fireproofing is complete.

### 3.3 Application

- .1 Clean all structural steel, joists, and metal deck to remove all loose scale or oily coatings, in accordance with manufacturer's recommendations. Remove existing coatings, paint, etc. if necessary to satisfy design criteria for fireproof assemblies.
- .2 Apply bonding adhesive or primer to substrate if recommended by manufacturer.
- .3 Apply fireproofing over substrates, building up to required thickness with as many passes or stages necessary to provide monolithic blanket of uniform density and texture. Total thickness shall be in accordance with submitted and approved designs.
- .4 At ducts, pipes and similar items, passing through fire rated assemblies and structural members, extend fireproofing 150 mm on either side along the penetrating item.

### 3.4 Tests and Inspections

- .1 Installed assembly will be tested and inspected for conformance with specifications by an independent inspection and testing company retained and paid for by the Owner.

### 3.5 Patching

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

### 3.6 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 81 16 Cementitious Fireproofing
- .2 Section 07 84 00 Firestopping
- .3 Section 09 91 23 Interior Painting

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
  - .2 ASTM D2794-93(2019) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
  - .3 ASTM D3960-05(2018) Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
  - .4 ASTM D4060-14 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
  - .5 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials
  - .6 ASTM E119-18ce1 Standard Test Methods for Fire Tests of Building Construction and Materials
  - .7 ASTM E595-15 Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment
  - .8 ASTM E736/E736M-17 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
  - .9 ASTM E759/E759M-92(2015)e1 Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
  - .10 ASTM E761/E761M - 92(2015)e1 Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- .2 Association of the Wall and Ceiling Industries - International (AWCI)
  - .1 Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- .3 Underwriters' Laboratories of Canada (ULC)
  - .1 List of Equipment and Materials, Fire Resistance, current edition.
- .4 Underwriters Laboratories Inc. (ULI)
  - .1 Fire Resistance Directory, Volume 1, current edition.
  - .2 ULC 101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
- .5 Intertek Testing Services / Warnock Hersey International, Inc. (ITS/WH):
  - .1 Directory of Listed Products, current edition.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit product data for specified products. Include product data indicating product characteristics, performance and limitation criteria.



- .3 Quality Assurance/Control Submittals:
  - .1 Design Data: ULC and FM published test designs for fire resistive coating application to substrate materials required and test reports showing compliance with specified physical performance characteristics and physical properties.
  - .2 Manufacturer's installation instructions.

#### 1.5 Quality Assurance

- .1 Manufacturer Qualifications:
  - .1 Company specializing in manufacturing products of this section for a minimum of 10 years.
  - .2 Company's quality management system shall have been assessed and registered by an independent registrar as conforming to the requirements of the standard ISO 9001:1994.
- .2 Applicator Qualifications:
  - .1 Approved, certified and supervised by manufacturer of fire resistive coating materials.
  - .2 Company shall have minimum five years documented experience.
- .3 Product Qualifications: Manufactured under ULI, ULC, ITS/WH and/or FM Follow-up Programs. Each container or package shall bear ULI, ULC, ITS/WH and/or FM label.
- .4 Regulatory Requirements: Conform to applicable codes for fire resistance ratings. Submit certification of acceptability of fire resistive coating materials to consultant and authority having jurisdiction.

#### 1.6 Project Conditions

- .1 Environmental Requirements
  - .1 Protect work area from windblown dust and rain. Protect adjacent areas from overspray.
  - .2 Provide ventilation in areas to receive work of this Section, during application and for 24 hours (minimum) after application.
- .2 Provide metal pans or adequate tarpaulin to protect surfaces in areas assigned for the storage and mixing of paints.
- .3 Temperature and Humidity Requirements:
  - .1 Do not apply thin-film intumescent fire-resistive coating when temperature of substrate and/or surrounding air is below 10 °C. Use electric or natural gas heat, if supplemental heat is required.
  - .2 Relative humidity of 40 percent to 60 percent is recommended in work area. Relative humidity in work area must not exceed 75 percent throughout the total period of application and drying for the intumescent coating, and must not exceed 65 percent throughout the application and drying for the protective decorative finish coat.
  - .3 Manufacturer's recommended temperature and humidity conditions must be maintained throughout the entire application and drying period until intumescent coating and basecoat are fully dried and top coated, including any interim period prior to application of the topcoat.

#### 1.7 Sequencing and Scheduling

- .1 Sequence work in conjunction with ceiling hanger tabs, sprinkler pipes, HVAC systems and other mechanical systems, structural steel installation.
- .2 Do not apply thin-film intumescent fire-resistive coating until concrete toppings and/or roofing applications have been installed.

- .3 Steel surfaces with less than 1 meter clear working access may necessitate the application of materials to inaccessible surfaces prior to erection of the finished steel members, either at the point of fabrication or on-site.

#### 1.8 System Descriptions

- .1 Design Requirements: Thin-film intumescent fire-resistive coating system shall provide a fire resistance rating as indicated on the drawings.

#### 1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification label intact.
- .4 Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
- .5 Store materials at a temperature not less than 10 °C in a dry, protected area, off ground in original, undamaged, sealed containers with manufacturer's labels and seals intact.
- .6 Protect from freezing.
- .7 Do not store in direct sunlight.
- .8 Discard any materials that have come into contact with contaminants prior to actual use.

#### 1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### PART 2 PRODUCTS

#### 2.1 Manufacturers

- .1 A/D Fire Protection Systems, 420 Tapscott Rd., Scarborough, Ontario M1B 1Y4.
- .2 Equivalent products as manufactured by the following are acceptable subject to compliance with performance requirements specified herein.
  - .1 3M
  - .2 Cafco Industries Inc,
  - .3 Carboline

#### 2.2 Products

- .1 Proprietary Systems: A/D FIREFILM III Intumescent Coating.
- .2 Primer: Select primer from manufacturer's list of approved primers, or other only as approved by manufacturer.

- .3 Basecoat: A/D BASECOAT by A/D Fire Protection Systems.
- .4 Top Coat: A/D COLORCOAT by A/D Fire Protection Systems.
- .5 Products/Systems Testing: Listed by ULC and bearing the ULC label.

### 2.3 Materials

- .1 Fire Resistant Coating Material: Thin-film, intumescent coating: A/D FIREFILM III as manufactured by A/D Fire Protection Systems listed by ULC and bearing ULC label on each container or package.
  - .1 Water based.
  - .2 Hardness (Shore "D"): Durometer D81.8, creep 1 at 15 s, 230° C.
  - .3 Surface Burning Characteristics (ASTM E 84): Flame Spread: 0-20, Smoke Development: 0-50, Class "A".
  - .4 Density 1,366 g/l.
  - .5 Dry Weight: 2.2 kg/m<sup>2</sup> at 1.6 mm dry.
  - .6 Cohesion/Adhesion (Bond or Tensile) (ASTM 736): 3.24 kgm<sup>2</sup> at 3 mm dry.
  - .7 Compressive strength (ASTM E 761): 7.6 MPa at 10 percent deformation.
  - .8 Deflection Resistance (ASTM E 759): Pass without spalling, cracking or delaminating.
  - .9 Impact Resistance (ASTM D2794): 3.3 kg-m (direct) at 3 mm, 1.4 kg-m (direct) at 1.6 mm.
  - .10 Abrasion Resistance (ASTM D4060): 508 cycles per mil at 1.6 mm dry.
  - .11 Off gassing (ASTM E595): TML 0.82, CVCM 0.00, WVR 0.49), NASA SP-R-0022A and ESA PSS-01-702.

### 2.4 Mixing

- .1 Paints shall be ready mixed.
- .2 Mix gently in order to minimize introduction of air to the product. Do not add water or solvent.
- .3 Mix topcoat by boxing and stirring. Do not add water or solvent.

## PART 3 EXECUTION

### 3.1 Inspection

- .1 Examine surfaces to receive work of this Section and report any defects that may affect the work of this section. Identification marking of steel components must be by wax crayon to facilitate ease of removal prior to application of this intumescent fireproofing.
- .2 Verify that substrate surfaces have been prepared in accordance with manufacturer's recommendations.
- .3 Verify that all clips hangers, sleeves and similar devices have been attached. Confirm compatibility of surfaces to receive fireproofing materials. Steel surfaces must be primed with a compatible primer.
- .4 Beginning of installation means acceptance of substrate.
- .5 Verify substrate and workspace temperature and humidity conditions are in accordance with manufacturer's recommendations.

### 3.2 Preparation

- .1 Protection: Protect adjacent surfaces, work areas, finished surfaces and equipment from over-spray/damage during product application.
- .2 Surface Preparation: Clean substrate free of dust, dirt, grease or other foreign matter that would impair bond of fire resistance material.
- .3 Weld flashes shall be ground smooth prior to commencement of application.

### 3.3 Installation

- .1 Apply primer and basecoat by spray application in accordance with manufacturer's product data, including technical bulletins, product catalogue, application instructions and product markings for installation in sufficient thickness to achieve required fire resistance rating.
- .2 Priming: Apply only to primed surfaces. Use only primer as approved by manufacturer. Follow primer manufacturer's instructions.
- .3 Apply topcoat decorative finish according to manufacturer's recommendations.
- .4 Application Rates and Thickness Measurements:
  - .1 Comply with fire test designs or manufacturer's thickness selection tables for determination of dry film thickness of intumescent coatings required for size of steel element to be protected and for required fire resistance ratings.
  - .2 Apply basecoat at a maximum rate of 60-mil wet per coat.
  - .3 Apply intumescent coatings at a maximum rate of 1.14 mm wet or approximately 0.58 mm dry per coat.
  - .4 Final dry film thickness must be measured with a dry-film thickness gauge. For method of thickness determination refer to AWC Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.

### 3.4 Application

- .1 Spray Equipment: Use equipment recommended by manufacturer.
- .2 Drying and Recoat Time: Drying time will vary with temperature and humidity conditions. Apply next coat only after previous coat is dry.
- .3 Topcoat Application:
  - .1 Allow a minimum of 24 hours between application of the final coat of basecoat and application of topcoat. Recommended site conditions must be maintained for any interim period after final coat of basecoat and until topcoat has been applied and dried. Basecoat must be dry before application of topcoat.
  - .2 Do not apply topcoat until it has been determined that the required dry film thickness of basecoat materials has been provided.
  - .3 Thickness: Apply topcoat to a minimum dry film thickness of 0.05 - 0.10 mm.
- .4 Patching: Patch and repair any fire resistive coating that has been damaged in accordance with patching recommendations of material manufacturer. If coating becomes damaged, rebuild thickness by spray or brush. Fill small areas with trowel. When dry, smooth and finish with topcoat to match.

### 3.5 Field Quality Control

- .1 Field Samples: An independent testing laboratory/company shall be selected by the Consultant to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with AWCI Technical Manual 12-B, Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials; an Annotated Guide. Inspection shall be carried out immediately following final thickness of thin film intumescent coatings and just before application of topcoat.
- .2 All test results must be made available to all parties at the completion of each designated area and approved prior to the application of top-coat.
- .3 In-place fire protection material not in compliance with the specification requirements must be corrected prior to the application of the decorative top-coat.
- .4 Prior to application, random pre-determined liquid samples of the water borne intumescent material must be submitted for material characterization (fingerprinting) in accordance with the procedures detailed in the ISO 20340 Standard. Sample frequency will be pre-determined by the Consultant and testing performed by an independent testing laboratory or the intumescent material manufacturer.

### 3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions. Remove and legally dispose of construction debris.

### 3.7 Protection

- .1 Protect intumescent coatings from damage until date of Substantial Performance.
- .2 Touch up any areas damaged in accordance with manufacturer's recommendations and to the entire satisfaction of the Consultant.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 24 33 Prefabricated EIFS Wall Panels
- .3 Section 07 92 00 Joint Sealants
- .4 Section 09 21 16 Gypsum Board

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E84-18 Standard Test Method for Surface Burning Characteristics of Building Materials
  - .2 ASTM E119-18 Standard Test Methods for Fire Tests of Building Construction and Materials
  - .3 ASTM E136-16a Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750° C
  - .4 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems.
  - .5 ASTM E1966-15 Standard Test Method for Fire-Resistive Joint Systems
  - .6 ASTM E2307-15be1 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- .2 Underwriter's Laboratories of Canada (ULC)
  - .1 ULC 101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
  - .2 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
  - .3 ULC 115-2018 Standard Method of Fire Tests of Firestop Systems
- .3 National Fire Protection Association (NFPA)
  - .1 NFPA 252 Standard Methods of Fire Test and Door Assemblies
- .4 South Coast Air Quality Management District (SCAQMD) California State
  - .1 SCAQMD Rule 1168-03: Adhesives and Sealants.
- .5 Ontario Building Code

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings: Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .4 Samples: Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.

- .1 Test reports: in accordance with ULC 101 for fire endurance and ULC 102 for surface burning characteristics.
- .2 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties
- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

#### 1.5 Definitions

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

#### 1.6 Quality Assurance

- .1 One installer shall install all firestopping on the project. Each trade shall not firestop their own service penetrations. Installer shall be certified by fire stopping manufacturer.
- .2 Qualifications:
  - .1 Qualified Installer: specializing in fire stopping installations with 5 years documented experience approved and trained by manufacturer.
  - .3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
- .4 Site Meetings:
  - .1 As part of Manufacturer's Services described in 3.5- Field Quality Control, schedule site visits, to review Work, at stages listed.
  - .2 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
  - .3 Twice during progress of Work at 25% and 60% complete.
  - .4 Upon completion of Work, after cleaning is carried out.
  - .5 Single Source Responsibility: Obtain through-penetration fire-stop systems for each kind of penetration and construction condition indicated from a single manufacturer.
- .5 Field-Constructed Mockup: Prior to installing fire-stopping, erect mockups for each different through-penetration fire-stop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.

- .1 Locate mockups on site in locations indicated or, if not indicated, as directed by Consultant.
- .2 Notify Consultant one (1) week in advance of the dates and times when mockups will be erected.
- .3 Obtain Consultant's acceptance of mockups before start of final unit of Work.
- .4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
- .5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

- .1 Materials shall be Low VOC type conforming to SCAQMD Rule 1168-03. Maximum VOC level of firestopping materials shall be 250 g/l.

1.8 Project Conditions

- .1 Environmental Conditions: Do not install fire-stopping when ambient or substrate temperatures are outside limits permitted by fire-stopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- .2 Ventilation: Ventilate fire-stopping per fire-stopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
- .4 Storage and Protection:
  - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 All fire stopping shall consist of ULC listed firestop system.
- .2 Applications: Provide fire-stopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- .3 All firestopping material shall be:
  - .1 From one manufacturer;
  - .2 Intumescent where an appropriate system exists.



- .4 Fire stopping and smoke seal systems: ULC listed in accordance with ULC 115.
  - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of ULC 115 and not to exceed opening sizes for which they are intended.
- .5 Service penetration assemblies: ULC listed systems tested to ULC 115.
- .6 Service penetration fire stop components: ULC listed and certified by test laboratory to ULC 115.
- .7 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .8 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .9 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .10 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .11 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .12 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.
- .13 Sealants for vertical joints: non-sagging.
- .14 General: Provide fire-stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- .15 F-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with F ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- .16 T-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with T ratings, in addition to F ratings, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
  - .1 Where fire-stop systems protect penetrations located outside of wall cavities.
  - .2 Where fire-stop systems protect penetrations located outside fire-resistive shaft enclosures.
  - .3 Where fire-stop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
  - .4 Where fire-stop systems protect penetrating items larger than a 100 mm diameter nominal pipe or 10,000 mm<sup>2</sup> in overall cross-sectional area.
- .17 Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- .18 For fire-stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
  - .1 For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
  - .2 For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed

- to possible loading and traffic, provide fire-stop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
- .3 For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.
- .19 For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450.
- .20 Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by fire-stopping manufacturer based on testing and field experience.
- .21 Accessories: Provide components for each fire-stopping system that are needed to install fill materials and to comply with "System Performance Requirements". Use only components specified by the fire-stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance-rated systems. Accessories include but are not limited to the following items:
- .1 Permanent forming/damming/backing materials including the following:
- .1 Semi-refractory fibre (mineral wool) insulation.
  - .2 Ceramic fibre.
  - .3 Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
  - .4 Fire-rated formboard.
  - .5 Joint fillers for joint sealants.
- .2 Temporary forming materials.
- .3 Substrate primers.
- .4 Collars.
- .5 Steel sleeves.

### PART 3 EXECUTION

#### 3.1 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications.

#### 3.2 Preparation

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

#### 3.3 Installation

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.
- .2 Provide fire stopping for all disciplines.
- .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.
- .4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .6 Tool or trowel exposed surfaces to neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.

### 3.4 Sequences of Operation

- .1 Proceed only when submittals have been reviewed by Consultant.
- .2 Mechanical pipe insulation: certified fire stop system component.
  - .1 Ensure pipe insulation installation precedes fire stopping.

### 3.5 Field Quality Control

- .1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.
- .3 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1.4 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1.6 - QUALITY ASSURANCE.

### 3.6 Commissioning

- .1 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site. Submit DRI's written reports within 3 days of review, verifying compliance of Work.
- .2 Perform a thorough examination of the fire stopping system to determine if the assembly is installed as per its ULC listing.
- .3 Allow for destructive testing of installed firestopping. Repair all tested assemblies.

- .4 The examination shall take place prior to close-up to confirm assembly components and installation configuration.
- .5 Any and all deviations from the ULC listed system shall be considered grounds for rejection and replacement.

### 3.7 Schedule

- .1 Fire stop and smoke seal at:
  - .1 Penetrations through fire-resistance rated concrete, masonry, and gypsum board partitions and walls.
  - .2 Top of fire-resistance rated partitions.
  - .3 Intersection of fire-resistance rated partitions.
  - .4 Control and sway joints in fire-resistance rated partitions and walls.
  - .5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
  - .6 Around mechanical and electrical assemblies penetrating fire separations.
  - .7 Rigid ducts: greater than 129 cm<sup>2</sup>: 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.
  - .8 All electrical outlet boxes installed in fire rated gypsum board assemblies.
  - .9 All locations required by the Ontario Building Code.
  - .10 Any other locations indicated.

### 3.8 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- |     |                  |  |
|-----|------------------|--|
| .1  | Section 06 10 00 | Rough Carpentry                        |
| .2  | Section 06 20 00 | Finish Carpentry                       |
| .3  | Section 07 13 13 | Bituminous Sheet Waterproofing         |
| .4  | Section 07 21 13 | Building Insulation                    |
| .5  | Section 07 24 33 | Prefabricated EIFS Wall Panels         |
| .6  | Section 07 27 13 | Modified Bituminous Sheet Air Barriers |
| .7  | Section 07 52 00 | Modified Bituminous Roofing            |
| .8  | Section 07 62 00 | Sheet Metal Flashing and Trim          |
| .9  | Section 07 84 00 | Firestopping                           |
| .10 | Section 08 11 00 | Metal Doors and Frames                 |
| .11 | Section 08 32 16 | Vinyl Sliding Glass Doors              |
| .12 | Section 08 50 00 | Aluminum Doors, Windows and Screens    |
| .13 | Section 08 53 13 | Vinyl Windows                          |
| .14 | Section 08 80 05 | Glazing                                |
| .15 | Section 12 35 30 | Residential Casework                   |

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C510-16 Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
  - .2 ASTM C661-15 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
  - .3 ASTM C719-14 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle) 1, 2
  - .4 ASTM C794-18 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
  - .5 ASTM C834-17 Standard Specification for Latex Sealants
  - .6 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
  - .7 ASTM C1087-16 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
  - .8 ASTM C1193-16 Standard Guide for Use of Joint Sealants
  - .9 ASTM C1247-14 Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids
  - .10 ASTM C1248-18 Standard Test Method for Staining of Porous Substrate by Joint Sealants
  - .11 ASTM C1311-14 Standard Specification for Solvent Release Sealants
  - .12 ASTM C1330-18 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
  - .13 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  - .14 ASTM D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
  - .15 ASTM D2203-01(2018) Standard Test Method for Staining from Sealants
  - .16 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
- .2 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 South Coast Air Quality Management District (SCAQMD) California State

- .1 SCAQMD Rule 1168-03: Adhesives and Sealants.

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product data for all sealant materials and accessories including:
  - .1 Preparation instructions and recommendations.
  - .2 Standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions applicable to Project.
- .3 Joint Sealant Schedule: Indicate joint sealant location, joint sealant type, manufacturer and product name, and colour, for each application. Utilize joint sealant designations included in this Section.
- .4 Samples:
  - .1 Samples for Colour Selection: For each joint sealant type.
  - .2 Samples for Verification: For each joint sealant product, for each colour selected.
- .5 Greenguard Certificates: For each sealant and accessory product specified to meet volatile organic emissions standards of the Greenguard Children and Schools Certification.

#### 1.5 Quality Assurance

- .1 Installer Qualifications: Company with minimum of three years of experience specializing in work of this section, employing applicators trained for application of joint sealants required for this project, with record of successful completion of projects of similar scope, and approved by manufacturer.
- .2 Single Source Responsibility: Provide joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.
- .3 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

#### 1.7 Project Conditions

- .1 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Ventilate area of work by use of approved portable supply and exhaust fans.

#### 1.8 Scheduling

- .1 Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
- .2 Ensure sealants are cured before covering with other materials.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Basis-of-Design Products: Provide joint sealant products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing, 220 Wicksteed Avenue, Toronto, www.tremcosealants.com, or comparable products of other manufacturer approved by Consultant.

2.2 Materials, General

- .1 VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):
- .1 Architectural Sealants: 250 g/L.
  - .2 Sealant Primers for Nonporous Substrates: 250 g/L.
  - .3 Sealant Primers for Porous Substrates: 775 g/L.
- .2 Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- .3 Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.
- .4 Joint Sealant Standard: Comply with ASTM C920 and other specified requirements for each joint sealant.

2.3 Silicone Joint Sealants

- .1 SJS#1: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
- .1 Basis of Design Product: Tremco Spectrem 1.
  - .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Staining, ASTM C1248: None on concrete, marble, granite, limestone, and brick.
  - .5 Colour: As selected by Consultant from manufacturer's standard line.
- .2 SJS#5: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
- .1 Basis of Design Product: Tremco Tremsil 200 Sanitary.
  - .2 Volatile Organic Compound (VOC) Content: 1 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Colour: White and Clear.

2.4 Urethane Joint Sealants

- .1 UJS#1: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C920,

Type S, Grade NS, Class 50, Use NT; Greenguard certified.

- .1 Basis of Design Product: Tremco Dymonic 100.
  - .2 Volatile Organic Compound (VOC) Content: 40 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Tensile Strength ASTM D412: 350 to 450 psi
  - .5 Percent Elongation ASTM D412: 800 to 900%
  - .6 Modulus at 100% ASTM D412: 75 to 85 psi
  - .7 Tear Strength ASTM D412: 65 to 75 psi
  - .8 Smoke Development ASTM E84: 5
  - .9 Colour: As selected by Consultant from manufacturer's standard line.
- .2 UJS#2: Single-Component, Nonsag, Moisture-Cure, Polyurethane Hybrid Joint Sealant: ASTM C920, Type S, Grade NS, Class 35, Use NT; Greenguard certified.
- .1 Basis of Design Product: Tremco Dymonic FC.
  - .2 Extrusion Rate ASTM C1183: 93.1 mL/min
  - .3 Weight Loss ASTM C1246: Pass
  - .4 Tack Free Time ASTM C679: 3 to 4 hours.
  - .5 Volatile Organic Compound (VOC) Content: 10 g/L maximum.
  - .6 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .7 Colour: As selected by Consultant from manufacturer's standard line.
- .3 UJS#4: Immersible, Single-Component, Pourable, Traffic Grade Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 50, Use T and I.
- .1 Basis of Design Product: Tremco Vulkem 45 SSL.
  - .2 Volatile Organic Compound (VOC) Content: 110 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Colour: As selected by Consultant from manufacturer's standard line.
- .4 UJS#6: Multi-Component, Non-sag, Polyurethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 50, Use I.
- .1 Basis of Design Product: Tremco Dymeric 240 FC.
  - .2 Volatile Organic Compound (VOC) Content: 0 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Colour: As selected by Consultant from manufacturer's standard line.

## 2.5 Latex Joint Sealants

- .1 LJS#1: Latex Joint Sealant: Siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
- .1 Basis of Design Product: Tremco Tremflex 834.
  - .2 Volatile Organic Compound (VOC) Content: 35 g/L maximum.
  - .3 Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - .4 Colour: White, paintable.

## 2.6 Solvent-Release-Curing Joint Sealants

- .1 BJS#1: Butyl-Rubber-Based Joint Sealant: ASTM C1311.
- .1 Basis of Design Product: Tremco Tremco Butyl Sealant.
  - .2 Volatile Organic Compound (VOC) Content: 250 g/L maximum.



- .3 Colour: As selected by Consultant from manufacturer's standard colours.

## 2.7 Acoustical Sealants

- .1 AJS#1: Acoustical/Curtainwall Sealant: Single-component, non-hardening, non-sag, paintable synthetic rubber-tested to reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing of similar assemblies according to ASTM E90.
  - .1 Basis of Design Product: Tremco Tremco Acoustical/Curtainwall Sealant.
  - .2 Volatile Organic Compound (VOC) Content: 160 g/L maximum.
  - .3 Colour: White, paintable.

## 2.8 Joint Sealant Accessories

- .1 Cylindrical Sealant Backing: ASTM C1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.
- .2 Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.
- .3 Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.
- .4 Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.
- .5 Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

## PART 3 EXECUTION

### 3.1 Examination

- .1 Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

### 3.2 Preparation

- .1 Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer. Comply with ASTM C1193.
  - .1 Remove curing compounds, laitance, form-release agents, dust, and other contaminants.
  - .2 Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.
  - .3 Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

### 3.3 Application

- .1 Sealant and Primer Installation: Comply with ASTM C1193 and manufacturer's written instructions.
- .2 Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.

- .1 Install joint backing to maintain the following joint ratios:
  - .1 Joints up to 13 mm wide: 1:1 width to depth ratio.
  - .2 Joints greater than 13 mm wide: 2:1 width to depth ratio; maximum 13 mm joint depth.
- .2 Install bond breaker tape over substrates when sealant backings are not used.
- .3 Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- .4 Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- .5 Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
  - .1 Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
  - .2 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
  - .3 Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.
- .6 Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C919 and with manufacturer's written recommendations.

### 3.4 Exterior Joint Sealant Schedule

- .1 Exterior concealed transition joints in air barrier.
  - .1 UJS#1: Single-component non-sag urethane sealant.
  - .2 Compatibility: Compatible with air barrier components specified in Section 07 27 13.
- .2 Exterior construction joints in cast-in-place concrete.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 Exterior joints within exterior insulation finish systems (EIFS).
  - .1 UJS#6: Single-component non-sag urethane sealant.
- .4 Exterior joints between different materials listed above.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .5 Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .6 Exterior joints within aluminum storefront framing and window systems:
  - .1 SJS#1: Single-component neutral-curing non-staining silicone sealant.
- .7 All other exterior non-traffic joints.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .8 Exterior horizontal traffic and traffic isolation joints:
  - .1 UJS# 4: Single-component pourable urethane sealant.

### 3.5 Interior Joint Sealant Schedule

- .1 Interior vertical movement joints in interior concrete and unit masonry.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .2 Interior perimeter joints of exterior aluminum frames.
  - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 Interior perimeter joints of interior frames.
  - .1 UJS#2: Single-component non-sag urethane sealant.
- .4 Interior sanitary joints between plumbing fixtures, and casework and adjacent walls, floors, and counters.
  - .1 SJS#5: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.
- .5 Interior traffic joints in floor and between floor and wall construction.
  - .1 UJS# 4: Single-component pourable urethane sealant.
- .6 Interior non-moving joints between interior painted surfaces and adjacent materials.
  - .1 LJS#1: Siliconized acrylic latex
  - .2 Joint-Sealant Colour: Paintable.
- .7 Interior concealed sealants at thresholds and sills.
  - .1 BJS#1: Butyl-rubber-based joint sealant.
- .8 Interior exposed and non-exposed acoustical applications:
  - .1 AJS#1: Acoustical joint sealant.

### 3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.
  - .1 Remove masking tape immediately after tooling joint without disturbing seal.
  - .2 Remove excess sealant from surfaces while still uncured.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 92 00 Joint Sealants
- .3 Section 08 14 16 Flush Wood Doors
- .4 Section 08 14 33 Simulated Stile and Rail MDF Wood Doors
- .5 Section 08 80 05 Glazing
- .6 Section 09 21 16 Gypsum Board
- .7 Section 09 91 13 Exterior Painting
- .8 Section 09 91 23 Interior Painting

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A653/A653M-18 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM C177-19 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
  - .3 ASTM C518-17 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - .4 ASTM C553-13 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
  - .5 ASTM C591-17 Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
  - .6 ASTM C1289-18a Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
  - .7 ASTM E90-09 (2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - .8 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
  - .9 ASTM E2074-00e1 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies (Withdrawn 2007)
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc-Rich Coating.
  - .2 CGSB 41-GP-19M-84 Rigid Vinyl Extrusions for Windows and Doors.
- .3 CSA Group (CSA)
  - .1 CSA-G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W59-18 Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
  - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000
  - .2 CSDMA Recommended Specifications for Commercial Steel Doors and Frames, 2006.
  - .3 CSDMA Selection and Usage Guide for Commercial Steel Door and Frame Products, 2009.
- .5 Underwriters Laboratories Canada (ULC)
  - .1 ULC 104-2015 Standard Method for Fire Tests of Door Assemblies.

- .2 ULC 105- 2016 Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.
- .3 ULC 106-2015 Standard Method for Fire Tests of Window and Glass Block Assemblies
- .4 ULC 701-2011 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .5 ULC 702.1- 2014 Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .6 ULC 704-11 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .6 Underwriters Laboratories (UL)
  - .1 UL10B Fire Tests of Door Assemblies.
  - .2 UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.
- .7 National Fire Protection Association (NFPA)
  - .1 NFPA 80-2019 Standard for Fire Doors and Other Opening Protectives.
  - .2 NFPA 252-2017 Fire Tests of Door Assemblies.
- .8 American National Standards Institute (ANSI)
  - .1 ANSI 250.4-2018 Test Procedure and Acceptance Criteria for — Physical Endurance for Steel Doors, Frames and Frame Anchors
  - .2 ANSI 250.10-2011 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide shop drawings
  - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, arrangement of hardware, and finishes.
  - .2 Indicate each type frame material, core thickness, reinforcements, location of anchors and exposed fastenings, reinforcing, fire rating and finishes.
  - .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

#### 1.5 System Description

- .1 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35 °C to 35 °C.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

#### 1.7 Requirements of Regulatory Agencies

- .1 Steel fire rated doors and frames: labeled and installed by an organization accredited by Standards Council of Canada in conformance with ULC 104 or NFPA 252 for ratings specified or indicated.
- .2 Provide fire labeled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with ULC 104, ASTM E2074 or 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.

### 1.8 Testing and Performance

- .1 Fire labeled products shall be provided for those openings requiring fire protection ratings as scheduled on the drawings. Products shall be tested in strict conformance with ULC 104 and listed by Underwriters Laboratory of Canada Ltd. or Warnock Hersey under an active Factory Inspection Program.
- .2 Product quality shall meet the standards established by the Canadian Steel Door Manufacturer's Association.
- .3 Door construction shall meet acceptance criteria of ANSI A250.10 and shall be certified as meeting Level A (1,000,000 cycles) and Twist Test Acceptance Criteria deflection not to exceed 6.4 mm/13.6 kg force, total deflection at 136.1 kg force not to exceed 64 mm and permanent deflection not to exceed 3.0 mm when tested in strict conformance with ANSI A250.4. Test shall be conducted by an independent nationally recognized accredited laboratory.
- .4 Core materials for insulated doors shall attain a thermal resistance rating of RSI 2.17 when tested in accordance with ASTM C177 or ASTM C518.

### 1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of one year from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Steel: Commercial grade steel to ASTM A653, CS, Type B, Coating Designation ZF75 (A25) minimum. Minimum steel thicknesses shall be in accordance with Appendix 1 of the CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653, ZF75.

### 2.2 Door Core Material

- .1 Interior Doors: Structural small cell, 24.5mm maximum kraft paper 'honeycomb', weight 36.3 kg per ream minimum, density: 16.5 kg/m<sup>3</sup> minimum sanded to required thickness. ULC approved.
- .2 Exterior Doors: Polyisocyanurate: Rigid, modified polyisocyanurate, closed cell board. Density; 32 kg/m<sup>3</sup> minimum, thermal values; RSI 1.9 minimum, in accordance with ASTM C591 (un-faced) or ASTM C1289 (faced).

### 2.3 Primer

- .1 Touch-up prime CAN/CGSB-1.181, organic zinc rich, rust inhibitive.
  - .1 Maximum VOC limit 50 g/L to GC-03.

## 2.4 Adhesives

- .1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.
- .2 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .3 Polyisocyanurate: heat resistant, epoxy resin based, low viscosity, contact cement.
- .4 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, low VOC sealant/adhesive or U.L.C. approved equivalent.

## 2.5 Accessories

- .1 Glazing Stops: Minimum 0.9 mm base thickness sheet steel with wipe zinc finish to ASTM A525. Fasteners to be #6 x 32 mm cadmium plated oval head scrulox self-drilling type screws. Tamper proof screws.
- .2 Exterior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Metallic paste filler: to manufacturer's standard.
- .4 Frame Thermal Breaks: Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.
- .5 Door silencers: single stud rubber/neoprene type.
- .6 Fiberglass: to ULC 702, loose batt type, minimum density of 24 kg/m<sup>3</sup>.
- .7 Sealant: As specified in Section 07 92 00.

## 2.6 Fabrication - Frame Products

- .1 General
  - .1 Fabricate frames in accordance with CSDMA specifications.
  - .2 Fabricate frames to profiles and maximum face sizes as indicated.
  - .3 Exterior frame product shall be 16 gauge welded type construction, thermally broken.
  - .4 Interior frame product shall be 16 gauge. Interior frame and window assemblies shall be welded type or knock-down construction as indicated. Interior transoms, sidelights and window assemblies shall be welded type construction.
  - .5 Blank, reinforce, drill and tap frames for templated hardware and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
  - .6 Prepare frames to receive electrical conduit for door operators where indicated and required.
  - .7 Protect mortised cutouts with steel guard boxes.
  - .8 Provide anchorage appropriate to floor, wall and frame construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm provide two (2) anchors, and an additional anchor for each additional 760 mm of height or fraction thereof, except as indicated below. Frames in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm from the top and bottom of each jamb, and intermediate anchors at 660 mm on centre maximum. Fasteners for such anchors shall be provided by others.

- .9 Minimum reinforcing, anchor and other component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
  - .10 Each interior door opening shall be prepared for single stud rubber door silencers, three (3) for single door openings, two for double door openings, except on gasketed frame product.
  - .11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
  - .12 Fire-rated frame products shall be provided for those openings requiring fire protection as determined and scheduled by the Consultant. Frames, transom and sidelight assemblies shall be listed for conformance with ULC 104. Window assemblies shall be listed for conformance with ULC 106. All fire-rated frame products shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated frame products shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.
- .2 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 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two (2) holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm of the base of the jamb, shall be substituted.
  - .6 Weld in two (2) temporary jamb spreaders per door opening to maintain proper alignment during shipment and handling, which shall not be used for installation.
  - .7 Glazing stops shall be formed steel channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
  - .8 When required due to site access, when advised by the contractor responsible for coordination or installation, as specified on the drawings or due to shipping limitations, frame product for large openings shall be fabricated in sections as designated on the approved submittal drawings, with splice joints for field assembly and welding by others.
  - .9 Prior to shipment, mark each frame product with an identification number as shown on the approved submittal drawings.
  - .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
  - .11 Manufacturer's nameplates on frames and screens are not permitted.
- .3 Knock-Down Type
- .1 Knocked-down type frames shall be shipped unassembled.
  - .4 Frames shall have mechanical joints which inter-lock securely and provide functionally satisfactory performance when assembled and installed in accordance with the manufacturer's published instructions.
  - .5 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm of the base of the jamb, shall be substituted.
  - .6 Prior to shipment, components shall be designated with an identifier corresponding to the numbering on the approved submittal drawings.



## 2.7 Fabrication - Doors

### .1 General

- .1 Interior doors: insulated steel construction with honeycomb core laminated to face sheets under pressure.
  - .2 Exterior doors: insulated steel construction with polyisocyanurate core laminated to face sheets under pressure.
  - .3 Doors: swing type, flush.
  - .4 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.
- .2 Longitudinal edges shall be mechanically inter-locked, adhesive assisted. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
  - .3 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware and electronic hardware, in accordance with the approved hardware schedule and templates provided by the hardware supplier.
  - .4 Holes 12.7 mm diameter and larger shall be factory prepared, except mounting and through-bolt holes, which are by others, on site, at time of hardware installation. Holes less than 12.7 mm diameter shall be factory prepared only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.
  - .5 Doors shall be reinforced where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware.
  - .6 Top and bottom of doors shall be provided with inverted, recessed, welded steel channels. Exterior doors, and where otherwise scheduled by the Consultant, shall be provided with rigid PVC top caps.
  - .7 Minimum reinforcing and component gauges shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
  - .8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
  - .9 Fire-rated doors shall be provided for those openings requiring fire protection as determined and scheduled by the Consultant. Such products shall be listed for conformance with ULC 104. All fire-rated doors shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated doors shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.
  - .10 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.
  - .11 Laminated Core Construction
    - .1 Both face sheets for exterior doors shall be formed from a sheet of 16 gauge steel with polyisocyanurate steel stiffened core, laminated under pressure to face sheets.
    - .2 Both face sheets for interior doors shall be formed from a sheet of 18 gauge steel with honeycomb core, laminated under pressure to face sheets.

.3 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.

.12 Manufacturer's nameplates on doors are not permitted.

## 2.8 Glazing Stops

.1 Glazing stops shall be accurately fitted, butted at corners with removable stops located on push side of door.

.2 Provide tamper proof screws on all doors and screens.

## 2.9 Finishes

.1 Doors and frames shall wipe coat zinc, ready for painting.

## PART 3 EXECUTION

### 3.1 Manufacturer's Instructions

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

### 3.2 Installation

.1 Install doors and frames to CSDMA Installation Guide, NAAMM-HMMA 840, Installation Guide for Commercial Steel Doors and Frames.

.2 Fire-rated door and frame product shall be installed in accordance with the terms of their listings, NFPA-80, or the local Authority Having Jurisdiction (AHJ).

.3 Prior to installation, remove temporary shipping spreaders.

.4 Prior to installation, the area of floor on which the frame is to be installed, and within the path of the door swing, shall be checked and corrected for flatness.

.5 Check door and frame product for correct size, swing, rating and opening number.

.6 The supplier shall be advised of any discrepancies prior to installation.

.7 Set frames plumb, square, level and at correct elevation.

.8 Secure anchorages and connections to adjacent construction.

.9 Brace frames rigidly in position while building-in. Install wood spreaders at third points of frame rebate height to maintain frame width. Provide vertical support at centre of head for openings exceeding 1200 mm in width.

.10 During the setting of frame product, check and correct as necessary for opening width, opening height, square, alignment, twist and plumb, in accordance with the CSDMA, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

.11 Remove wood spreaders after frames have been built-in.

.12 Make allowance for deflection to ensure structural loads are not transmitted to frame product.

- .13 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.
- .14 Adjust operable parts for correct clearances and function.
- .15 Install louvers, glazing and door silencers.
- .16 Install transom panels using concealed fasteners.
- .17 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows:
  - .1 Hinge side: 1.0 mm.
  - .2 Latchside and head: 1.5 mm.
  - .3 Finished floor and thresholds: 13 mm.
  - .4 Adjust operable parts for correct function.
- .18 Caulk perimeter of frames.

### 3.3 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.

### 3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 08 11 00 Metal Doors and Frames
- .2 Section 08 14 33 Simulated Stile and Rail MDF Wood Doors
- .3 Section 09 91 23 Interior Painting

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM D1761-12 Standard Test Methods for Mechanical Fasteners in Wood
  - .2 ASTM D5456-18 Standard Specification for Evaluation of Structural Composite Lumber Products
  - .3 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  - .4 ASTM E413-16 Classification for Rating Sound Insulation
  - .5 ASTM E1332-16 Standard Classification for Rating Outdoor-Indoor Sound Attenuation
  - .6 ASTM E2235-04(2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods
- .2 American National Standards Institute (ANSI):
  - .1 ANSI A208.1 - Standard for Particleboard.
- .3 CSA Group (CSA)
  - .1 CSA O115-M1982 (R2001) Hardwood and Decorative Plywood.
  - .2 CSA O132.2 Series-90 (R2003), Wood Flush Doors
- .4 Canadian General Services Board (CGSB)
  - .1 CAN/CGSB-71.19 Adhesive, Contact, Sprayable
  - .2 CAN/CGSB-71.20 Adhesive, Contact, Brushable
- .5 Underwriters Laboratories Canada (ULC)
  - .1 ULC 104-2015 Standard Method for Fire Tests of Door Assemblies.
- .6 National Fire Protection Association (NFPA)
  - .1 NFPA 80 Standard for Fire Doors and Other Opening Protectives.
  - .2 NFPA 252 Standard Method of Fire Test for Door Assemblies.
- .7 Architectural Woodwork Manufacturers Association of Canada (AWMAC): Quality Standards for Architectural Woodwork
- .8 Window and Door Manufacturer's Association (WDMA)
  - .1 ANSI/WDMA I.S. 1A-13 Interior Architectural Wood Flush Doors
- .9 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1113-06, Architectural Coatings.
  - .2 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.
- .10 Green Seal Environmental Standards
  - .1 Standard GS-11-97, Architectural Paints.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's printed product literature, specifications and data sheets.
  - .1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets. Indicate VOC's:

- .2 For caulking materials during application and curing.
- .3 For door materials and adhesives.
- .3 Submit shop drawings and door schedules.
  - .1 Indicate door types, sizes, thicknesses, and details of construction.
- .4 Submit samples.
  - .1 Submit one 300 x 300 mm corner sample of each type wood door.
  - .2 Show door construction, core, glazing detail and faces.
- .5 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

#### 1.5 Quality Assurance

- .1 The "Quality Standards" of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), 1991 Edition, together with authorized additions and amendments, shall be used as a reference standard and shall form part of this project specification.
- .2 Where modifications to the AWMAC Quality Standards contained within the Manual are included in this project specification, then such modifications shall govern in case of conflict.
- .3 Any reference to Custom or Premium grade in this specification shall be as defined in the AWMAC Quality Standards.
- .4 Any item not given a specific quality grade shall be Custom grade as defined in the AWMAC Quality Standards.
- .5 References in this specification to part and item numbers mean those parts and items contained within the AWMAC Quality Standards Manual.
- .6 Regulatory Requirements:
  - .1 Wood fire rated doors: labelled and listed by an organization accredited by Standards Council of Canada.
- .7 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .8 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 16 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Wood door delivery, storage and handling shall be in accordance with Part 6, Item 3, of the AWMAC Quality Standards.
- .4 Do not deliver wood doors until the building and storage areas are sufficiently dry so that the wood doors will not be damaged by excessive changes in moisture content.

- .5 Delivered materials which are damaged in any way or do not comply with these specifications will be rejected by the Consultant and shall be removed from the job site and replaced with acceptable materials.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.8 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two (2) years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturers

- .1 Acceptable Manufacturers: Member in good standing of the Architectural Woodwork Manufacturers Association of Canada (AWMAC) with minimum 5 years of production experience similar to this project, whose qualifications indicate ability to comply with requirements of this Section.

2.2 Materials

- .1 All door materials to conform to CSA 0132.2-M.
- .2 Door thickness: as indicated.
- .3 Adhesive: To CSA 0132.2, Type II, water resistant, for interior use.
- .4 Solid Core Wood Doors (SCW) shall be constructed of solid laminated wood core with 50 mm stiles and 76 mm top and bottom rails.
  - .1 Core for non-rated, 20 minute and 45 minute fire rated doors shall be structural composite lumber. All cores shall be drum sanded both sides. Particleboard cores are not acceptable.
  - .2 Core for 60 minute fire-rated doors shall be mineral core.
- .5 Hollow Core Wood Doors (HCW) shall be constructed of mesh or cellular core with lock blocks, 7-ply construction with 50 mm stiles and 76 mm top and bottom rails. ‘
- .6 Faces at doors for opaque finish shall be Closed Grain Hardwood.

2.3 Fire Rated Wood Doors

- .1 Wood doors: tested in accordance with ULC 104 and NFPA 252 to achieve rating as scheduled.

PART 3 EXECUTION

3.1 Fabrication

- .1 Fabricate doors in accordance with CSA 0132.2.
- .2 Provide No. 3 vertical edge strips to match face veneer.

- .3 Bevel vertical edges of single acting doors 3.0 mm on lock side and 1.6 mm on hinge side.
- .4 Prepare doors for hardware.
- .5 Fabricate doors with reinforced openings for louvres, door grilles and glazed lites. Provide manufacturer's standard trim and stops.
- .6 Sand and prepare doors to receive clear urethane finish as indicated on the Room Finish and Door Schedules.

### 3.2 Installation

- .1 Unwrap and protect doors in accordance with CSA-O132.2 Series, Appendix A.
- .2 Install doors and hardware in accordance with manufacturer's printed instructions and CSA-0132.2 Series, Appendix A.
- .3 Install labelled fire rated doors to NFPA 80.
- .4 Install glazing in accordance with Section 08 80 05.
- .5 Adjust hardware for correct function.
- .6 Doors to receive opaque finish as specified in Section 09 91 23.

### 3.3 Final Adjustment

- .1 Re-adjust doors and hardware just prior to completion of building to function freely and properly

### 3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 92 00 Joint Sealants
- .2 Section 08 11 00 Metal Doors and Frames
- .3 Section 08 14 16 Flush Wood Doors
- .4 Section 09 91 23 Interior Painting

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM D1037-12 Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
- .2 American National Standards Institute (ANSI)
  - .1 ANSI A208.1 – Urea-formaldehyde Emissions
- .3 Window and Door Manufacturer's Association (WDMA)
  - .1 ANSI/WDMA I.S. 6A-13 Interior Architectural Stile and Rails Doors
- .4 Architectural Woodwork Standards, latest edition, published jointly by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturer Association of Canada, and the Woodwork Institute.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings: Indicate:
  - .1 Door number
  - .2 Door Type
  - .3 Door Sizes
  - .4 Handing
  - .5 Door elevations
  - .6 Hardware Set Numbers
  - .7 Details of construction
- .3 Samples : Submit 300 x 300 mm door corner samples showing door construction, panel and sticking details as specified

### 1.5 Quality Assurance

- .1 Manufacturer: Shall be a company specializing in the manufacture of stile and rail doors specified in this section for a minimum of 10 years. All stile and rail doors specified in this section MDF, Wood doors shall be supplied and manufactured by one company. All details including panels, sticking and profiles shall match.

### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.



- .2 Storage and Handling : Doors shall be stored and handled in accordance with the manufacturer's recommendations and the WDMA – Appendix Section – “Care and Installation at Job Site”.
  - .1 Doors shall be stored on a flat and level surface in a well ventilated dry building. Doors shall not be stored on edge and shall be protected from dirt, water and abuse.
  - .2 Protect doors from exposure to light for veneers which are light sensitive.
  - .3 Doors shall not be subjected to extreme heat or humidity. HVAC systems should be set to provide a temperature range of 15 – 32 °C and 25-55% relative humidity.
  - .4 Handle doors with clean hands or gloves. Do not drag doors across floors or other surfaces.
  - .5 Each Door shall be marked with the opening number.

#### 1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### PART 2 PRODUCTS

#### 2.1 Manufacturer

- .1 Acceptable Manufacturers, subject to compliance with specifications:
  - .1 TruStile Doors, LLC.
  - .2 Simpson Door Company

#### 2.2 Materials

- .1 Type: MDF Interior Stile and rail doors
  - .1 Door Construction 45 mm Raise Panel Doors: 22 mm Premium grade primed MDF (Medium Density Fiberboard) skins which sandwich individual raised panels. Provide 25 mm Fir Stiles on each vertical edge precision routed into and sandwiched between the MDF skins.
  - .2 Style and panel type as indicated on drawings.
- .2 Stile Construction
  - .1 Core material to be constructed of engineered wood to resist moisture, warping, checking and improved screw pull.
  - .2 Stiles are to be constructed for improved screw holding by use of solid wood edges. Hardwood stiles to match face veneers. Stiles and rails assembled with dowel construction.

#### 2.3 Bifold Doors

- .1 Bifold Doors shall match panel, sticking, profile and design of MDF/Wood Doors specified herein.
- .2 All doors shall have hardwood wedge in the top rail of all door panels for improved screw holding and hardware attachment.
- .3 Bifold Hardware: Manufacturer and Type: L.E. Johnson Products, Inc. Series 111FD folding door hardware set including track, hangers, hinges, pivots, knobs, brackets, screws and all other accessory items.

#### 2.4 Finishes

- .1 MDF doors to be factory prime painted with low VOC, water based primer.

## 2.5 Fabrication

- .1 Fabricate wood doors in accordance with requirements of WDMA I.S. 1 Quality Standards.
- .2 Machining for door hardware: All doors shall be machined for specified hardware that is not surface applied.
- .3 Provide blocking for hardware per hardware manufacturers requirements for hardware to be installed without thru-bolts.
- .4 Prefit and Bevel Doors 3 mm in 50 mm at lock stile.
- .5 Doors shall be factory glazed with glass as specified unless otherwise indicated.

## PART 3 EXECUTION

### 3.1 Examination

- .1 Verification of Conditions: Comply with Section 01600:
  - .1 Before installation, verify that frames are proper size and type for door and are installed plumb and square as required for proper installation of doors.
  - .2 Inspect doors for any damage, manufacturing defects or prefinish inconsistency prior to installation.
  - .3 Notification: Notify General Contractor of unsatisfactory conditions in writing with copy to Consultant.
- .2 Acceptance: Beginning of work will indicate acceptance of existing conditions by installer.

### 3.2 Preparation

- .1 Conditioning: Condition doors to average humidity in installation area prior to hanging.
- .2 Prefitting: Prefit doors to frames and machine for hardware to whatever extent not previously worked at factory as required for proper fit and uniform clearance at each edge.
- .3 Sealing: Before installation of hardware brush apply primer to all job site cut or planed surfaces.
  - .1 Primer: Type recommended by manufacturer.

### 3.3 Installation

- .1 General: Install doors in accordance with manufacturer's recommendations and to comply with WDMA IS 1A and NFPA 80.
  - .1 Installation: By skilled finish carpenters or factory authorized installers.
  - .2 Installer: Thoroughly familiar with the requirements of the manufacturer's door warranty as currently in effect and assure compliance with all provisions.
- .2 Hanging:
  - .1 After sizing doors, fit for hardware as scheduled.
  - .2 Hang doors to be free of binding with hardware functioning properly.

### 3.4 Adjusting and Protection

- .1 Adjustment: Adjust doors and hardware as required and leave in proper operating condition.

- .2 Protection: Advise General Contractor of proper procedures required to protect installed wood doors from damages or deterioration until acceptance of entire project.
- .3 Replacement: Refinish or replace doors damaged during installation.
  - .1 Causes for Rejection: Include chips, scratches or gouges.

3.5 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 92 00 Joint Sealants
- .2 Section 08 53 13 Vinyl Windows

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  - .2 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  - .3 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  - .4 ASTM E1105-15 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
  - .5 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
- .2 CSA Group (CSA)
  - .1 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights
  - .2 CSA A440.2-14/A440.3-14 Fenestration Energy Performance/User Guide to CSA A440.2-14, Fenestration Energy Performance
- .3 American Architectural Manufacturers Association (AAMA)
  - .1 AAMA/WDMA/CSA 101/I.S.2/A440-08 - NAFS - North American Fenestration Standard / Specification for Windows, Doors, and Skylights

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data.
- .3 Shop Drawings: Include door schedule, door elevations, sections and details, and multiple unit assembly details.
- .4 Samples:
  - .1 Colour samples: Minimum 25 x 100 mm samples of PVC with integral colour.
  - .2 Glass, showing specified Low-E.
- .5 Quality Assurance/Control Submittals:
  - .1 Qualifications: Proof of manufacturer's qualifications.
  - .2 Product options: Information on drawings and specifications establish requirements for aesthetic appearance, product trim options, finishes, and performance.
  - .3 Manufacturer's Installation Instructions, with appropriate fastener type, size, depth and install location details.
  - .4 Installation Qualifications: An installer acceptable to the manufacturer for installation of sliding

glass doors.

- .6 Submit operating and maintenance instructions for acoustical vinyl sliding glass doors for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

#### 1.5 System Description

- .1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
  - .2 Insulating glass units in combination with window framing shall be designed by the supplier to comply with energy efficient requirements specified in MMAH Supplementary Standard SB-10. Submit engineered shop drawings, calculations and certificates certifying compliance with that standard.

#### 1.6 Design Requirements

- .1 Design sliding glass doors in accordance with Climatic Design Data as contained in the Ontario Building Code:
  - .1 Design temperature: January 1%, July 2 ½%.
  - .2 Wind (Hourly Wind Pressures): 1 in 30 year occurrence.
- .2 Design sliding glass doors to accommodate the following without detrimental effect:
  - .1 Cyclic 40 °C daily, thermal swing of components.
  - .2 Cyclic, dynamic loading and release of loads such as wind loads.
  - .3 13 mm vertical deflection in the supporting structure and movement of supporting structure due to live, dead load, and creep or deflection, seismic load, sway displacement and similar items.
- .3 Design sliding glass door systems in accordance with following CSA-A440 classification ratings:
  - .1 Air tightness: A2
  - .2 Water tightness: B2
  - .3 Wind Load resistance: C2
  - .4 Temperature Index: 166.
- .4 Sliding glass doors to be Energy Star certified to Natural Resources Canada.
- .5 Design and detail controlled drainage path to discharge water which enters into or forms within windows, to exterior. Prevent accumulation or storage of water within the windows.
- .6 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to L/175 maximum (under uniformly distributed positive load) and 10 mm maximum regardless of span.
- .7 Design anchorage inserts for installation as part of other sections of the Work. Design anchorage assemblies to accommodate construction and installation tolerances.
- .8 Design window glazing system ensuring a minimum STC rating of 38: Comply with Sound Transmission Class Testing - ASTM E90
- .9 Energy Star certified.

### 1.7 Quality Assurance

- .1 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-up:
  - .1 Construct one field sample mock-up of window in location acceptable to Consultant.
  - .2 Demonstrate installation of anchorage devices and air/vapor retarder sealing and relation of window to surrounding construction.
  - .3 Arrange for Consultant's review and acceptance.
  - .4 Mock-up may remain as part of the Work if accepted by Consultant.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

### 1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .4 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Protect windows from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

### 1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

## PART 2 PRODUCTS

### 2.1 Manufacturers

- .1 Manufacture: The following manufacturers are considered as acceptable subject to approval by the Consultant, of supporting technical literature, samples, drawings, engineering and performance data.
  - .1 Aurora
  - .2 Mason Windows
  - .3 Nordic
  - .4 North Star Windows
  - .5 Pella
  - .6 Rehau Industries
  - .7 Sound Control Systems

### 2.2 Sliding Door Types

- .1 Sound Control Systems V-82 Series or equivalent acoustic vinyl sliding glass door:

- .1 Frame: Minimum 151 x 48 mm, extruded multi-chambered vinyl profile.
- .2 Panel Frame: Minimum 90 x 50 mm, extruded multi-chambered vinyl profile.
- .3 Sill: 151 x 45 mm, extruded multi-chambered vinyl profile.
- .4 Design Pressure: (SGD-C35) minimum.

### 2.3 Materials

- .1 Vinyl: Integral colour PVC compound containing impact-resistant solid plasticizer, titanium dioxide UV inhibitor, and surface and colour stabilizers.
  - .1 Comply with AAMA/WDMA/CSA 101/I.S. 2/A440.

Aluminum exterior sub-frame. Constructed of extruded aluminum, (6063 T5/T6 alloy) free of defects. Consisting of head, jamb and sill components, with brickmould, flat casing, and clad cap trim profiles.

- .2 Head & Jambs: 1.57 and 1.77 mm
  - .3 Sill: 1.27 mm
  - .4 Brickmould Casing: 1.27 mm
  - .5 Flat Casing: 1.27 mm
  - .6 Clad Cap: 1.27 mm
- .2 Weatherstripping: Fin seal polypropylene pile.
  - .3 Sliding Screen: Heavy-duty, 76 mm wide extruded aluminum frame, (1.27 mm wall thickness). Mitered corner, assembled with corner gussets and corner screws.
    - .1 Screen Cloth: Charcoal coloured fiberglass mesh
  - .4 Fasteners: Stainless Steel: AISI 300 Series
    - .1 Fasteners shall be selected to prevent galvanic reaction with any reinforcement materials fastened.
    - .2 Above criteria is applicable to screws used to secure internal reinforcement and to fasteners used in window mulling connections, if required.
    - .3 Avoid exposed fasteners to greatest extent possible.
    - .4 Where exposed fasteners are unavoidable in finished surfaces, use flathead countersunk Phillips head screws.
  - .5 Sealants: As specified in section 07 92 00.

### 2.4 Glazing

- .1 Glass shall comply with requirements of AAMA/WDMA/CSA 101/I.S.2/A440-05, Section 6.2 and the GANA Glazing Manual.
- .2 Insulating Glass Units: To CAN/CGSB-12.8-M, double glazed sealed units, 25 mm overall thickness.
  - .1 Glass: to CAN/CGSB-12.1 (tempered)
  - .2 Glass thickness: minimum 6.4 mm each light
  - .3 Inter-cavity space thickness: 12.7 mm with low conductivity spacers.
  - .4 Glass coating: surface number 2, low "E".
  - .5 Inert gas fill: argon.

### 2.5 Hardware

- .1 Handle Lock: Inside and outside pull handle with lever operated multi-point lock. Colour to match door frame.

- .2 Rollers: Two sets of stainless steel, self-leveling tandem, ball bearing, 38 mm diameter, rollers on raised stainless steel snap-in track.

#### 2.6 Isolation Coating

- .1 Primers, Coatings: in accordance with manufacturer's recommendations for surface conditions.

#### 2.7 Vinyl Finishes

- .1 Frame and Sash Colour: Colour to be selected by Consultant from manufacturer's standards
- .2 Colour match door hardware and screen frame to main frame and sash colour.

#### 2.8 Air Barrier and Vapour Retarder

- .1 Equip frames with factory installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
  - .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
  - .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

#### 2.9 Fabrication

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
  - .1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
  - .2 Face dimensions detailed are maximum permissible sizes.
  - .3 Brace frames to maintain squareness and rigidity during shipment and installation.
  - .4 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40.
  - .5 Factory Glazed: Silicone sealant (wet glazed), utilizing exterior snap-in PVC glazing beads matching interior sash and frame finish. Units shall be re-glazable without dismantling sash framing.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Examine openings in which doors will be installed.
  - .1 Verify sill is flat and level, and jambs are plumb.
  - .2 Verify framing is in good structural condition free of dry rot or decay. Verify framing is solidly anchored and capable of supporting the installation and operation of the door in all respects.
- .2 Coordinate with responsible entity to correct unsatisfactory conditions.

#### 3.2 Installation

- .1 Install doors in framed walls in accordance with manufacturer's installation instructions.
- .2 Do not remove temporary labels.



.3 Seal all around perimeter of sliding door frames as specified in Section 07 92 00.

3.3 Adjusting

.1 Adjust operating panels and hardware for smooth operation and tight fit with weatherstripping.

3.4 Cleaning

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

.2 Remove temporary labels and retain for Closeout Submittals.

.3 Clean soiled surfaces and glass using a mild detergent and warm water solution with soft, clean cloths.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM D3363-05(2011)e2 Standard Test Method for Film Hardness by Pencil Test
  - .2 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings: indicate material details, construction and accessory details, operating mechanisms and required clearances.
- .3 Submit sample of door section showing construction, workmanship and finish.
- .4 Operation and Maintenance Data: Provide operation and maintenance data for rolling metal door hardware and operators regarding adjustment, maintenance and troubleshooting for incorporation into operation and maintenance manual specified under Section 01 78 00.

### 1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

### 1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.7 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

## PART 2 PRODUCTS

### 2.1 Manufacturers

- .1 Rolling metal doors as manufactured by the following are acceptable:
  - .1 Cookson Co Inc.
  - .2 Amstel Manufacturing Inc.

- .3 Kinnear
- .4 Richards Wilcox of Canada Ltd.

## 2.2 Products

- .1 Rolling Metal Doors:
  - .1 Cookson Model ESD20 or approved equivalent. Manually operated insulated rolling service door.
- .2 Curtain
  - .1 Fabrication
    - .1 Slat Material: No. 6F, (Listed Exterior/Interior):
    - .2 Aluminum/Aluminum: 1.016 mm aluminum
    - .3 Insulation: 22 mm foamed-in-place, closed cell urethane
    - .4 Total Slat Thickness: 24 mm
    - .5 Flame Spread Index of 0 and a Smoke Developed Index of 10 as tested per ASTM E84
    - .6 R-value: 8.0
    - .7 STC Rating: Up to 30 for the curtain and up to 32 for the entire assembly, as tested per ASTM E90 and based on testing a complete, operable assembly.
  - .2 Exterior Slat finish: Aluminum: Clear anodized
  - .3 Interior Slat finish: Aluminum: Clear anodized.
- .3 Endlocks: Fabricate interlocking sections with high strength nylon endlocks on alternate slats each secured with two 6.35 mm rivets. Provide windlocks as required to meet specified wind load.
- .4 Bottom Bar
  - .1 Insulated Bottom Bar: Reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 102 mm tall x 27 mm thickness.
  - .2 Finish to match slats
- .5 Guides
  - .1 Fabrication
    - .1 Minimum 4.76 mm structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.
    - .2 Top 420 mm of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain service.
  - .2 Finish: Powder Coat (Colour Selected by Consultant): Zirconium pre-treatment followed by baked-on polyester powder coat, minimum 0.065 mm cured film thickness; ASTM D3363 pencil hardness: H or better.
- .6 Counterbalance Shaft Assembly:
  - .1 Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 2.5 mm per meter of width
  - .2 Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 110 N. Provide wheel for applying and adjusting spring torque.

.7 Brackets:

- .1 Fabricate from minimum 5 mm steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
- .2 Finish: Powder Coat (Colour Selected by Consultant): Zirconium pre-treatment followed by baked-on polyester powder coat, minimum 0.065 mm cured film thickness; ASTM D3363 pencil hardness: H or better.

.8 Hood

- .1 Minimum 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 6.35 mm steel intermediate support brackets as required to prevent excessive sag.
- .2 Finish: Powder Coat (Colour Selected by Consultant): Zirconium pre-treatment followed by baked-on polyester powder coat, minimum 0.065 mm cured film thickness; ASTM D3363 pencil hardness: H or better.

.9 Weatherstripping

- .1 Bottom Bar: Manually Operated Doors: Replaceable, bulb-style, compressible EDPM gasket extending into guides.
- .2 Guides: Replaceable vinyl strip on guides sealing against both sides of curtain.
- .3 Hood: Neoprene/rayon baffle to impede air flow above coil.
- .4 Lintel Seal: Nylon brush seal fitted at door header to impede air flow.

.10 Operation: Manual Chain Hoist: Provide chain hoist operator with endless steel chain, chain pocket wheel and guard, geared reduction unit, and chain keeper secured to guide. Chain hoist to include integral brake mechanism that will immediately stop upward or downward travel and maintain the door in a stationary position when the hand chain is released by the user.

.11 Locking: Padlockable slide bolt on fascia side of bottom bar at each jamb extending into slots in guides.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
- .2 Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- .3 Commencement of work by installer is acceptance of substrate.

#### 3.2 Installation

- .1 General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.
- .2 Follow manufacturer's installation instructions.

#### 3.3 Adjusting

- .1 Upon completion of the work of this Section, and in the presence of the Owner's representative, inspect, test and adjust installation to ensure smooth dependable operation.

.2 Test all operable elements and ensure easy and smooth operation.

3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- |     |                  |   |
|-----|------------------|---|
| .1  | Section 06 10 00 | Rough Carpentry                         |
| .2  | Section 07 21 13 | Building Insulation                     |
| .3  | Section 07 24 33 | Prefabricated EIFS Wall Panels          |
| .4  | Section 07 26 00 | Vapour Retarders                        |
| .5  | Section 07 27 15 | Modified Bituminous Sheet Air Barriers. |
| .6  | Section 07 92 00 | Joint Sealants.                         |
| .7  | Section 08 32 16 | Vinyl Sliding Glass Doors               |
| .8  | Section 08 53 13 | Vinyl Windows                           |
| .9  | Section 08 80 05 | Glazing                                 |
| .10 | Section 09 21 16 | Gypsum Board                            |

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  - .2 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  - .3 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  - .4 ASTM E1105-15 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
  - .5 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-79.1-M91, Insect Screens
- .3 CSA Group (CSA)
  - .1 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights
  - .2 CSA A440.2-14/A440.3-14 Fenestration Energy Performance/User Guide to CSA A440.2-14, Fenestration Energy Performance
  - .3 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 American Architectural Manufacturers Association (AAMA)
  - .1 AAMA/WDMA/CSA 101/I.S.2/A440-08 - NAFS - North American Fenestration Standard / Specification for Windows, Doors, and Skylights
  - .5 Aluminum Association (AA), Designation System for Aluminum Finishes (2000)
- .6 Ontario Ministry of Municipal Affairs and Housing (MMAH)
  - .1 Ontario Building Code
  - .2 MMAH Supplementary Standard SB-10, Energy Efficiency Requirements.

### 1.4 Submittals

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

- .2 Submit shop drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
    - .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes, fasteners, and caulking. Indicate location of manufacturer's nameplates.
    - .2 Submit point to point wiring diagrams for electric strikes.
  - .3 Submit test reports from approved independent testing laboratories, certifying compliance with specified performance characteristics and physical properties, for:
    - .1 Energy efficiency (MMAH SB-10 compliance for complete assembly including glass units)
    - .2 Anodized finish, weathering characteristics.
    - .3 Air infiltration
    - .4 Water tightness.
    - .5 Wind load resistance.
    - .6 Condensation resistance.
    - .7 Mullion deflection.
  - .4 Certificates: submit product certificates signed by manufacturer certifying materials and assemblies comply with specified performance characteristics and criteria and physical requirements.
  - .5 Closeout Submittals: Provide operation and maintenance data for doors, screens and hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.5 System Description
- .1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
    - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
  - .2 Insulating glass units in combination with storefront framing shall be designed by the supplier to comply with energy efficient requirements specified in MMAH Supplementary Standard SB-10. Submit engineered shop drawings, calculations and certificates certifying compliance with that standard.
- 1.6 Shipping, Handling and Storage
- .1 Refer to Section 01 61 00 – Common Product Requirements.
  - .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- 1.7 Waste Management and Disposal
- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- 1.8 Protection
- .1 Protect the work of this trade from damage. Protect work of other trades resulting from the work of this Section.

- .2 Provide at the factory, strippable coatings on all exposed surfaces of aluminum. This coating and protective wrappings shall remain on the surfaces through the period that other trades' works proceed on the building and shall be removed on completion of the building.
- .3 Make good all damaged work caused by failure to provide adequate protection. Remove unsatisfactory work and replace at no expense to the Owner.

#### 1.9 Field Quality Control

- .1 Manufacturer's field services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 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.
- .3 Field Tests: Consultant shall select units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
  - .1 Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
    - .1 Air Leakage Tests: Conduct tests in accordance with ASTM E783. Allowable air leakage shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft<sup>2</sup>, whichever is greater.
    - .2 Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 383 Pa.
  - .2 Evaluate installed system by thermo-photographic scan.
- .4 Obtain reports within three days of review and submit immediately to Consultant.

#### 1.10 Sequencing

- .1 Co-ordinate work of this Section with air barrier placement, flashing placement, and other related components or materials.

#### 1.11 Project Conditions

- .1 Do not install sealants when ambient and surface temperature is less than 5 °C. Maintain this minimum temperature during and after installation of sealants.

#### 1.12 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.



- .2 Provide a warranty stating that the anodized finish will be non-fading, nonconvertible, and permanently a part of the metal surface for a period of five years from the date of Substantial Performance. The warranty shall state that any item showing failure during the warranty period will be replaced or refinished to the original condition, at no cost to the Owner.

## PART 2 PRODUCTS

### 2.1 Manufacturers

- .1 Manufacture: The following manufacturers are considered as acceptable subject to approval by the Consultant, of supporting technical literature, samples, drawings, engineering data and performance data:
  - .1 Alumicor
  - .2 Commdoor
  - .3 CRL United States Aluminum
  - .4 Kawneer
  - .5 Oldcastle
  - .6 Windspec
  - .7 Zimcor

### 2.2 Materials

- .1 General: to CSA A440/A440.1 supplemented as follows:
  - .1 All storefront framing shall be by same manufacturer.
  - .2 Main frame: aluminum, thermally broken.
  - .3 Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.
- .2 Aluminum Extrusions: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish and not less than 1.8 mm wall thickness at any location for the main frame and complying with ASTM B221: 6063-T6 alloy and temper.
- .3 Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components. Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials. Stainless steel where exposed.
- .4 Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- .5 Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- .6 Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- .7 Sealant: For sealants required within fabricated systems, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- .8 Glass: Double glazed as scheduled and as specified in Section 08 80 05.
- .9 Exterior aluminum sills and facings: extruded aluminum and brake formed aluminum sheet metal of type and size to suit job conditions; minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors and anchoring devices.
- .10 Isolation coating: alkali resistant bituminous paint. Coating material shall be low VOC type conforming to SCAQMD Rule 1113-96.

## 2.3 Screen Types

- .1 Entrance Framing:
  - .1 Exterior Units: Thermally Broken Storefront Framing: thermally broken, inside glazed.
  - .2 Interior Units: Non-Thermally Broken Storefront Framing:
  - .3 Classification rating: to CSA-A440/A440.1.
  - .4 Air Tightness: A3: 0.20 (m<sup>3</sup>/h)m 1
  - .5 Water tightness: B3.
  - .6 Wind load resistance: C3.
  - .7 Condensation resistance: Temperature Index, If = 58.1

## 2.4 Doors

- .1 Interior Doors
  - .1 To size indicated on schedules and drawings.
  - .2 Medium stile with intermediate horizontal rails where detailed.
  - .3 Reinforce doors for continuous hinges.
  - .4 Clear anodized finish.
  - .5 Rails and stiles to be 90 mm ± wide, bottom rail 165 mm ± high. Frame 45 mm thick.
  - .6 Door members to be 3.0 mm nominal thickness. Glazing mouldings to be lock in type with glazing gaskets. Provide flush stops for insulating glass in exterior doors.
  - .7 Interior glass: clear, 6.0 mm thick, tempered.
- .2 Exterior Doors
  - .1 To size indicated on schedules and drawings.
  - .2 Thermally broken medium stile with intermediate horizontal rails where detailed.
  - .3 The door stile and rail face dimensions of the entrance door will be as follows:
    - .1 Vertical Stile 103.2 mm,
    - .2 Top Rail 103.2 mm,
    - .3 Bottom Rail 179.4 mm
  - .4 Major portions of the door members to be 3.2 mm nominal in thickness and glazing molding to be 1.3 mm thick.
  - .5 Reinforce doors for continuous hinges.
  - .6 Clear anodized finish.
  - .7 Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
  - .8 Provide adjustable glass jacks to help center the glass in the door opening.
  - .9 Exterior glass: 25 mm sealed units, insulating glass.

## 2.5 Door Hardware

- .1 Provide the following hardware for aluminum doors, as appropriate to location and configuration and as indicated:
  - .1 Exterior Door:
    - .1 1 ½ pair stainless steel ball bearing butt hinges.
      - .1 Door width: Up to 915 mm: 114 mm x 102 mm hinge
      - .2 Door width: Over 915 mm: 127 mm x 114mm hinge.
    - .2 Kawneer 1786 Rim Exit Device.
      - .1 Cylinder provided under Section 08 71 00.
    - .3 Style CO-12 Architects Classic Pull with clear anodized finish.
    - .4 Extruded aluminum threshold for barrier free access, 102 mm wide x 12 mm high.
    - .5 Weather-seal to head and jambs. Door seal to be aluminum with sponge neoprene a minimum of 6.0 mm thick, width to suit frame. Type TW2000.
    - .6 Door sweeps: Sealeze EB 395 EPDM blade gasket x door width.
    - .7 Electric Door Operators: As specified in Hardware Schedule
    - .8 Wall mounted card reader (by Division 28).
    - .9 Electric Strike. Assa Abloy HES 4500/9500/9600 Series to suit application. Installer to configure strike wiring to match input power.
  - .2 Interior Door:
    - .1 1 ½ pair stainless steel ball bearing butt hinges.
      - .1 Door width: Up to 915 mm: 114 mm x 102 mm hinge
      - .2 Door width: Over 915 mm: 127 mm x 114mm hinge.
    - .2 Style 'CS-15' Architects Classic Pull with finish to match door.
    - .3 Style CP-II Architects Classic Single Acting Push Bar
    - .4 Electric Door Operators: As specified in Hardware Schedule

## 2.6 Fabrication

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
  - .1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
  - .2 Face dimensions detailed are maximum permissible sizes.
  - .3 Brace frames to maintain squareness and rigidity during shipment and installation.
  - .4 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40.

## 2.7 Aluminum Finishes

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
- .2 Clear anodic finish: designation AA- AA M10C22A41, not less than 18 micrometre thick, Architectural Class I designation.

## 2.8 Isolation Coating

- .1 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials to provide isolation coating. Isolate aluminum from following:
  - .1 Dissimilar metals, except stainless steel, zinc, or white bronze of small area.
  - .2 Concrete, mortar, masonry and other alkaline materials.

## 2.9 Glazing

- .1 Glaze doors and screens in accordance with CSA A440 and Section 08 80 05 – Glazing.

## 2.10 Air Barrier and Vapour Retarder

- .1 Equip frames with site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
  - .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
  - .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

## PART 3 EXECUTION

### 3.1 Screen Installation

- .1 Install in accordance with CSA A440, shop drawings and manufacturer's instructions.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Erect and secure units in prepared openings, plumb and square, free from warp, twist or superimposed loads.
- .4 Secure work accurately to structure and in a manner not restricting thermal movement of materials.
- .5 Provide shims under sill frame at setting block locations, and as recommended by manufacturer.
- .6 Conceal all anchors and fitments. Exposed heads of fasteners not permitted.
- .7 Mechanically fasten flexible membrane air and vapour seal to frame with continuous aluminum channel as detailed on drawings.
- .8 Maintain dimensional tolerances after installation. Maintain alignment with adjacent work.
- .9 Isolate aluminum surfaces from dissimilar materials adjacent after installation, using coating of bituminous paint.
- .10 Seal framing joints with butyl polyisobutylene or silicone sealant.
- .11 Install glazing splines and gaskets uniformly, with accurately formed corners and bevels. Ensure that proper contact is made with glass and rabbet interfaces.
- .12 Continuously and uniformly compress glazing splines and gaskets during installation.

### 3.2 Sill Installation

- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.

- .2 Cut sills to fit opening.
- .3 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.
- .4 Fasten joint cover plates and drip deflectors with self-tapping stainless steel screws.
- .5 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

### 3.3 Door Installation

- .1 Erect and secure aluminum framing plumb, square and level, free from warp, twist or superimposed loads.
- .2 Use concealed fastenings where possible. Where concealed fasteners are not feasible, use flat headed screws in countersink holes. Exposed bolt or nut heads are not permitted.
- .3 Match exposed fastenings with finish or surfaces on which they occur.
- .4 Assess each component for appearance and colour. Any variations in appearance and colour will not be permitted.
- .5 Secure work adequately and accurately to the structure in the required position.
- .6 Install and adjust hardware in accordance with hardware templates and manufacturer's instructions. Coordinate installation of Automatic Door Operators with Section 08 71 10.

### 3.4 Caulking

- .1 Seal joints between framing and sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within units except where exposed use is permitted by Consultant.

### 3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Wash down exposed interior metal surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.
- .3 Clean exposed exterior non-metal surfaces as recommended by manufacturer of the material.
- .4 Clean interior and exterior surfaces as soon as adjacent construction which might soil surfaces, is completed.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 24 33 Prefabricated EIFS Wall Panels
- .4 Section 07 26 00 Vapour Retarders
- .5 Section 07 27 15 Modified Bituminous Sheet Air Barriers.
- .6 Section 07 92 00 Joint Sealants.
- .7 Section 08 32 16 Vinyl Sliding Glass Doors

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A123/A123M-13 Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  - .3 ASTM E783-02(2010) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  - .4 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
  - .5 ASTM E1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.
- .2 Aluminum Association (AA)
  - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes
- .3 CSA Group (CSA)
  - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
  - .2 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights
- .4 South Coast Air Quality Management District (SCAQMD)
  - .1 SCAQMD Rule 1168-05 Adhesives and Sealants.
- .5 Screen Manufacturers Association (SMA)
  - .1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.
- .6 Ontario Ministry of Municipal Affairs and Housing (MMAH)
  - .1 MMAH Supplementary Standard SB-10, Energy Efficiency Requirements.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings.
  - .1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes, fasteners, and caulking. Indicate location of manufacturer's nameplates.

- .3 Submit test reports from approved independent testing laboratories, certifying compliance with specified performance characteristics and physical properties, for:
  - .1 Energy efficiency (MMAH SB-10 compliance for complete assembly including glass units)
  - .2 Windows classifications.
  - .3 Finish weathering characteristics.
  - .4 Air infiltration
  - .5 Water tightness.
  - .6 Wind load resistance.
  - .7 Condensation resistance.
  - .8 Forced entry resistance.
  - .9 Mullion deflection.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials and assemblies comply with specified performance characteristics and criteria and physical requirements.
- .5 Provide maintenance data for vinyl windows for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

#### 1.5 System Description

- .1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
  - .2 Insulating glass units in combination with window framing shall be designed by the supplier to comply with energy efficient requirements specified in MMAH Supplementary Standard SB-10. Submit engineered shop drawings, calculations and certificates certifying compliance with that standard.

#### 1.6 Design Requirements

- .1 Design windows in accordance with Climatic Design Data as contained in the Ontario Building Code:
  - .1 Design temperature: January 1%, July 2 ½%.
  - .2 Wind (Hourly Wind Pressures): 1 in 30 year occurrence.
- .2 Design windows to accommodate the following without detrimental effect:
  - .1 Cyclic 40 °C daily, thermal swing of components.
  - .2 Cyclic, dynamic loading and release of loads such as wind loads.
  - .3 13 mm vertical deflection in the supporting structure and movement of supporting structure due to live, dead load, and creep or deflection, seismic load, sway displacement and similar items.
- .3 Design window systems in accordance with following CSA-A440 classification ratings:
  - .1 Air tightness: A2
  - .2 Water tightness: B2
  - .3 Wind Load resistance: C2
  - .4 Temperature Index: 166.
- .4 Windows to be Energy Star certified to Natural Resources Canada.
- .5 Design and detail controlled drainage path to discharge water which enters into or forms within windows, to exterior. Prevent accumulation or storage of water within the windows.

- .6 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to L/175 maximum (under uniformly distributed positive load) and 10 mm maximum regardless of span.
- .7 Design anchorage inserts for installation as part of other sections of the Work. Design anchorage assemblies to accommodate construction and installation tolerances.
- .8 Design window glazing system ensuring a minimum STC rating of 30. Comply with Sound Transmission Class Testing - ASTM E90.

#### 1.7 Quality Assurance

- .1 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-up:
  - .1 Construct one field sample mock-up of window in location acceptable to Consultant.
  - .2 Demonstrate installation of anchorage devices and air/vapor retarder sealing and relation of window to surrounding construction.
  - .3 Arrange for Consultant's review and acceptance.
  - .4 Mock-up may remain as part of the Work if accepted by Consultant.
  - .5 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

#### 1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .4 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Protect windows from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

#### 1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

### PART 2 PRODUCTS

#### 2.1 Manufacturers

- .1 Manufacture: The following manufacturers are considered as acceptable subject to approval by the Consultant, of supporting technical literature, samples, drawings, engineering and performance data.



- .1 Aurora
- .2 Mason Windows
- .3 Nordic
- .4 North Star Windows
- .5 Pella
- .6 Rehau Industries

## 2.2 Window Type

- .1 Fixed and casement type vinyl windows as s indicated.
- .2 Operable units shall comply with Ontario Building Code requirements for maximum opening dimensions.
- .3 Operable units shall be fitted with removeable insect screens and all necessary hardware.
- .4 Energy Star certified.

## 2.3 Materials

- .1 Vinyl: Integral colour PVC compound containing impact-resistant solid plasticizer, titanium dioxide UV inhibitor, and surface and colour stabilizers.
  - .1 Comply with AAMA/WDMA/CSA 101/I.S. 2/A440.
- .2 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:
  - .1 Sash: vinyl.
  - .2 Main frame: vinyl, thermally broken.
- .3 Weatherseals: Black polymer (EPDM) replaceable weatherseals:
  - .1 Shapes, designs, and thickness as needed to satisfy performance requirements.
  - .2 Weatherseals shall be provided in continuous lengths, butted firm to ends of races and to each other when in the same planes.
- .4 Screens: to ASTM E1748 on the ventilating portion of the windows.
  - .1 Insect screening mesh: count 18 x 14. Charcoal coloured.
  - .2 Fasteners: tamper proof.
  - .3 Screen frames: aluminum colour to match window frames.
  - .4 Mount screen frames for exterior replacement.
- .5 Interior and exterior sills and facings brake formed aluminum sheet metal of type and size to suit job conditions; minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, and anchoring devices.
- .6 Fasteners: Stainless Steel: AISI 300 Series
  - .1 Fasteners shall be selected to prevent galvanic reaction with any reinforcement materials fastened.
  - .2 Above criteria is applicable to screws used to secure internal reinforcement and to fasteners used in window mulling connections, if required.
  - .3 Avoid exposed fasteners to greatest extent possible.
  - .4 Where exposed fasteners are unavoidable in finished surfaces, use flathead countersunk Phillips head screws.
- .7 Sealants: As specified in section 07 92 00.

## 2.4 Glazing

- .1 Glass shall comply with requirements of AAMA/WDMA/CSA 101/I.S.2/A440-05, Section 6.2 and the GANA Glazing Manual.
- .2 Insulating Glass Units: To CAN/CGSB-12.8-M, double glazed sealed units, 22 mm minimum overall thickness.
  - .1 Glass: to CAN/CGSB-12.1 (tempered)
  - .2 Glass thickness: minimum 4 mm each light
  - .3 Inter-cavity space thickness: 12.7 mm with low conductivity spacers.
  - .4 Glass coating: surface number 2, low "E".
  - .5 Inert gas fill: argon.
  - .6 STC rating: 30

## 2.5 Hardware

- .1 Hardware: stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.
- .2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.
- .3 Include special keyed opening device for windows normally locked.

## 2.6 Isolation Coating

- .1 Primers, Coatings: in accordance with manufacturer's recommendations for surface conditions.

## 2.7 Vinyl Finishes

- .1 Vinyl finishes: in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, including appendices, supplemented as follows:
  - .1 Colour to be selected by Consultant from manufacturer's standards

## 2.8 Air Barrier and Vapour Retarder

- .1 Equip frames with factory installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
  - .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
  - .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

## 2.9 Fabrication

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
  - .1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
  - .2 Face dimensions detailed are maximum permissible sizes.
  - .3 Brace frames to maintain squareness and rigidity during shipment and installation.
  - .4 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40.

- .5 Factory Glazed: Silicone sealant (wet glazed), utilizing exterior snap-in PVC glazing beads matching interior sash and frame finish. Units shall be re-glazable without dismantling sash framing.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Verification of Conditions: verify conditions of substrates previously installed are acceptable for product installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied [and after receipt of written approval to proceed from Consultant.

#### 3.2 Installation

- .1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, shop drawings and manufacturer's instructions.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Install shims between windows and building frame at each installation screw location. Shim and fasten windows in accordance with manufacturer's recommendations and CAN/CSA A440.4.
- .4 Sill installation:
  - .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
  - .2 Cut sills to fit window opening.
  - .3 Secure sills in place with anchoring devices located at ends and evenly spaced 600 mm on centre in between.
- .5 Fasten drip deflectors with self-tapping stainless steel screws.
- .6 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.

#### 3.3 Caulking

- .1 Seal joints between windows and surrounding construction, interior and exterior, with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Consultant.

#### 3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Wash down exposed interior surfaces using a solution of mild domestic detergent in warm water, applied with soft clean wiping cloths.

- .3 Clean exposed exterior surfaces as recommended by manufacturer of the material.
- .4 Clean interior and exterior surfaces as soon as adjacent construction which might soil surfaces, is completed.

3.5 Protection

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 92 00 Joint Sealants
- .2 Section 08 11 00 Metal Doors and Frames
- .3 Section 08 32 16 Vinyl Sliding Glass Doors
- .4 Section 08 50 00 Aluminum Doors, Windows and Screens
- .5 Section 08 53 13 Vinyl Windows
- .6 Section 10 28 10 Toilet and Bath Accessories

### 1.3 References

- .1 ASTM International (ASTM).
  - .1 ASTM C162-05 (2015) Standard Terminology of Glass and Glass Products.
  - .2 ASTM C542-05(2017) Standard Specification for Lock-Strip Gaskets
  - .3 ASTM C1048-18 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
  - .4 ASTM C1376-15 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
  - .5 ASTM C1503-18 Standard Specification for Silvered Flat Glass Mirrors
  - .6 ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
  - .7 ASTM D1003-13 Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics
  - .8 ASTM D1929-16 Standard Test Method for Determining Ignition Temperature of Plastics
  - .9 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
  - .10 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials
  - .11 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  - .12 ASTM E1300-16 Standard Practice for Determining Load Resistance of Glass in Buildings
- .2 American National Standards Institute (ANSI).
  - .1 ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- .3 National Fire Protection Association
  - .1 NFPA 80 Standard for Fire Doors, Fire Windows.
- .4 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-12.1-17 Safety Glazing
  - .2 CAN/CGSB-12.2-91 (R2017) Flat, Clear Sheet Glass.
  - .3 CAN/CGSB-12.3-91 (R2017) Flat, Clear Float Glass.
  - .4 CAN/CGSB-12.4-91 (R2017) Heat Absorbing Glass
  - .5 CAN/CGSB-12.8-17 Insulating Glass Units
- .5 CSA Group (CSA).
  - .1 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights
- .6 Consumer Product Safety Commission
  - .1 CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
- .7 Environmental Choice Program (ECP).
  - .1 CCD-045-95 Sealants and Caulking.
- .8 Flat Glass Manufacturers Association (FGMA).

- .1 FGMA Glazing Manual - 1997.
- .9 Glass Association of North America (GANA)
  - .1 GANA Glazing Manual 50th Anniversary Edition-2008.
  - .2 GANA Laminated Glazing Reference Manual - 2009.
  - .3 GANA Sealant Manual-2008.
  - .4 GANA Guide to Architectural Glass (2010).
  - .5 GANA/PGC International Protective Glazing Manual (2010).
- .10 South Coast Air Quality Management District, California State (SCAQMD)
  - .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.
- .11 Ontario Ministry of Municipal Affairs and Housing (MMAH)
  - .1 Ontario Building Code
  - .2 MMAH Supplementary Standard SB-10, Energy Efficiency Requirements.

#### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials and assemblies comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Samples: Submit duplicate 300 x 300 mm size samples of glass and sealant material.
- .7 Manufacturer's Instructions: Submit manufacturer's installation instructions.
- .8 Provide maintenance data for glazing for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

#### 1.5 Quality Assurance

- .1 Perform work in accordance with FGMA Glazing Manual and Laminators Safety Glass Association Standards Manual for glazing installation methods.
- .2 Installer: Company specializing in the installation of structural glazing with five years proven experience and approved by the manufacturer for installation of their products.
- .3 Safety glass products shall comply with the testing requirements of CAN/CGSB-12.1, Type 1 for Laminated Glass and Type 2 for Tempered Glass.
- .4 Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.
  - .1 GANA Publications
  - .2 AAMA Publications
  - .3 IGMA/IGMAC Publications
- .5 Provide safety glass permanently marked with the company name or logo and CAN/CGSB-12.1 if the product meets categories 1 and 2, or mark as CAN/CGSB 12.1M-1 if the product meets the

requirements of Category 1 only.

- .6 Insulating Glass products are to be permanently marked either on spacers or at least one insulating unit component with appropriate certification label of the Insulating Glass Manufacturers Alliance (IGMA) or Insulating Glass Manufacturers Association of Canada (IGMAC)
- .7 Single-source fabrication responsibility: All glass fabricated for each type shall be processed and supplied by a single fabricator.
- .8 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .9 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

#### 1.6 System Description

- .1 Performance Requirements: Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
  - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
  - .2 Insulating glass units in combination with aluminum window, storefront or curtain wall framing specified elsewhere shall be designed by the supplier to comply with energy efficient requirements specified in MMAH Supplementary Standard SB-10. Submit engineered shop drawings, calculations and certificates certifying compliance with that standard.

#### 1.7 Design Requirements

- .1 Design glass, glazing channels, connections, attachments and glazing accessories to withstand loads designated by the Ontario Building Code and to accommodate all building deflections.
- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of 1.2 kPa as measured in accordance with ANSI/ASTM E330.
- .3 Limit glass deflection to 1/200 with full recovery of glazing materials.
- .4 Glass thicknesses indicated are minimum and are for detailing only. Confirm glass thickness by analyzing project conditions, including in-service conditions and loads. Provide glass lites for various size openings in nominal thicknesses indicated but not less than required to meet performance requirements of referenced standards including energy efficiency requirements of MMAH-SB-10. Coordinate glass thicknesses with manufacturers of framing systems.

#### 1.8 Project Conditions

- .1 Install glazing when ambient temperature is 10 ° C minimum. Maintain ventilated environment for 24 hours after application.
- .2 Maintain minimum ambient temperature before, during and for 24 hours after installation of glazing compounds.

#### 1.9 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Provide glass units with interleaving protection between lites. Keep glass and interleaving dry and

store cases in clean, cool, dry areas with temperatures above the dew point. Circulation of cool, dry air in storage areas is essential. Open cases and inspect units periodically for moisture accumulation.

- .4 Do not store glass in direct sunlight without an opaque protective covering over same.

#### 1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.11 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.
- .2 Warrant insulating glass units for ten years from date of Substantial Performance against seal failure, interpane dusting, or interpane misting.
- .3 Warrant low-emissivity coatings when applied to the second or third surfaces of an insulating glass unit, for ten years against peeling or coating deterioration due to product failure.
- .4 Warrant Laminated glass for ten years against delamination and discoloration.

### PART 2 PRODUCTS

#### 2.1 Materials-Flat Glass

- .1 Float glass: to CAN/CGSB-12.3, glazing quality, 6 mm thick minimum.
- .2 Sheet glass: to CAN/CGSB-12.2, selected, 6 mm thick minimum.
- .3 Tempered Safety Glass: To CAN/CGSB-12.1, transparent, 10 mm thick unless indicated otherwise. Type 2-tempered.
  - .1 Class B-float.
  - .2 Category 1 11.
  - .3 Edge treatment: ground, bevel edge.
- .4 Wired Glass (GWG): 6 mm thick minimum, polished both sides, square wire mesh style.

#### 2.2 Insulating Glass Units

- .1 Performance requirements for insulating glass units specified herein are the minimum permitted requirements. Provide engineered shop drawings and calculations showing that glazed assemblies including framing and glazing products in combination, meet or exceed the minimum requirements of MMAH Supplementary Standard SB-10.
- .2 Insulating Glass Units: To CAN/CGSB-12.8-M, double glazed sealed units, 25 mm overall thickness.
  - .1 Glass: to CAN/CGSB-12.1(tempered)
  - .2 Glass thickness: 6.4 mm each light
  - .3 Inter-cavity space thickness: 12.7 mm with low conductivity spacers.
  - .4 Glass coating: surface number 2, low "E".
  - .5 Inert gas fill: argon.



## 2.1 Glazing Products

- .1 Select appropriate glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.
- .2 Setting blocks: Neoprene 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.
- .3 Spacer shims: Neoprene 50-60 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.
- .4 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; black colour.
  - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.
- .5 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.
- .6 Lock-strip gaskets: to ASTM C542.
- .7 Glazing Gaskets: To ASTM C864.
- .8 Sealant: as specified in Section 07 92 00 – Joint Sealants. Low VOC.

## 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.

### 3.3 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 – General

- .1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.

### 3.5 Installation: Exterior Dry Method- Preformed Glazing

- .1 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.
- .2 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .3 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- .4 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.
- .5 Trim protruding tape edge.

3.6 Installation: Exterior Wet/Dry Method (Preformed Tape and Sealant)

- .1 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .2 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .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 and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
- .5 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.
- .6 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .7 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 Installation: Interior - Dry Method

- .1 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .2 Apply cap bead of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- .3 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
- .6 Place glazing tape on free perimeter of glazing.
- .7 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .8 Knife trim protruding tape.

- .9 Glaze hollow metal doors and pressed steel screens. Glass type as indicated.
- .10 Install wired glass in fire rated doors and screens to meet requirements of NFPA 80.

3.8 Juliet Balcony Rails

- .1 Provide and install laminated safety glass for installation in glazed Juliet balcony rails.
- .2 Coordinate glazing materials and methods of installation with aluminum railing system specified In Section 10 80 00.

3.9 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Perform cleaning to remove construction and accumulated environmental dirt.
- .3 Remove traces of primer, caulking.
- .4 Remove glazing materials from finish surfaces.
- .5 Remove labels after work is complete.
- .6 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .7 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.10 Protection of Finished Work

- .1 After installation, mark light with an "X" by using removable plastic tape.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 24 33 Prefabricated EIFS Wall Panels
- .4 Section 07 26 00 Vapour Retarders
- .5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .6 Section 07 92 00 Joint Sealants
- .7 Section 09 22 16 Non-Structural Metal Framing
- .8 Section 09 91 23 Interior Painting

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C475/C475M-17 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - .2 ASTM C514-04(2014) Standard Specification for Nails for the Application of Gypsum Board
  - .3 ASTM C840-17a Standard Specification for Application and Finishing of Gypsum Board
  - .4 ASTM C954-15 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
  - .5 ASTM C1002-16 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  - .6 ASTM C1047-14a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
  - .7 ASTM C1396/C1396M - 17 Standard Specification for Gypsum Board
  - .8 ASTM E90-09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  - .9 ASTM E814-13a Standard Test Method for Fire Tests of Penetration Firestop Systems
  - .10 ASTM E1966-15 Standard Test Method for Fire-Resistive Joint Systems
- .2 American National Standards Institute (ANSI)
  - .1 ANSI A118.9-1992 Test Methods and Specifications for Cementitious Backer Units.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
  - .2 CAN/CGSB 19-GP-21M Sealing and Bedding Compound for Acoustical Purposes
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 ULC 114-2018 Standard Method of Test for Determination of Non-Combustibility in Building Materials
  - .3 ULC 129- 2015 Standard Method of Test for Smoulder Resistance of Insulation (Basket Method)
  - .4 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
- .5 Gypsum Association (GA)
  - .1 GA-253 Application of Gypsum Sheathing.

1.4 Submittals

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

1.5 Quality Assurance

- .1 Dry wall installers: minimum 5 years proven experience.
- .2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Design Requirements

- .1 Where indicated provide minimum sound transmission rating of installed partitions of STC 50 tested to ASTM E90.
- .2 Provide fire resistance rating of installed partitions as indicated and according to referenced IULC design.

1.7 Mock-Ups

- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock up gypsum board wall installation including one inside corner and one outside corner. Mock-up may be part of finished work.
- .3 Allow two working days for inspection of mock-up by Consultant before proceeding with rest of the work.
- .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Protect gypsum board materials before, during and after installation and to protect the installed work and materials of other trades affected by this work. Store materials in a dry area inside the building. Do not remove wrapping until ready for use. Prevent damage to all edges and surfaces.

### 1.9 Project Conditions

- .1 Maintain temperature minimum 10 °C, maximum 21 °C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.
- .2 Apply board and joint treatment to dry, frost free surfaces.
- .3 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

### 1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

## PART 2 PRODUCTS

### 2.1 Gypsum Board

- .1 To ASTM C1396/C1396M. Standard for non-rated applications, Type X and Type C for rated applications indicated, 1220 mm wide x maximum practical length, ends square cut, edges tapered with round edge, 12.7 mm thick or to thickness indicated on drawings. All fire rated board shall be minimum 16 mm thickness.
- .2 Abuse Resistant Gypsum Board: CGC Fibrerock abuse resistant fibre/gypsum panels, 16 mm thickness.
- .3 Water and Moisture Resistant Board: to ASTM C1396, 12.7 mm thick, 1220 mm wide with tapered edges.
- .4 Fire-Resistant Gypsum Shaftliner Board: To ASTM C1396/1396M. To meet requirements of ULC design W452 for a 45 minute FRR as indicated including: 25 mm thick shaftwall liner panels, bevelled edge, 610 mm wide with ULC label.
  - .1 CGC Shaft Wall Liner Boards
  - .2 Certainteed Glasroc Shaftliner
  - .3 Georgia Pacific DENS Glass Shaftliner

### 2.2 Cementitious Backer Board

- .1 Cementitious backer board for shower and tub area walls: cementitious, water durable, board; surfaced with fiberglass reinforcing mesh on front and back; long edges wrapped; to ANSI A118.9, ASTM C1288 and ASTM C1325, 13 mm thick, edges tapered, 1200 mm wide x maximum practical length. Compressive strength: Not less than 15.51 MPa when tested in accordance with ASTM D2394. Water absorption: Not greater than 8 percent when tested for 24 hours in accordance with ASTM C473.
  - .1 CGC Durock Brand
  - .2 Certainteed Diamondback

### 2.3 Fastening and Adhesives

- .1 Drywall Screws: To ASTM C954 or ASTM C1002 self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.
- .2 Joint Tape: To ASTM C475, 50 mm perforated with preformed seam, mould and mildew resistant.
  - .1 Joint tape for abuse resistant gypsum board: CGC Mould Resistant Fiberglass Drywall Tape.

- .3 Joint Filler and Topping: To ASTM C475 vinyl or latex base, slow setting.
- .4 Laminating Compound: as recommended by manufacturer, asbestos-free.

#### 2.4 Acoustic Insulation

- .1 Acoustic Insulation:
  - .1 Mineral Fibre Fire Rated Acoustic Insulation: To ASTM C665 and ASTM E136, Mineral wool blanket insulation, minimum density of 40 kg/m<sup>3</sup>. Thickness as indicated. (25 mm wider than stud spacing):
    - .1 Thermafiber Creased SAFB manufactured by Owens Corning Canada.
  - .2 STC contribution and fire resistance (hour): Refer to NBC 2015, tables A-9.10.3.1-A/B and Product Data Sheet for various assemblies contributing to acoustic performance and fire resistance.
  - .3 Surface burning characteristics to ULC 102:
    - .1 flame spread: 15
    - .2 smoke developed: 5
    - .3 Smoulder resistance: to ULC 129.
    - .4 Non-combustible: to ULC 114-2018
  - .4 Thickness to suit depth of wall framing and as indicated.
- .2 Acoustic sealant: as specified in Section 07 92 00 - Joint Sealants.

#### 2.5 Accessories

- .1 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by hot-dip process 0.5 mm base thickness, perforated flanges, one piece length per location.
- .2 Trim:
  - .1 Trim-1: Bailey D200 Metal Edge Trim.
  - .2 Trim-2: Bailey D300 Drywall Reveal Trim.
  - .3 Trim-3: Bailey 4411 Channel Edge Trim
- .3 Insulating Strip: Rubberized, moisture resistant, 3.0 mm thick, 12 mm wide closed cell neoprene strip, with self-sticking permanent adhesive on one face; lengths as required.
- .4 Control Joints: Bailey D-ZNCJ 7/16 x 10' Drywall or Veneer Plaster Control Joint.
- .5 Sealants: as specified in Section 07 92 00 - Joint Sealants.

### PART 3 EXECUTION

#### 3.1 General

- .1 Prior to installation of gypsum wallboard, ensure that all required vapour barriers, air seals, gaskets and the like installed under another Section have been inspected and accepted by Municipal authorities and the Consultant. Failure to do so will result in removal of all gypsum board installed prior to approval and replacement, at no additional cost to the Owner.
- .2 Unless otherwise indicated on the drawings, all gypsum board partitions shall extend from floor level to the underside of floor or roof structures above.

### 3.2 Acoustic Insulation

- .1 Install acoustic blankets full width and length, with tight joints, between wall framing and around penetrating electrical service boxes, piping, air ducts and frames.
- .2 Place acoustic blankets where indicated on the Drawings and to thickness required to obtain acoustic performance indicated for the assembly.
- .3 Place acoustic blankets between studs ensuring friction fit, free of sags, folds or open joints that may let sound pass through.
- .4 Install blankets from the bottom up, tightly adjusted and trim accurately with a utility knife.

### 3.3 Gypsum Board Application

- .1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.
- .2 Do not apply gypsum board until bucks, anchors, blocking, electrical, and mechanical work are approved.
- .3 Do not apply gypsum board until insulation, vapour retarder and air seals have been installed and inspected by others, including consultant, owner and municipal building inspectors.
- .4 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.
- .5 Install abuse resistant gypsum panels at all walls and ceilings in Scooter Storage and Refuse Storage rooms. Treat joints with fibreglass reinforced joint tape in accordance with manufacturer's instructions.
- .6 Apply water or moisture resistant gypsum wallboard where indicated. Apply water resistant sealant to edges, ends and cut outs which expose gypsum core.
- .7 Carry gypsum board from floor to underside of floor or roof structure above. Furr out and carry gypsum board around any structural members as may be required.

### 3.4 Cementitious Backer Board

- .1 Install cementitious backer board where indicated in shower and tub enclosures and other wet areas indicated.
- .2 Install in accordance with manufacturer's instructions.

### 3.5 Accessories

- .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.
- .2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.



- .3 Install insulating strips continuously at edges of gypsum board or casing beads abutting exterior door or window frames, to provide thermal break.
- .4 Install continuous bead of acoustic sealant at all penetrations through sound control partitions.
- .5 Provide control joints in gypsum board facing. Control joints shall be supported with metal studs or furring channels on both sides of the joint. Control joints shall be provided:
  - .1 At abutting structural elements, steel columns.
  - .2 At expansion or control joints in the substrate;
  - .3 At maximum 6.0 m spacings on long partition and bulkhead runs;
  - .4 At each door jamb.

### 3.6 Shaft Wall Systems

- .1 Install runners, studs, liner panels and finish panels for fire rated shaftwall assemblies, where indicated, and in accordance with system manufacturer's printed instructions, ASTM C754 and ASTM C840 and to meet ULC requirements for 1 hour fire rating.
- .2 Finished assembly shall meet requirements for ULC listed assembly indicated.

### 3.7 Access Doors

- .1 Install access doors to electrical and mechanical fixtures specified in respective Sections.
- .2 Rigidly secure frames to furring or framing systems, to satisfy fire rating requirements.

### 3.8 Taping and Filling

- .1 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.
- .2 Finish corner beads, control joints and trims as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.
- .4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

### 3.9 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 24 33 Prefabricated EIFS Wall Panels
- .3 Section 09 21 16 Gypsum Board

### 1.3 References

- .1 ASTM International (ASTM).
  - .1 ASTM A653/A653M-17 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM C645-14e1 Standard Specification for Nonstructural Steel Framing Members
  - .3 ASTM C754-17 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
  - .4 ASTM C841-03(2018) Standard Specification for Installation of Interior Lathing and Furring.
  - .5 ASTM C1002-16 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
  - .6 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  - .7 ASTM E814 - 13a(2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
  - .8 ASTM E1966-15 Standard Test Method for Fire-Resistive Joint Systems
- .2 CSA Group (CSA)
  - .1 CSA A82.30-M1982 (R1992) Interior Furring, Lathing and Gypsum Plastering
  - .2 CSA A82.31-M91 Gypsum Board Application
- .3 Canadian General Services Board (CGSB)
  - .1 CAN/CGSB-1.40-97 Primer, Structural Steel, Oil Alkyd Type.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
- .5 CSSBI Lightweight Steel Framing Manual

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit WHMIS Safety Data Sheets (SDS) for all products, prior to delivery of products to the site.

### 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.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Metal Furring and Suspension Systems

- .1 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: To CSA A82.30-M, electro-zinc coated steel.
- .2 Runner Channels: 38 x 19 x 0.59 mm and 38 x 9.5 x 0.45 mm, hot dip or electro-galvanized sheet steel. Use of various sizes governed by applied loads and applicable spans.
- .3 Drywall Furring Channel: Channel shaped furring member for screw attachment of drywall with knurled face. For interior use. Furring masonry or concrete surfaces. Cross furring under steel joist or suspended metal channels in suspended ceiling systems: 70 x 22 x 0.9 mm with knurled face, hot dip or electro-galvanized sheet steel. Bailey D-1001.
- .4 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .5 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild steel rods.
- .6 Tie Wire: 0.90 mm, galvanized, soft annealed, steel wire or clip as recommended by the manufacturer of furring channels.

2.2 Shaft Wall Framing Systems

- .1 Shaft Wall Framing (Firewalls): To meet requirements of ULC design W446 for two (2) hour fire wall as indicated including C-H studs, E studs, and J runners, hot dip galvanized.
  - .1 CGC Cavity Shaft Wall framing system.
  - .2 Certainteed Glasroc Shaftliner framing system.

2.3 Fasteners

- .1 Powder activated fasteners: to suit structural conditions and fastening requirements and in accordance with manufacturer's recommendations: Ramset; Hilti; or approved equivalent.
- .2 Sheet Metal Screws: To CSA A82.31-M, and ASTM C1002, self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

2.4 Accessories

- .1 Acoustic sealant: To ASTM E814 and ASTM E1966, with STC performance rating of 55 to ASTM E90.
- .2 Insulating strip: rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-

sticking adhesive on one face, lengths as required.

- .3 Zinc Rich Paint: to CGSB 1-GP-181M. Low VOC type.

### PART 3 EXECUTION

#### 3.1 Wall Furring

- .1 Install wall furring for gypsum board wall finishes in accordance with CSA A82.31-M, except where specified otherwise and shown on drawings.
- .2 Frame openings and around built-in equipment, cabinets, access panels, etc., on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

#### 3.2 Shaft Wall Framing

- .1 Install runners, studs, liner panels and finish panels for Firewall assemblies, where indicated, and in accordance with system manufacturer's printed instructions and to meet ULC W446 requirements for 2 hour firewall.
- .2 Finished assembly shall meet requirements for ULC listed assembly indicated.

#### 3.3 Suspended and Furred Ceilings and Bulkheads

- .1 Erect hanger and runner channels for suspended gypsum board ceilings in accordance with CSA A82.31-M except where specified otherwise and indicated on drawings.
- .2 Securely anchor hanger to structural supports 1220 mm o.c. maximum along runner channels and not more than 150 mm from ends. Under no circumstances shall hanger wires be secured to or supported from mechanical or electrical materials or equipment or penetrate mechanical ductwork.
- .3 Space runner or furring channels as shown on drawings and not more than 610 mm o.c. maximum nor 150 mm from walls. Run channels in long direction of board. Bend hanger sharply under bottom flange of runner and securely wire in place with a saddle tie. Provide channels below mechanical or electrical equipment and mechanical ductwork to maintain maximum spacing.
- .4 Install furring channels transversely across runner channels in short direction of wallboard at 610 mm o.c. maximum or 150 mm from walls and interruptions in ceiling continuity. Secure channels to support with furring clips or wire. Where splicing is necessary lap minimum 200 mm and wire tie each end with double loops of 0.90 mm gauge galvanized tie wire, 25 mm from each end of overlap.
- .5 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture. Coordinate with Electrical.
- .6 Install work level to tolerance of 1:1200.
- .7 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles, etc.

- .8 Install furring channels parallel to, and at exact locations of steel stud partition header track.
- .9 Furr for gypsum board faced vertical bulkheads within or at termination of ceilings.

3.4 Gypsum Board

- .1 Installation of gypsum board is specified in Section 09 21 16

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 92 00 Joint Sealants
- .2 Section 09 21 16 Gypsum Board
- .3 Section 14 21 23 Electric Traction Passenger Elevator

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C150/C150M-18 Standard Specification for Portland Cement
  - .2 ASTM C207-06 (2011) Standard Specification for Hydrated Lime for Masonry Purposes
- .2 American National Standards Institute (ANSI)
  - .1 ANSI A108/A118/A136.1:2017 American National Specifications for the Installation of Ceramic Tile.
  - .2 ANSI A118.10 Waterproof Membrane
  - .3 ANSI A137.1: 2017 American National Standard Specifications for Ceramic Tile
- .3 Canadian General Standards Board (CGSB)
  - .1 CGSB 71-GP 22M 1978 Adhesive, Organic, for Installation of Ceramic Wall Tile
- .4 International Standards Organization (ISO)
  - .1 ISO 10545 Series Ceramic Tiles, Standards for Testing
  - .2 ISO 13006-2012 Ceramic Tiles, Definitions, Classifications, Characteristics and Marking.
  - .3 ISO 13007-2010 Ceramic Tiles, Grouts and Adhesives.
- .5 Terrazzo, Tile and Marble Association of Canada (TTMAC)
  - .1 TTMAC 2016-2017 Specifications Guide 09 30 00, Tile Installation Manual.
  - .2 TTMAC Hard Surface Maintenance Guide.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Provide product data. Include manufacturer's information on:
  - .1 Ceramic tile, marked to show each type, size, and shape required.
  - .2 Mortar and grout.
  - .3 Divider strip.
  - .4 Levelling compound.
- .3 Submit duplicate samples of tile. Samples to be submitted on 300 x 600 mm sample board for each colour, texture, size and pattern of tile. Grout sample joints for representative sample of final installation.
- .4 Trim and Accessories: submit duplicate samples of each trim.
- .5 Maintenance Data: Provide maintenance data for tile work, for incorporation into Maintenance Manuals specified under Section 01 78 00.

1.5 Quality Assurance

- .1 Do tile work in accordance with Installation Manual 200, Ceramic Tile, by Terrazzo, Tile and Marble Association of Canada (TTMA), except where this specification is more stringent.
- .2 For the installation of ceramic tile, use only skilled tradesmen who are familiar with the referenced standards and with the requirements for this Work.
- .3 The setting material manufacturer's representative shall review the details with the Contractor prior to the start of work. Instruct the Contractor on the proper installation procedures to ensure compliance with the guarantee requirements.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver packaged materials in original unopened containers.
- .3 Keep delivered material dry and free from stains. Store cementitious material off damp surfaces.
- .4 Use all means necessary to protect materials, before, during and after installation and to protect the installed work and materials of all other trades.
- .5 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.
- .6 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Project Conditions

- .1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 °C for 48 hours before, during and 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.
- .4 Provide and maintain temporary lighting. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas.

1.8 Qualifications

- .1 Installer of ceramic tiles shall have a minimum of 10 years of experience including at least five projects of similar scope and scale. Submit documented proof of experience prior to commencing work of this Section.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.10 Maintenance

- .1 Upon completion of the installation and as a condition of acceptance, deliver to the Owner 2% of tile and accessory tiles in each colour and pattern of ceramic tiles installed under this section for

the Owners maintenance program. Identify each carton for location and installation date. Submission must be made all at one time and prior to Substantial Performance.

#### 1.11 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 Materials shall be graded and containers grade sealed, delivered to the job site in their original packages or containers with the manufacturer's labels and seals intact.
- .2 Tile and grout colours shall be selected by the Consultant from the manufacturer's standard range of colours.
- .3 Tile shall conform to ANSI A137.1.
- .4 Floor tile shall have coefficient of slip resistance conforming to ANSI A137.1.
- .5 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

#### 2.2 Ceramic Tile

- .1 PT1: Ceramic Floor Tile: Olympia Regal Series 305 x 610 mm. Matte Finish. Up to three (3) colours will be selected.

#### 2.3 Mortar, Grout, Additives and Adhesives

- .1 The products of one manufacturer shall be used throughout the project to ensure compatibility of materials. Manufacturers of commercial mortar, grout and adhesive having product considered acceptable for use:
  - .1 Laticrete
  - .2 Mapei
  - .3 Flextile
- .2 Water: Potable.
- .3 Floors: (thinset) T.T.M.A. Detail #317 SP "A".
  - .1 Thinset mortar: Laticrete 4237 latex additive plus 211 Crete filler powder or Mapei Kerabond mixed with Keralastic high performance latex admixture or Flextile 52 thin set.
  - .2 Levelling Compound (if required): Laticrete 3701 latex or 226 Mapecem mortar mixed with Planicrete 50.
  - .3 Grout: Laticrete Latapoxy SP100, solid epoxy grout or Mapei Kerapoxy. Colours to Consultant's selection.

#### 2.4 Patching and Levelling Compound

- .1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors, capable of being applied in layers up to 50 mm thick, being brought to



feather edge, and being trowelled to smooth finish and having 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
- .5 Products containing gypsum are not acceptable.

- .2 Levelling Compound: Laticrete 3701 latex or 226 Mapecem mortar mixed with Planicrete 50.

## 2.5 Floor Sealer and Protective Coating

- .1 To tile and grout manufacturer's recommendations.

## 2.6 Accessories

- .1 Cleavage Membrane: 0.10 mm thick polyethylene film meeting or exceeding requirements of CAN/CGSB-51.34
- .2 Reducers, edge trim, and transition strips: Schluter Systems purpose made aluminum.
- .3 Stair Nosing: Schluter TREP-G, 55mm wide, Colours to be selected by the Consultant.
- .4 CT Edge Protection: Schluter RONDEC, size to suit tile thickness. Satin anodized aluminum. Trim to come with all connectors or end caps required for a complete and finished installation. As a minimum, provide edge protection at the following locations:
  - .1 Top of PC Base;
  - .2 Top of CT wall tile;
  - .3 All outside corners of wall tile or porcelain ceramic tile base.
- .5 Transition Strip: (Porcelain ceramic tile to resilient flooring): Schluter RENO.V, satin anodized aluminum transition strips.
- .6 Sealant: as specified in Section 07 92 00.

## PART 3 EXECUTION

### 3.1 Surface Conditions

- .1 Surfaces on which tile is to be applied, shall be thoroughly cleaned down.
- .2 Verify that concrete substrates have been allowed to cure for a minimum of 28 days in accordance with TTMAC requirements.
- .3 Verify that substrates for bonding tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and are within starting flatness tolerances as specified in Section 03 30 00 and are ready for application of levelling materials specified in this Section.
- .4 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.

- .5 Drywall surfaces on which wall and floor tile is to be applied, shall be free from dust, excess plaster and shall be plain and true without any irregularities. Prepare existing gypsum board surfaces as recommended by TTMAC and product manufacturer to support tile installation.
- .6 Existing painted masonry or concrete wall surfaces to receive ceramic tile shall be thoroughly cleaned of all paint down to concrete or concrete block surfaces using paint stripper. Prepare painted surfaces in accordance with manufacturer's instructions and TTMAC recommendations.
- .7 In the event of discrepancies, immediately notify the Consultant and do not proceed with installation in such areas until all such discrepancies have been fully resolved.
- .8 Check that conditions of temperature, humidity, traffic and usage are suitable as required by Installation Manual specifications. Minimum temperature to be not less than 10°C.
- .9 Check that surfaces ready to receive tiling are cured, level and/or graded, plumb, smooth, firm, free from loose particles, droppings, projection, grease, solvent, paint and other foreign matter and from other unsuitable conditions.
- .10 Install transition strips, reducers and edge trim at exposed edges of all tiled walls and floors in accordance with manufacturer's instructions.

### 3.2 Installation

- .1 Install tiling in accordance with requirements of TTMAC Tile Installation Manual and parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials, and to methods required for complete tile installation.
- .2 Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions:
  - .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  - .2 Make cut edges smooth, even and free from chipping.
  - .3 Do not split tile.
- .3 Install ceramic floor tile in elevator specified in Section 14 20 00.
- .4 Accurately form intersections and returns; perform cutting and drilling of tile without marring visible surfaces:
  - .1 Cut, drill, and fit tile to accommodate work of other subcontractors penetrating or abutting work of this Section.
  - .2 Carefully grind cut edges of tile abutting trim, finish, or built in items for straight aligned joints.
  - .3 Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile and to provide a uniform joint appearance.
- .5 Lay tile in pattern indicated on Drawings and as follows:
  - .1 Align joints when adjoining tiles on floor, base, walls, and trim are the same size.
  - .2 Centre tile patterns between control and movement joints; notify Consultant for further instructions where tile patterns do not align with control or movement joints.
  - .3 Cut tile accurately and without damage.
  - .4 Smooth exposed cut edges with abrasive stone, where exposed.
  - .5 Chipped or split edges are not acceptable.
- .6 Bonding Bed: Set tile in place while bond coat is wet and tacky and as follows:
  - .1 Adjust amount of bonding materials placed on substrates based on temperature and humidity

- to prevent skinning over of bonding materials.
- .2 Use sufficient bond coat to provide a minimum 80% contact for tiles smaller than 300 mm x 300 mm with bonding material evenly dispersed and pressed into back of tile; refer to back buttering requirements for larger materials and installations having Moderate or higher Load Bearing Performance requirements.
  - .3 Notch bond coat in horizontal straight lines and set on freshly placed bonding material while moving (sliding) tile back and forth at 90° to notches.
  - .4 Verify that corner and edges are fully supported by bonding material.
  - .5 Set tiles to prevent lippage greater than 1 mm over a 3 mm grout joint.
  - .6 Keep two-thirds of grout joint depth free of bonding materials.
  - .7 Clean excess bonding materials from tile surface prior to final set.
  - .8 Sound tiles after bonding materials have cured and replace hollow sounding tile before grouting.
- .7 Back Buttering: Obtain 100% mortar coverage in accordance with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108 series of tile installation standards for the following applications:
- .1 Tile installed with chemical resistant mortars and grouts
  - .2 Tile having tiles 300 mm or larger in any direction
  - .3 Tile having tiles with raised or textured backs
  - .4 Tile having tile installation rated for Heavy or Extra Heavy Duty.
  - .5 All porcelain tiles with more than 20% of the tile backs covered with firing release dust back buttered so that 100% of the back is covered with adhesive mortar rated for C627, Extra Heavy Duty rating.
- .8 Install prefabricated edge strips and control at locations indicated or where exposed edge of floor tile meets different flooring materials and exposed substrates.
- .9 Protect exposed edges of floor tile with properly sized transition strips, use sloped reducer strips where uneven transitions between 6 mm and 13 mm occur.
- .10 Control and Movement Joints: Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ-2012-2014; keep control and expansion joints free of bonding materials and as follows:
- .1 Cut tiles to establish line of joints; sawn joints after installation of tiles will not be acceptable.
  - .2 Locate joints in tile surfaces directly above joints in concrete substrates.
  - .3 Provide floor control joints over structural control joints.
  - .4 Install prefabricated joint profiles in accordance with manufacturer's written instructions, set with top surface of joint profile slightly below top surface of tile.
  - .5 Prepare joints and apply sealants in accordance with requirements of Section 07 92 00.
  - .6 Keep control and movement joints free from setting materials.
  - .7 Form an open joint for sealant in tile wherever a change in backing material occurs, at all vertical interior corners, around penetrating pipes and fixtures, and where tile abuts other materials or fixtures.
  - .8 Install control joints where indicated or at not less than the following spacings:

Environment	Minimum	Maximum	Joint Width (minimum)
Interior/Shaded	4800 mm	6100 mm	6 mm
Interior/Sunlight	2400 mm	3700 mm	6 mm
Exterior/Normal	2400 mm	3700 mm	10 mm
Exterior/Excessive	2400 mm	3000 mm	13 mm

3.3 Grouting

- .1 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of

TTMAC, and as follows:

- .1 Allow proper setting time before application of grout.
  - .2 Pre-seal or wax tiles requiring protection from grout staining.
  - .3 Force grout into joints to a smooth, dense finish.
  - .4 Remove excess grout in accordance with manufacturer's written instructions and polish tile with clean cloths.
- .2 Grout all tile using specified grout in strict accordance with manufacturers written instructions all to give a flush, hard joint.
  - .3 Joints in tile shall be filled solid and flush with grout.
  - .4 Prepare joints and mix grout in accordance with manufacturer's printed instructions. Force maximum amount of grout into joints, avoiding air traps or voids.
  - .5 Remove all excess grout by washing diagonally across the joints. Check for voids, air pockets and gaps and fill same. Remove all discoloured grout and replace with new.
  - .6 Cure all joints.

#### 3.4 Floor Sealer and Protective Coatings

- .1 Apply in accordance with manufacturer's instructions.

#### 3.5 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Cleaning: Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completion of placement and grouting and as follows:
  - .1 Remove grout residue from tile as soon as possible.
  - .2 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation; protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.
  - .3 Flush surface with clean water before and after cleaning.
- .3 Protection: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies as follows:
  - .1 Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.
  - .2 Protect floor areas from traffic after grouting is completed in accordance with manufacturer's written instructions.
  - .3 Prevent foot and wheel traffic from floors for a minimum of 24 hours after completion of grouting.
  - .4 Provide protective covering until Substantial Performance of the Work.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 43 00 Wood Stairs
- .2 Section 03 54 00 Cementitious Underlayment
- .3 Section 09 65 19 Resilient Tile Flooring

### 1.3 References

- .1 Ontario Building Code
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA B651-12 (R2017) Accessible Design for the Built Environment
- .3 The Accessibility for Ontarians with Disabilities Act (AODA).

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: For each product. Include installation instructions for using setting materials and grouts.
- .3 Layout: Submit a layout for Tactile Warning Dome system in accordance with the Ontario Building Code as well as the Accessibility for Ontarians with Disabilities Act.
- .4 Installation Data: Manufacturer's special installation requirements.
- .5 Provide maintenance data for Tactile Warning Tile for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00.

### 1.5 Regulatory Requirements

- .1 Conform to the following:
  - .1 Ontario Building Code OBC Section 3.8
  - .2 CAN/CSA-B651
  - .3 The Accessibility for Ontarians with Disabilities Act (AODA).

### 1.6 Quality Assurance

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .2 Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

### 1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

### 1.8 Project Conditions

- .1 Do not install tile materials when ambient air temperature and substrate temperature is less than 12 °C and maintain a substrate temperature level of not less than 10 °C or greater than 20 °C for a minimum of 24 hours before, during and a minimum of 72 hours after installation.
- .2 After initial set maintain temperature above 5 °C for 21 days before exposure.

### 1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.10 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Low Emitting Materials: Hard surface flooring covered by the FloorScore standard must be certified as compliant with the latest standard by an independent third party. All adhesives and seams sealers must have a VOC content of 50g/l or less.

### 2.2 Tactile Warning Tile

- .1 Eon Tile as manufactured by Kinesik Engineering Products Inc, or equivalent. Flexible polymer tactile warning indicator tiles, 300 x 300 mm, with 5 mm high truncated domes. Colour to be selected by Consultant from full range of manufacturer's standards.
- .2 Layout: Provide a layout in accordance with Ontario Building Code and the AODA requirements.

### 2.3 Accessories

- .1 Provide adhesives and accessories in accordance with Section 09 65 19 - Resilient Tile Flooring and manufacturer's written recommendations

## PART 3 EXECUTION

### 3.1 Examination

- .1 Verify existing conditions before starting work.
- .2 Verify exact location of area to receive tile installation.

### 3.2 Preparation

- .1 Provide templates and rough-in measurements as required.
- .2 Protect adjacent surfaces from damage during installation. Mask and cover adjacent surfaces, fixtures, and equipment.

3.3 Installation

- .1 Install tiles in accordance with manufacturer's written instructions at stair landings where indicated.
- .2 Surface mount tile on substrates indicated.
- .3 Coordinate with installation of resilient flooring specified in Section 09 65 19.

3.4 Protection

- .1 Prevent traffic and loads on installed tiles until materials are cured and ready to accept loads. Provide protective barriers and devices.
- .2 Protect installation from excessive temperatures, freezing, and water immersion, for 48 hours after installation.

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean tiles in accordance with manufacturer's written instructions.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 09 53 00 Acoustic Suspension

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM C423-17 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  - .2 ASTM E1264-14 Standard Classification for Acoustical Ceiling Products
  - .3 ASTM E1477-98a(2017) Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-10 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate 300 x 300 mm samples of each type of acoustical units.

### 1.5 Quality Assurance

- .1 Mock-up:
  - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up 10 m<sup>2</sup> minimum of acoustical panel tile ceiling including one inside corner and one outside corner.
  - .3 Construct mock-up where directed.
  - .4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with ceiling work.
  - .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

### 1.6 Environmental Requirements

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15 °C and humidity of 20-40% before and during installation.
- .3 Store materials in work area 48 hours prior to installation

### 1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.



- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Protect on site stored or installed absorptive material from moisture damage.

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- .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 (WMP).

#### 1.9 Extra Materials

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required for project.
- .3 Ensure extra materials are from same production run as installed materials.
- .4 Deliver to Owner upon completion of the Work.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1-M and ASTM E 1264
- .2 Panel Type 1: CGC Mars ClimaPlus
  - .1 Class A.
  - .2 Composition: Wet Formed Mineral Fiber
  - .3 Pattern: Fine-textured, non-perforated, and non-fissured
  - .4 Flame spread: ASTM E1264, Class A (U.L.C.), 25 or less.
  - .5 Smoke developed 50 or less in accordance with CAN/ULC-S102-10.
  - .6 Noise Reduction Coefficient (NRC): ASTM C423; Classified with UL label, 0.75
  - .7 Ceiling Attenuation Class (CAC): ASTM C1414; Classified with UL label, 35
  - .8 Light Reflectance (LR) range of 0.90 to ASTM E1477.
  - .9 Dimensional Stability: Standard
  - .10 Edge Profile: Square Lay-In
  - .11 Colour: White.
  - .12 Size 610 x 610 x 19 mm thick.
  - .13 Shape flat.
  - .14 Surface coverings: Washable and scrubbable finish.
- .3 Ceiling Suspension System: as specified in Section 09 53 00.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Do not install acoustical panels until work above ceiling has been inspected by Consultant.

3.2 Installation

- .1 Install acoustical panels and tiles in ceiling suspension system.

3.3 Application

- .1 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width, with directional pattern running in same direction. Refer to 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 to be built into acoustical ceiling including mechanical and electrical work.

3.5 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 09 51 13 Acoustic Panel Ceilings

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A641/A641M-09a (2014) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
  - .2 ASTM C635/C635M-13a Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
  - .3 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit when requested, one representative model of each type of ceiling suspension system.
  - .1 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

### 1.5 Design Requirements

- .1 Determine the superimposed loads that will be applied to suspension systems by components of the building other than the ceiling and ensure that adequate hangers are installed to support the additional loads in conjunction with the normal loads of the system.
- .2 Design supplemental suspension members and hangers where width of ducts and other construction within ceiling plenum produces hanger spacing that interferes with location of hangers at required spacing to support standard suspension system members:
  - .1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- .3 Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360 to ASTM C635 deflection test..

### 1.6 Performance Requirements

- .1 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

### 1.7 Quality Assurance

- .1 Mock-up:
  - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and as described in Section 09 51 13.

1.8 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.9 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized steel as per ASTM C635. Main beams and cross tees shall be double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
- .2 Face width: 22 mm
- .3 Edge Moldings and Trim: Hemmed angle moulding to match main beams and cross tees.
- .4 Structural Classification: Intermediate Duty System, ASTM C635.
- .5 Colour: White and match the actual colour of the specified ceiling tile.
- .6 Standard of Acceptance:
  - .1 Armstrong Prelude XL
  - .2 Donn DX
  - .3 Certainteed Classic Environmental Stab.
- .7 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated.
- .8 Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least three times design load, but not less than 12 gauge.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

- .1 Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines; reviewed shop drawings and in accordance with the manufacturer's installation instructions.
- .2 Install wall moldings at intersection of suspended ceiling and vertical surfaces.

- .3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.
- .4 Secure hangers to overhead structure using attachment methods as indicated by manufacturer. Do not suspend ceiling systems from building services including plumbing lines, conduit, cable trays or duct work.
- .5 Install hangers spaced at maximum 1219 mm centres and within 150 mm from ends of main tees. Install hanger wires plumb and straight.
- .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.
- .7 Ensure suspension system is coordinated with location of related components.
- .8 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.
- .9 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture.
- .10 Interlock cross member to main runner to provide rigid assembly.
- .11 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
- .12 Install access splines to provide ceiling access.
- .13 Finished ceiling system to be square with adjoining walls and level within 1:1000

### 3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Touch up scratches, abrasions, voids and other defects in painted surfaces

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 03 54 00 Cementitious Underlayment
- .2 Section 06 20 00 Finish Carpentry
- .3 Section 09 36 00 Tactile Warning Tiling

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM E84-18b Standard Test Method for Surface Burning Characteristics of Building Materials
  - .2 ASTM F710-17 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
  - .3 ASTM F1066-04(2018) Standard Specification for Vinyl Composition Floor Tile
  - .4 ASTM F1344-15 Standard Specification for Rubber Floor Tile
  - .5 ASTM F1861-16 Standard Specification for Resilient Wall Base
- .2 Underwriters Laboratories of Canada (ULC)
  - .1 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
- .3 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate samples of manufacturer's full range of colours for specified products for selection of colours by the Consultant.
- .3 Before any resilient flooring materials are delivered to the job site, submit to the Consultant, a complete list of all materials proposed to be furnished and installed under this portion of the Work, stating manufacturer's name and catalogue number for each item, and product samples in colours specified.
- .4 Accompanying the materials list, submit two copies of the manufacturer's current recommended method of installation for each item.
- .5 Provide maintenance data for resilient flooring for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

### 1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Use all means necessary to protect resilient flooring materials before, during and after installation and to protect the installed work and materials of all other trades.

### 1.6 Extra Materials

- .1 Provide extra stock materials of resilient flooring, base and adhesives in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Provide one carton of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Provide one container of adhesive.
- .4 Extra materials to be from same production run as installed materials.
- .5 Clearly identify each container of floor tile and each container of adhesive.

### 1.7 Environmental Requirements

- .1 Maintain air temperature and structural base temperature at floor installation area above 20 °C for 48 hours before, during and after installation.

### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

### 1.9 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Luxury Vinyl Tile:
  - .1 LVT1:
    - .1 Tarkett LVT ID Freedom – Textgrain Charcoal
    - .2 457 x 457 mm tile
    - .3 Pattern: Texgrain
    - .4 Pattern type: Allover
    - .5 Format Type: Tile
    - .6 ASTM Product type: Solid Vinyl Floor Tile (ASTM F1700)
    - .7 Surface treatment: Polyurethane - Reinforced
    - .8 Total thickness ASTM F386: 3.20 mm
    - .9 Wear layer thickness: ASTM F410 20 mil (0.50 mm)
    - .10 Installation method: Glue-Down
  - .2 LVT2:
    - .1 Tarkett LVT Residential Transcend Click Brushed Oak Lion
    - .2 Format: Plank
    - .3 ASTM Product type: Solid Vinyl Floor Tile (ASTM F1700)
    - .4 Wear Layer Thickness (ASTM F 410): 20 mil (0.5 mm)
    - .5 Size/Tolerance (ASTM F2055): Passes
    - .6 Tile Squareness (ASTM F 2055): Passes

- .7 Tile Dimensional Stability (ASTM F 2199): Passes
  - .8 Flexibility (ASTM F137): Passes 1 inch mandrel
  - .9 Total Thickness (ASTM F 386): 0.158" (4 mm)
  - .10 Static Load Limit (ASTM F 970): 250 PSI - Passes
  - .11 Resistance to Heat (ASTM F 1514):  $\Delta E \leq 8$
  - .12 Resistance to Light (ASTM F 1515):  $\Delta E \leq 8$
  - .13 Slip Resistance (ASTM D 2047): SCOF  $\geq 0.5$
  - .14 Fire Performance (ASTM E648 Radiant Panel):  $\geq 0.45 \text{ W/cm}^2$ .
    - .1 Class 1
  - .15 Chemical Resistance (ASTM F925): Passes
- .2 Resilient Base: To ASTM F1861, 100 mm high thermoplastic rubber, not less than 3.0 mm gauge with preformed internal and external corners. Base at resilient tile shall have standard toe.
- .1 Johnsonite DuraCove DC Rubber Wall Base.
  - .2 Roppe Pinnacle Rubber Base.
  - .3 Amtico Marathon.
  - .4 Burke Mercer BurkeBase.
- .3 Primers, Adhesives and Caulking: non-flammable, solvent free, waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .4 Cementitious Underlayment: as specified in Section 03 54 00.
- .5 Sub-floor filler and leveler for concrete floors shall be white premixed latex compatible with flooring products and adhesive as recommended by flooring manufacturer for specific flooring types.
- .6 Acoustic Underlayment: high density heavy weight fothed polyurethane foam underlayment
- .1 Minimum 1.4 mm thickness
  - .2 11.3 kg/m<sup>3</sup> density.
  - .3 Antimicrobial
  - .4 Durability
    - .1 Compression Set: 2% Max
    - .2 Compression Strength 25% ASTM D-3575: 55.4 lbs/in<sup>2</sup>
    - .3 Tensile Strength: 100 lbs/ft<sup>2</sup>
    - .4 Indentation Load Deflection (25%): 32 lbs/ft<sup>2</sup>
    - .5 Indentation Load Deflection (65%): 200+ lbs/ft<sup>2</sup>
  - .5 Sound rating: Luxury Vinyl Tile (LVT)
    - .1 Impact Insulation Class (ASTM E492-90): 73 IIC
    - .2 Sound Transmission Class (ASTM E413-87): 67 STC
  - .6 Product:
    - .1 Everstep SKU Acoustical Underlayment.
- .7 Metal edge strips: aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .8 Transition strips, mouldings and adaptors shall be rubber or vinyl, manufactured by Johnsonite, Roppe or Burke Mercer with lip to extend under floor tile with tapered edge, colour matched to flooring.
- .9 All colours and patterns shall be as selected by the Consultant from the complete range of manufacturer's colours and patterns.

### PART 3 EXECUTION



### 3.1 Surface Conditions

- .1 Conform to requirements of ASTM F710.
- .2 Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- .3 Confirm that resilient flooring and base may be installed in accordance with the original design and the manufacturer's recommendations.
- .4 Ensure concrete floors are dry, by using test methods recommended by tile manufacturer. Concrete must be cured a minimum of 35 days prior to commencement of resilient flooring application.
- .5 In the event of discrepancy, immediately notify the Consultant.
- .6 Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

### 3.2 Sub Floor Treatment

- .1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- .2 Install sub floor to manufacturer's recommended standard limits and deviations.
- .3 Remove all substance and materials affecting adhesive bond.
- .4 Vacuum clean floors.
- .5 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler is cured and dry.
- .6 Prime or seal substrates to flooring and adhesive manufacturer's instructions.

### 3.3 Application

- .1 Provide a high ventilation rate, with maximum outside air, during installation, and for 48 hours after installation. Whenever possible, ventilate directly to outside. Do not allow contaminated air to re-circulate through the building ventilation system.
- .2 Install all resilient flooring in strict accordance with the manufacturer's printed instructions and recommendations.
- .3 Do not lay floor coverings and base until all trades, except painter, have completed their work and just prior to completion of the building.
- .4 Apply adhesive uniformly with recommended trowels, at coverage as recommended by the manufacturer. Do not spread more adhesive than can be covered before initial set takes place.
- .5 Lay flooring with joints parallel to building lines unless otherwise indicated, to produce symmetrical tile pattern. Patterns shall be as directed by the consultant. Allow for one field tile and one accent tile in each room or space. Border tiles shall be minimum ½ tile width.

- .6 Install flooring to square grid pattern with all joints aligned unless otherwise indicated.
- .7 As installation progresses, and after installation, roll flooring in 2 directions with a 45 kg roller to ensure full adhesion.
- .8 Cut and fit tile neatly around fixed objects.
- .9 Install feature strips or feature tiles where directed. Fit joints tightly.
- .10 Continue flooring throughout areas to receive movable type partitions or fitments without interrupting floor pattern.
- .11 Install flooring full depth of closets, toe spaces, and recesses.
- .12 Terminate flooring at centre line of door in openings where adjacent floor finish or colour is dissimilar.
- .13 Install transition strips at unprotected or exposed edges where flooring terminates. Locate transition strip at centre line of door where a door occurs.
- .14 Coordinate with installation of tactile warning tiling specified in Section 09 36 00.

### 3.4 Base Application

- .1 Lay out base to keep number of joints to a minimum. Locate joints at maximum available spacing or at internal or pre moulded corners.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using a 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.
- .7 Cope internal corners. Use pre moulded corner units for right angle external corners. Use formed straight base materials for external corners of other angles, minimum 300 mm each leg.
- .8 Provide rubber base at all locations specified, regardless of floor finish.

### 3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove excess adhesive from resilient floor coverings, base and adjacent finished surfaces as the work progresses.
- .3 Clean floor and base surfaces to manufacturer's instructions.

### 3.6 Protection

- .1 Protect new floors until time of final inspection.
- .2 Prohibit traffic on floors for 48 hours after installation.
- .3 Immediately prior to final inspection, remove protection, clean, dry or damp mop resilient flooring and apply one additional coat of wax.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 03 41 23 Precast Concrete Stairs

### 1.3 References

- .1 American Concrete Institute (ACI)
  - .1 ACI 308 Standard Specification for Curing Concrete

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product data: Submit manufacturer's Product data indicating:
  - .1 Product characteristics, performance criteria, and limitations.
  - .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
- .3 Samples: Submit minimum 300 x 300 mm samples indicating coating and final concrete finish.
- .4 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.
- .5 Provide maintenance data for concrete floor sealer for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals.

### 1.5 Quality Assurance

- .1 Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer. Submit to Consultant, applicator's current certificate of approval by the material manufacturer as proof of compliance.
- .2 Mock-up:
  - .1 Construct one 10 m<sup>2</sup> mock-up of floor sealer in location acceptable to Consultant.
  - .2 Arrange for Consultant's review and acceptance, allow 48 hours after acceptance before proceeding with Work.
  - .3 Mock-up may remain as part of Work if accepted by Consultant. If sealer application is unacceptable to Consultant, rework sealer in accordance with manufacturer's recommendations to provide a sealed concrete surface acceptable to Consultant.
  - .4 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section.

### 1.6 Project Conditions

- .1 Do not install the Work of this Section outside of environmental ranges as recommended by the manufacturer without manufacturer's written acceptance and as follows:
  - .1 Relative Humidity: In accordance with manufacturers' requirements.

- .2 When no dust is being raised.
- .3 In well-ventilated and broom clean areas.

- .2 Install temporary protection and facilities to maintain the product manufacturer's and specified environmental requirements for 24 hours before, during, and 24 hours after installation.
- .3 Post do not enter and appropriate warning signs at conspicuous locations.

#### 1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16 ° C.
- .4 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.9 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

### PART 2 PRODUCTS

#### 2.1 Materials

- .1 All materials including sealers and coatings are to have low VOC content limits.
- .2 Each material used in the application of each flooring system shall be as recommended or manufactured by the supplier of the flooring system.
- .3 Concrete floor sealer: Alkali-silicate, water-soluble, inorganic concrete hardener and dustproof; MasterKure HD 200WB by BASF Building Systems or approved alternative by Euclid or Sika Canada Inc.
- .4 Colour: clear

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.
- .2 Verify that concrete floors have cured 28 days minimum and that substrate is acceptable to sealer manufacturer.

- .3 Test surfaces for moisture content to ensure that they are suitable for application.

### 3.2 Preparation

- .1 Prepare substrate in accordance with manufacturer's written instructions. Diamond grind and vacuum substrate free of debris and dust.
- .2 Protect adjacent surfaces from damage resulting from Work of this section. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

### 3.3 Application

- .1 Spray apply concrete sealer to entire surface and keep from drying for 30 minutes as recommended by manufacturer.
- .2 Sprinkle surface with water as sealer begins to penetrate (after 30 minutes).
- .3 Flush surface with water and drying begins to remove excess material. Allow to harden for 24 hours.
- .4 Lightly buff floor with a commercial floor buffer and non-aggressive pad to bring up required sheen.

### 3.4 Protection

- .1 Erect barriers to prevent the entry and presence of personnel not performing work of this Section during application of floor sealer, and for 48 hours following completion of application.

### 3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove promptly as work progresses spilled or spattered materials from surfaces of work performed under other Sections. Clean floors on completion of work. Do not mar surfaces while removing.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 24 33 Prefabricated EIFS Wall Panels
- .2 Section 09 91 23 Interior Painting

### 1.3 References

- .1 Environmental Protection Agency (EPA)
  - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .2 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.
  - .2 Standard GPS-1-08 MPI Green Performance Standard for Painting and Coatings.
- .3 National Fire Code of Canada.
- .4 Society for Protective Coatings (SSPC)
  - .1 Systems and Specifications, SSPC Painting Manual 2005.
- .5 South Coast Air Quality Management District, California State (SCAQMD)
  - .1 SCAQMD Rule 1113-96 Architectural Coatings.
- .6 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
  - .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
  - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties and SCAQMD Rule 1113-96.
- .5 Provide maintenance data for paint products for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals. Include following:
  - .1 Product name, number, type and use.
  - .2 Colour numbers.
  - .3 MPI Environmentally Friendly classification system rating.

### 1.5 Quality Assurance

- .1 Qualifications:
  - .1 Contractor: to have a minimum of five years proven satisfactory experience. When requested,

- provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
  - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.
- .2 Conform to latest MPI requirements for exterior painting work including preparation and priming.
  - .3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
  - .4 Paint materials to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
  - .5 Provide mock-up in accordance with Section 01 45 00 - Quality Control.
    - .1 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen and textures. Locate where directed.
    - .2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
    - .3 Allow 24 hours for inspection of mock-up before proceeding with work.
    - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
  - .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 Provide and maintain dry, temperature controlled, secure storage. Store materials and equipment in well-ventilated area with temperature range 7 °C to 30 °C. Store materials and supplies away from heat generating devices.
- .4 Observe manufacturer's recommendations for storage and handling.
- .5 Keep areas used for storage, cleaning and preparation, clean and orderly. After completion of operations, return areas to clean condition.
- .6 Remove paint materials from storage only in quantities required for same day use.
- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Remove damaged, opened and rejected materials from site.

#### 1.7 Fire Safety Requirements

- .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.



- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with Municipal regulations.
- .3 Unused materials must be disposed of at official hazardous material collections site.
- .4 Paint and related materials are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from the Ministry of the Environment.
- .5 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .6 Place materials defined as hazardous or toxic waste in containers or areas designated for hazardous waste.

#### 1.9 Maintenance

- .1 Extra Materials:
  - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Deliver extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.
  - .3 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
  - .4 Delivery, storage and protection: comply with Owner's requirements for delivery and storage of extra materials.

#### 1.10 Ambient Conditions

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
  - .2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 °C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Provide continuous ventilation for seven days after completion of application of paint
  - .4 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless specifically pre-approved by Consultant and product manufacturer, perform no painting work when:
    - .1 Ambient air and substrate temperatures are below 10 °C.
    - .2 Substrate temperature is over 32 °C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
    - .4 Relative humidity is above 85 % or when dew point is less than 3 °C variance between

- air/surface temperature.
- .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  - .2 Perform no painting work when maximum moisture content of substrate exceeds 12%.
  - .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter.
  - .4 Test concrete surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
- .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
  - .3 Apply paint when previous coat of paint is dry or adequately cured.
  - .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
  - .5 Do not apply paint when:
    - .1 Temperature is expected to drop below 10 °C before paint has thoroughly cured.
    - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
    - .3 Surface to be painted is wet, damp or frosted.
  - .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
  - .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
  - .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Paint materials listed in latest edition of MPI Approved Products List (APL) and from a single manufacturer for each system used are acceptable for use on this project.
- .2 Paint materials for paint systems: to be products of single manufacturer.
- .3 Only qualified products with E2 or E3 "Environmentally Friendly" ratings are acceptable for use on this project.
- .4 Use only MPI listed 'L' rated materials.
- .5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:
  - .1 Be water-based water soluble water clean-up.
  - .2 Be non-flammable biodegradable.
  - .3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
  - .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
  - .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
- .6 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including Fisheries Act and Canadian

Environmental Protection Act (CEPA).

- .7 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .8 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61 °C or greater.
- .9 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
  - .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
  - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .10 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 or E3 rating.
- .11 Recycled water-borne surface coatings must contain 50 % post-consumer material by volume.
- .12 Recycled water-borne surface coatings must not contain:
  - .1 Lead in excess of 600.0 ppm weight/weight total solids.
  - .2 Mercury in excess of 50.0 ppm weight/weight total product.
  - .3 Cadmium in excess of 1.0 ppm weight/weight total product.
  - .4 Hexavalent chromium in excess of 3.0 ppm weight/weight total product.
  - .5 Organochlorines or polychlorinated biphenyls (PCBS) in excess of 1.0 ppm weight/weight total product.
- .13 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.
  - .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
  - .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
  - .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

## 2.2 Colours

- .1 Consultant will provide Colour Schedule.
- .2 Exterior colour schedule will be based upon selection of three base colours and two deep tint accent colours.
- .3 Selection of colours will be from manufacturer's full range of colours.
- .4 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

### 2.3 Mixing and Tinting

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.
- .4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.
- .5 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: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as specified.

### 2.5 Exterior Painting Systems

- .1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
  - .1 EXT 2.1A - Latex zone/traffic marking finish. Line stripping to be yellow. Accessible parking spaces shall be blue.
- .2 Steel Doors, Frames and Metal Fabrications:
  - .1 EXT 5.1D – Alkyd G5 semi-gloss finish over alkyd primer.

## PART 3 EXECUTION

### 3.1 General

- .1 Perform preparation and operations for painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and application instructions, and data sheets.

### 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 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.
- .2 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and 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. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
  - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
  - .6 Many water-based paints cannot be removed with water once dried. Minimize use of kerosene or such organic solvents to clean up water-based paints.
- .3 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

### 3.4 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 such surfaces.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Store items and re-install after painting is completed.
- .4 Protect factory finished products and equipment.
- .5 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas.

### 3.5 Application

- .1 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .2 Brush and Roller Application:
  - .1 Apply paint in a uniform layer using brush and/or roller of types 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 shall be free of roller tracking and heavy stipple unless approved by Consultant.
  - .5 Remove runs, sags and brush marks from finished work and repaint.

- .3 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.
- .6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.
- .7 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 Field Quality Control

- .1 Standard of Acceptance:
  - .1 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

3.8 Restoration

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications
- .2 Section 06 20 00 Finish Carpentry
- .3 Section 08 11 00 Metal Doors and Frames
- .4 Section 09 21 16 Gypsum Board
- .5 Section 09 91 13 Exterior Painting
- .6 Section 09 96 46 Intumescent Coatings

### 1.3 References

- .1 Environmental Protection Agency (EPA)
  - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
- .2 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.
  - .2 Standard GPS-1-08 MPI Green Performance Standard for Painting and Coatings.
- .3 National Fire Code of Canada.
- .4 Society for Protective Coatings (SSPC)
  - .1 Systems and Specifications, SSPC Painting Manual 2005.
- .5 Underwriters Laboratories of Canada (ULC)
  - .1 ULC 102-18 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .6 South Coast Air Quality Management District, California State (SCAQMD)
  - .1 SCAQMD Rule 1113-96 Architectural Coatings.
- .7 Green Seal GS-11 Green Seal Environmental Standard for Paints and Coatings, January 1997.

### 1.4 Submittals

- .1 Make 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 product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit full range colour sample chips.
  - .2 Submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating and special finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
  - .3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties and SCAQMD Rule 1113-96.
- .5 Provide maintenance data for paint products for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals. Include following:
  - .1 Product name, number, type and use.

- .2 Colour numbers.
- .3 MPI Environmentally Friendly classification system rating.

#### 1.5 Quality Assurance

- .1 Qualifications:
  - .1 Contractor: to have a minimum of five years proven satisfactory experience.
  - .2 Qualified journeymen as defined by local jurisdiction to be engaged in painting work.
  - .3 Apprentices: may be employed provided they work under direct supervision of qualified journeyman in accordance with trade regulations.
- .2 Conform to latest MPI requirements for painting work including preparation and priming.
- .3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
- .4 Paint materials to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.
- .5 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.
- .6 Provide mock-up in accordance with Section 01 45 00 - Quality Control.
  - .1 Prepare and paint designated surface, area, room or item (in each colour scheme) to specified requirements, with specified paint or coating showing selected colours, gloss/sheen and textures. Locate where directed.
  - .2 Mock-up will be used to judge workmanship, substrate preparation, operation of equipment and material application and workmanship to MPI Architectural Painting Specification Manual standards.
  - .3 Allow 24 hours for inspection of mock-up before proceeding with work.
  - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
  - .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 Provide and maintain dry, temperature controlled, secure storage. Store materials and equipment in well-ventilated area with temperature range 7 °C to 30 °C. Store materials and supplies away from heat generating devices.
- .4 Observe manufacturer's recommendations for storage and handling.
- .5 Keep areas used for storage, cleaning and preparation, clean and orderly. After completion of operations, return areas to clean condition.
- .6 Remove paint materials from storage only in quantities required for same day use.



- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Remove damaged, opened and rejected materials from site.

#### 1.7 Fire Safety Requirements

- .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

#### 1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with Municipal regulations.
- .3 Unused materials must be disposed of at official hazardous material collections site.
- .4 Paint and related materials are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from the Ministry of the Environment.
- .5 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .6 Place materials defined as hazardous or toxic waste in containers or areas designated for hazardous waste.

#### 1.9 Maintenance

- .1 Extra Materials:
  - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Deliver extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.
  - .3 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
  - .4 Delivery, storage and protection: comply with Owner's requirements for delivery and storage of extra materials.

#### 1.10 Ambient Conditions

- .1 Heating, Ventilation and Lighting:
  - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
  - .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 °C for 24 hours before, during and after paint application until paint has cured sufficiently.
  - .3 Provide continuous ventilation for seven days after completion of application of paint.
  - .4 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.

- .5 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless pre-approved in writing by Consultant and product manufacturer, perform no painting when:
    - .1 Ambient air and substrate temperatures are below 10 °C.
    - .2 Substrate temperature is above 32 °C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
    - .4 The relative humidity is under 85% or when the dew point is more than 3 °C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 °C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
  - .2 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
  - .3 Perform painting work when maximum moisture content of the substrate is below:
    - .1 Allow new concrete to cure minimum of 28 days.
    - .2 15% for wood.
    - .3 12% for plaster and gypsum board.
  - .4 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
  - .5 Test concrete and plaster surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
  - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
  - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
  - .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 Products to meet requirements of GS-11 or SCAQMD Rule 1113-96
- .3 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .4 Only qualified products with E2 or E3 "Environmentally Friendly" rating are acceptable for use.
- .5 Linseed oil, shellac, and turpentine: highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.
- .6 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids:
  - .1 Non-flammable, biodegradable.
  - .2 Manufactured without compounds which contribute to ozone depletion in the upper atmosphere.
  - .3 Manufactured without compounds which contribute to smog in the lower atmosphere.
  - .4 Do not contain methylene chloride, chlorinated hydrocarbons or toxic metal pigments.

- .5 Recycled content of 15% post-consumer and ½ post-industrial waste.
- .7 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .8 Flash point: 61 °C or greater for water-borne surface coatings and recycled water-borne surface coatings.

## 2.2 Colours

- .1 Consultant will provide Colour Schedule.
- .2 Colour schedule will be based upon selection of eight base colours and six deep tint accent colours.
- .3 Selection of colours will be from manufacturer's full range of colours.
- .4 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

## 2.3 Mixing and Tinting

- .1 Perform colour tinting operations prior to delivery of paint to site.
- .2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .3 Thin paint for spraying in accordance with paint manufacturer's instructions.
- .4 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: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees	Units @ 85 Degrees
G1 – matte finish	0 to 5	Max. 10
G2 – velvet finish	0 to 10	10 to 35
G3 – eggshell finish	10 to 25	10 to 35
G4 – satin finish	20 to 35	Min. 35
G5 – semi-gloss finish	35 to 70	
G6 – gloss finish	70 to 85	
G7 – high gloss finish	> 85	

- .2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

## 2.5 Interior Painting Systems

- .1 Metal Fabrications:
  - .1 INT 5.3A Latex G5 semi-gloss finish

- .2 Galvanized Metal: interior doors, frames.
  - .1 INT 5.3A Latex G5 semi-gloss finish
- .3 Wood Paint Finish:
  - .1 INT 6.3A High performance architectural latex G5 semi-gloss finish.
- .4 Gypsum Board: Walls and Bulkheads.
  - .1 INT 9.2A Latex G3 eggshell finish over latex sealer.
- .5 Gypsum Board: Ceilings and Bulkheads:
  - .1 INT 9.2A Latex G2 velvet finish over latex sealer.
- .6 All other surfaces not noted above: high performance finish suitable for commercial and institutional environment and in accordance with MPI painting manual.

### 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 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and application instructions, and data sheets.

#### 3.2 Examination

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report damages, defects, unsatisfactory or unfavourable conditions to Consultant 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 and in accordance with paint manufacturers and MPI recommendations. If damaged, clean and restore surfaces as directed by Consultant.
  - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-install after painting is completed.
  - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress.
- .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 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 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
  - .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
    - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
    - .2 Apply wood filler to nail holes and cracks.
    - .3 Tint filler to match stains for stained woodwork.
  - .6 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 and SSPC-SP 6. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes blowing with clean dry compressed air or vacuum cleaning.
  - .7 Touch up of shop primers with primer as specified.
  - .8 Do not apply paint until prepared surfaces have been accepted by Consultant.

### 3.4 Application

- .1 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .2 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.
- .3 Spray application:
  - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
  - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
  - .4 Brush out immediately all runs and sags.
  - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .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.
- .6 Sand and dust between coats to remove visible defects.
- .7 Finish surfaces both above and below sight lines as specified for surrounding surfaces.
- .8 Finish alcoves as specified for adjoining rooms.
- .9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### 3.5 Mechanical/Electrical Equipment

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces.
- .2 Mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red.
- .9 Paint natural gas piping yellow.
- .10 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .11 Do not paint interior transformers and substation equipment.

### 3.6 Field Quality Control

- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .2 Standard of Acceptance:
  - .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.

3.7 Cleaning and Restoration

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean and re-install hardware items removed before undertaken painting operations.
- .3 Remove protective coverings and warning signs as soon as practical after operations cease.
- .4 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .5 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.
- .6 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 09 21 16 Gypsum Board

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A653/A653M-18 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .2 ASTM A924/A924M-18 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
  - .3 ASTM B456-17 Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  - .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
  - .3 CGSB 31-GP-107Ma-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
- .3 CSA Group (CSA)
  - .1 CSA-B651-12 (R2017) Accessible Design for the Built Environment.
  - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
  - .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.
- .3 Samples:
  - .1 Submit samples when requested.
  - .2 Samples to be returned for inclusion into work.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### 1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

### 1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.



1.7 Extra Materials

- .1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
- .2 Deliver special tools to Owner.

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet steel: to ASTM A653 with ZF001 designation zinc coating.
- .2 Stainless steel sheet metal: Type 304, with Brushed finish.
- .3 Stainless steel tubing: Type 304, commercial grade, seamless welded, minimum 1.2 mm wall thickness.
- .4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 Manufacturers

- .1 Products and components listed are minimum standard of acceptance. Alternative products by recognized manufacturers of toilet and bath accessories may be accepted subject to review by the Consultant of manufacturer's product information and specifications.
- .2 Acceptable manufacturers include:
  - .1 American Standard
  - .2 Bobrick
  - .3 Bradley
  - .4 Frost
  - .5 Hafele
  - .6 Richelieu
  - .7 Watrous

2.3 Components

- .1 Washroom accessories for each apartment suite washroom shall be residential grade or better complying with CMHC, Ontario Ministry of Housing, Ontario Building Code and AODA standards.
- .2 Products named shall establish a minimum basis of design and shall be selected by the Consultant from full range of manufacturer standards.
- .3 Products shall have concealed mounting.
- .4 Include the following at each apartment:
  - .1 Toilet paper dispenser. Bobrick B-543.
  - .2 Towel bar. American Standard 8336.018.002, 508 mm x 51 mm x 111 mm.
  - .3 Recessed medicine Cabinet with mirror: Bobrick B-398.
  - .4 Stainless Steel Shelf: 455 mm long x 125mm wide, 1.2mm type 304 stainless steel, satin finish. 19mm return edge; front edge hemmed for safety. 1.6mm brackets. Bobrick B295 x 18.
  - .5 Shower rod.

- .5 Include the following additional accessories at each accessible apartment
  - .1 GB1: Grab Bar, 38 mm diameter x 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN. 600 mm long. Bobrick B-6806.99 x 24
  - .2 GB2: Barrier Free Toilet Grab Bars 2 (L-shaped) 760 x 760 38 mm dia. Peened finish c/w mounting kits. Bobrick B-6898.99, 90° Angle Grab Bar.
  - .3 GB3: Shower Grab Bar: (Horizontal, 1066 mm long), 38 mm dia. Peened finish c/w mounting kits. Bobrick B-6806.99 x 42
  - .4 GB4: Shower Grab Bar (Vertical 1066 mm long) 38 mm dia. Peened finish c/w mounting kits. Bobrick B-6806.99 x 42
  - .5 GB5: Swing Up Grab Bar: 32 mm diameter, 737 mm deep, satin stainless steel. Bobrick B-4998.
  - .6 RSS: Retractable Shower Seat (left hand and right hand) Refer to drawings for locations. Bobrick B-5181
  - .7 Robe/Towel Hook: Satin finish stainless steel. 50 x 50 mm flange. 50 mm projection. Satin stainless steel. Bobrick B-6717 Single Robe Hook.

#### 2.4 Fabrication

- .1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.
- .2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.
- .3 Brake form sheet metal work with 1.5 mm radius bends.
- .4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- .5 Back paint components where contact is made with building finishes, to prevent electrolysis.
- .6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.
- .7 Shop assemble components and package complete with anchors and fittings.
- .8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.
- .9 Provide steel anchor plates and components for installation on studding and building framing.

#### 2.5 Finishes

- .1 Chrome and nickel plating: to ASTM B456, satin finish.
- .2 Manufacturer's or brand names on face of units not acceptable.

### PART 3 EXECUTION

#### 3.1 Installation

- .1 Install toilet and bath accessories in accordance with the Ontario Building Code, CSA B651 and manufacturer's instructions.

- .2 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 or concrete: use bolt with lead expansion sleeve set into drilled hole.
- .3 Install grab bars on built-in anchors provided by manufacturer.
- .4 Install medicine cabinet and shelf 1000 mm above finished floor.
- .5 Use tamper proof screws/bolts for fasteners.
- .6 Fill units with necessary supplies shortly before final acceptance of building.
- .7 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
  - .1 Verify blocking has been installed properly.
  - .2 Verify location does not interfere with door swings or use of fixtures.
  - .3 Comply with manufacturer's recommendations for backing and proper support.
  - .4 Use fasteners and anchors suitable for substrate and project conditions.
  - .5 Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
  - .6 Conceal evidence of drilling, cutting, and fitting to room finish.
  - .7 Test for proper operation.

### 3.2 Schedule

- .1 Locate accessories where indicated. Exact locations determined by Owner.

### 3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.
- .3 Touch-up, repair or replace damaged products until Substantial Performance.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 09 21 16 Gypsum Board

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A591 / A591M - 89 Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications
  - .2 ASTM A653/A653M-17 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .3 ASTM A666-15 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
  - .4 ASTM A1008/A1008M-16 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
  - .5 ASTM B209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - .6 ASTM B221-14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- .2 Canada Post
  - .1 SOR/83-743 Mail Receptacles Regulations
  - .2 Delivery Planning Standards Manual for Builders and Developers
- .3 AODA Accessibility for Ontarians with Disabilities Act.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Provide manufacturer's standard catalog data for specified products.
- .3 Shop Drawings: Prepared specifically for this project; show dimensions of mail boxes, wall cuts, and interface with other products.

### 1.5 Quality Control

- .1 Comply with Canada Post SOR/83-743 Mail Receptacles Regulations for wall-mounted centralized mailboxes.
- .2 Comply with AODA Accessibility for Ontarians with Disabilities Act.

### 1.6 Quality Assurance

- .1 Manufacturer Qualifications: Manufacturer shall have a Quality System in place to ensure and be able to substantiate that manufactured units conform to requirements and match the approved design.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Store materials protected from exposure to harmful weather conditions.
- .4 Handle materials to prevent damage or marring of finish.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.9 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of five years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Acceptable Manufacturer: Canadian Mailbox Company, 5170 Saint Patrick Street, Montreal, Quebec, Canada Tel: (800) 363-8735 Fax: (514) 362-1412 Email: sales@canadianmailbox.com Web: www.canadianmailbox.com

2.2 Mailboxes

- .1 Canada Post approved Front-Loading interior mailboxes: Horizontal style complying with SOR/83-743 Mail Receptacles Regulations and the following.
- .2 Constructed of heavy gauge reinforced extruded aluminum. High Security Panel (HSP) to house the master lock and prevent the unit from being pried open.
- .3 Model: CMC NS-101 Recessed, Front Load
  - .1 Door Size: 406 mm High x 139 mm Wide
  - .2 Door Size: 406.4mm High x 279mm Wide
  - .3 Locks: 5 pin cylinder cam lock with 1000 different changes. Each lock shall have 3 keys.
  - .4 Mounting: Recessed
  - .5 Box Identification: Adhesive labels
  - .6 Box Identification: Engraved gravoply number plates (black on gray)
  - .7 Finish: All surfaces are clear anodized aluminum
  - .8 Mail slot: 12.7mm High x 254mm Wide
  - .9 Master key, additional keys
  - .10 Bell buttons 15.88mm in diameter installed on top frame
  - .11 Compartments: Shelves and dividers 22 gauge satin coated steel with extruded aluminum support bars.
  - .12 Doors: Extruded 6063 aluminum alloy 3.05 mm thick with a clear anodized finish.
  - .13 Frame: Extruded 6061 aluminum alloy with a clear anodized finish.
  - .14 Total Number of Units: 21.
  - .15 Configuration as indicated.

- .4 Matching anodized aluminum snap on trim

## 2.3 Finishes

- .1 Material and Finish: All surfaces clear anodized aluminum,

## PART 3 EXECUTION

### 3.1 Examination

- .1 Verify that openings in wall are correctly located, aligned, and sized for mailboxes.
- .2 Installer's Examination:
  - .1 Examine conditions under which construction activities of this section are to be performed; submit written notification if such conditions are unacceptable.
  - .2 Beginning installation indicates acceptance of conditions.

### 3.2 Installation

- .1 Install mail boxes in accordance with shop drawings and manufacturer's printed installation instructions.
- .2 Distance to top of frame not to exceed 1701 mm from finished floor.
- .3 Distance to bottom of frame at least 457 mm above finished floor.
- .4 One compartment is required to be a master door for postal service use.
- .5 Align, plumb, and level; anchor in accordance with manufacturer's requirements.
- .6 Adjust doors and locks to operate correctly.

### 3.3 Protection

- .1 Protect finishes from damage by construction activities.

### 3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean surfaces with mild dish detergent. Do not use harsh abrasive cleaners. Lubricate locks with graphite type lubricants only.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 20 00 Finish Carpentry
- .2 Section 10 28 10 Toilet and Bath Accessories
- .3 Section 10 55 23 Mailboxes

### 1.3 Reference Standards

- .1 ASTM International (ASTM)
  - .1 ASTM A312/A312M-17 Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- .2 Aluminum Association (AA)
  - .1 Aluminum Association Designation System for Aluminum Finishes
- .3 Ontario Traffic Manual Book 5 - Regulatory Signs.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
  - .1 Submit detailed shop drawings and where applicable complete colour charts or colour samples for each item specified herein.
  - .1 Verify site dimensions before proceeding with shop fabrication and to suit field conditions and field openings.
  - .2 Show and describe in detail all the work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as all other pertinent data and information, including type, size and description of all fasteners and anchors.
  - .3 Indicate connections to building structure.
  - .4 Shop drawings for all Juliet Balcony railing assemblies shall be stamped and signed by a Professional Engineer registered in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.
- .2 Submit manufacturer's preprinted technical literature for pre-manufactured products.
- .3 Submit samples of metal finishes when requested by the Consultant.
- .4 Submit operating and maintenance instructions for all manufactured products and specialties, for inclusion in the Operations and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

### 1.2 Design Requirements

- .1 Design Juliet Balcony railing assemblies and connections to OBC vertical and horizontal live load requirements.

1.3 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Protect finished surfaces during shipment and installation.

1.4 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Materials

- .1 Items specified herein shall be standard manufactured items, modified if required and as specified to suit conditions of this project.
- .2 Fabricate work true to dimensions, square and plumb, to suit site conditions.
- .3 Thickness of metals shall be adequate for the various conditions with requirements specified as a minimum.
- .4 Finished work shall be free from warping, open seams, weld marks, rattles and other defects. Drilling shall be reamed and exposed edges finished smooth.
- .5 Fastenings shall be concealed or theft-proof type where possible. Exposed fastenings shall be neatly executed and shall be of the same material and finish as the base metal on which they occur.
- .6 Clear Anodic Finish: For work specified to have clear anodic finish, provide an AA-M12C22A31 finish, unless otherwise specified.

2.2 Products

- .1 **Access Doors:** 14 gauge galvanized steel for non-fire rated applications. Doors in fire rated assemblies shall be of thickness required to meet fire rating requirements. Generally, and unless noted otherwise, fire rated doors shall be UL/ULC rated for 1 ½ hour "B" label with 250 degree F temperature rise in 30 minutes. Door shall be provided with a 25 mm recess or 14 mm to suit the thickness of the drywall ceiling. The frame shall be provided with a galvanized steel drywall taping bead on all sides. The hinge shall be a concealed pivoting rod. The latch shall be a flush to the surface, screwdriver operated cam latch. The steel finish shall be 5 stage iron phosphate preparation with prime coat of greybaked enamel.
  - .1 Standard of Acceptance: Acudor, Mifab, Zurn, Watrous.
  - .2 Supply access doors to the relevant building trade to provide access in furred ceilings for the following:
    - .1 Servicing equipment
    - .2 Access to plumbing cleanouts
    - .3 Access to shut off valves.
    - .4 Inspection of life safety equipment.
    - .5 Service of operating devices
    - .6 All locations where periodic maintenance is required.



- .3 Access door sizes shall be as follows:
  - .1 Body Entry: 600 x 600 mm
  - .2 For Hand Entry: 450 x 450 mm
  - .3 For Viewing Only: 300mm x 300mm
  
- .2 **Coat Rod and Shelf Brackets:** heavy duty steel bracket with factory finish (white). 241 mm high x 305 mm wide, fabricated of 2.4 mm x 25 mm wide plate. As manufactured by Stanley, Knape and Vogt or Ferrum Metal Products. Coat rod 27 mm diameter chrome plated steel tubing, Knape and Vogt #770 1 Series Extra Duty Round Closet Rod. Flanges to be Knape and Vogt 734 CHR and 735 CHR.
  
- .3 **Internal Signage**
  - .1 Resident Rooms and Spaces:
  - .2 To be selected by Owner and Consultant from full range of manufacturer's standards.
  - .3 Include signs for each resident suite and all service spaces, storage, mechanical, laundry room, scooter storage etc.
  - .4 Graphics shall meet requirements of CMHC, AODA and y the Ontario Building Code.
  
- .4 **Parking Signs:** Heavy-duty, 2.0 mm thick aluminum signs and sign posts to Ontario Traffic Manual Book 5- Regulatory Signs and Municipal standards. Reflective Aluminum (RA) engineer grade reflective sign face designed to provide increased visibility in low-light conditions with UV-resistant inks to prevent fading during long-term outdoor use. Supplied with top and bottom center holes for post or fence mounting and galvanized steel post. Symbols and markings as indicated
  
- .5 **Juliet Balcony Glass Railing** including colour anodized aluminum top and bottom rails for glass inserts, brackets, connectors and hardware and all glazing assemblies, custom fabricated to suit site conditions and engineered to meet loading requirements of the Ontario Building Code. 1.07m railing height. Laminated/tempered impact resistant glass infill minimum 8 mm thick as specified in Section 08 80 05. Aluminum material profiles and colour to be selected by the Consultant.

### PART 3 EXECUTION

#### 3.1 Installation

- .1 Install manufactured items in accordance with manufacturer's printed instructions and recommendations.

#### 3.2 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 06 10 00 Rough Carpentry
- .2 Section 07 92 00 Joint Sealants
- .3 Section 09 21 16 Gypsum Board
- .4 Section 09 91 23 Interior Painting

### 1.3 References

- .1 Architectural Woodwork Manufacturer's Association of Canada (AWMAC)
  - .1 Architectural Woodwork Standards Manual.
- .2 American National Standards Institute (ANSI)
  - .1 ANSI A208.1-2009 Particleboard
  - .2 ANSI/NPA A208.2-2009 Medium Density Fibreboard (MDF)
  - .3 ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates (HPDL)
  - .4 ANSI/HPVA HP-1-2009 Standard for Hardwood and Decorative Plywood
- .3 Kitchen Cabinet Manufacturers Association (KCMA)
  - .1 ANSI/KCMA A161.1-2017 Performance & Construction Standard for Kitchen and Vanity Cabinets.
- .4 Canadian Kitchen Cabinet Association (KCKA)

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Manufacturers published literature on specified product.
- .3 Shop Drawings: For cabinets show materials, finishes, filler panels, and hardware.
- .4 Samples showing specified colors, textures and patterns for each type of material exposed to view.
- .5 Samples:
  - .1 Mock up: Upper and lower cabinets showing construction, materials, finishes and hardware.
  - .2 Project Mock-up:
    - .1 Upper and lower cabinet.
    - .2 Approved mock-up may be incorporated into final project and will set standard for judging remaining installed cabinets.
- .6 Submit operating and maintenance instructions for residential casework, for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

### 1.5 Quality Assurance

- .1 Quality Standard: Comply with the following standards:
  - .1 Cabinets: Kitchen Cabinet Manufacturers Association (KCMA) A161.1.
    - .1 KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semi-exposed location of each unit and showing compliance with the above standard.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.
- .3 Assure work remains undamaged during fabrication, installation. Store above ground, under cover and protected from damage.
- .4 Do not deliver cabinets, fixture materials or products to job site until concrete, plaster and gypsum board installations are completed and are dry; 7 days minimum after application.

1.7 Project Conditions

- .1 Permanent HVAC system to be in continuous operation. Maintain 10 °C temperature and 35 to 80 percent relative humidity.
- .2 Maintain 30 ft.-candles minimum measured 900 mm. above floor during installation.

1.8 Field Measurements

- .1 Verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings.
- .2 Provide fillers and scribes if necessary.

1.9 Coordination

- .1 Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.
- .2 Coordinate requirements of plumbing and electrical work installed in casework.
- .3 Coordinate casework with residential appliances.

1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

1.11 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of two years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Materials

- .1 Solid Wood:
  - .1 Unless otherwise indicated, provide AWMAC Custom Grade.
  - .2 All wood materials shall be new, straight and clean, free of sap, knots, pitch, and other defects, except as permitted by applicable grading rules.
  - .3 All wood shall be kiln dried to a maximum moisture content of 7%.

- .4 Softwood: to CSA O141, dressed all sides used in concealed locations.
- .2 Plywood:
  - .1 Veneer core plywood: hardwood with a non-telegraphing grain manufactured with exterior glue. To ANSI/HPVA HP-1-09, minimum five plies.
  - .2 Soft Plywood: to CSA O151-M Standard Grade, solid two sides. Use in concealed locations only, except as indicated.
- .3 Particleboard: To ANSI A208.1 , minimum density of 720kg/m3 Grade "R".
- .4 MDF: Medium Density Fiberboard meeting requirements of AWMAC's STANDARDS (NAAWS).
- .5 Edgeband
  - .1 For wood veneer casework: Veneer of same species and cut as exposed surfaces.
  - .2 For Plastic Laminate Casework: PVC.
- .6 Plastic laminate facing sheet: ANSI/NEMA LD 3 High-Pressure Decorative Laminates (HPDL) PF-S and GP-S;
  - .1 Backing sheet: BK Grade by manufacturer of facing sheet.
  - .2 Core: CAN3-0188.1M, Grade R.
  - .3 Laminating adhesive: CAN3-O112 Series M.
  - .4 Core sealer: clear water resistant synthetic resin sealer.
  - .5 Colours, pattern, gloss and texture will be selected by Consultant from full range of products by one of the following:
    - .1 Formica,
    - .2 Arborite,
    - .3 Pionite,
    - .4 Nevamar
    - .5 Wilsonart.
  - .6 Up to three (3) colours and patterns will be selected by the Consultant.
- .7 Melamine Overlaid Panels:
  - .1 Melamine overlay, heat and pressure laminated with phenolic resin to 12.7 mm thick particle board.
  - .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only, reverse side to be overlaid with a plain balancing sheet.
  - .3 Furniture finish: solid colour as selected by the Consultant.
  - .4 Edge Finishing: matching melamine and polyester overlay edge strip with self-adhesive.
- .8 Fasteners and Adhesive:
  - .1 Nails and staples: ASTM F1667, galvanized, spiral head nails.
  - .2 Screws: Zinc, cadmium or chrome plated steel.
  - .3 Splines: wood or metal, to suit application.
  - .4 Adhesive: Type 1 waterproof. To CSA O112-M, type as appropriate for the intended application. Complying with ANSI/WDMA I.S-1 series. Contact bond not acceptable.
  - .5 Avoid the use of adhesives, preservatives, synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content.

## 2.2 Casework

- .1 Subject to compliance with requirements.
- .2 Residential Kitchen and Vanity Cabinets:

- .1 Manufacturer: Member of the Canadian Kitchen Cabinet Association (KCKA)
- .1 Selected by Consultant from full range of manufacturer' standards.
- .2 Style: Selected by Consultant from full range of manufacturer' standards.
- .3 Colour: Selected by Consultant from full range of manufacturer' standards.
- .4 Hardware at Standard Units:
  - .1 Provide manufacturer's standard door and drawer pulls, drawer slides, self-closing concealed hinges, stops, adjustable shelf standards and clips etc. as required for a complete installation. Hardware at barrier free accessible units shall meet requirements of AODA and the Ontario Building Code.
- .5 Cabinet Interiors: Melamine.
- .6 Countertops: Plastic laminate on 19 mm particleboard, roll formed edges and integral splashback.
  - .1 Sidesplash: 19 mm thick, plastic laminate to match countertop.
- .7 Kickboard: to match exposed face of cabinets.

### 2.3 Fabrication

- .1 Fabricate residential casework including kitchen cabinets and bathroom vanities to meet standards of ANSI/KCMA A161.1-2017 Performance & Construction Standard for Kitchen and Vanity Cabinets.
- .2 Finishes
  - .1 Quality Standard: Comply with AWI Section 1500 "Factory Finishing" for finishing preparation, including sanding, filling countersunk fasteners, and dealing with concealed surfaces and other preparations applicable to each unit of work.
  - .2 Colours selected by the Consultant.
  - .3 All exposed interior surfaces: melamine unless indicated otherwise.
  - .4 Cabinet and case backs unexposed to view shall be back primed with one coat of moisture repellent sealer.
  - .5 Apply finishes in accordance with the AWMAC Manual.

## PART 3 EXECUTION

### 3.1 Installation

- .1 Surface conditions:
  - .1 Examine areas and conditions under which work performed.
  - .2 Correct conditions detrimental to timely completion of work.
  - .3 Proceed when unsatisfactory conditions corrected.
  - .4 Protect work from damage.
  - .5 Verify required blocking and backing for secure attachment in place.
- .2 Cut and fit work to receive, clear, engage, or support parts of work for interface with electrical, plumbing, appliances and other units.
- .3 Install work in accordance with:
  - .1 Construction documents
  - .2 Reviewed shop drawings.
  - .3 Pertinent requirement of governmental agencies having jurisdiction.
  - .4 Manufacturer's and referenced standard's installation procedures.
  - .5 Anchor components firmly into position plumb, level and true.
  - .6 Scribe units to wall, floor, and other surfaces with not more than 0.8 mm clear between cabinet or fixture and abutting permanent surface, with no change of clearance in excess of

0.25 mm in any 100 mm.

- .4 Set each unit square, level, plumb, and aligned within tolerance of one in 1000 vertically and horizontally, and within 6 mm of designated location for freestanding work. Shims, if used, to be concealed.
- .5 Provide continuous wood back in toe space of in-line base cabinets.
- .6 Attach casework to backing with countersunk screws in secure manner.
- .7 Miter corners; bevel cut and glue joints. Ease sharp external edges before finishing. Exposed finish nails to be set and puttied.
- .8 Where casework abuts other finished work, scribe and cut for accurate fit.
  - .1 Provide filler strips, scribe strips, and moldings in finish to match casework face.
- .9 Coordinate with availability of trades to make required utility connections.
  - .1 Provide adequate time period for trades to do testing before enclosing.
- .10 Remove excess sealant and adhesive.

### 3.2 Adjustment

- .1 Adjust casework and hardware so doors and drawers are centered in openings, reveals are equally spaced and operate smoothly without warp or bind.
- .2 Lubricate operating hardware as recommended by manufacturer.

### 3.3 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean casework on exposed and semi-exposed surfaces.
  - .1 Use cleaning material recommended by manufacturer of surface to be cleaned.
- .3 Touch up factory applied finishes to restore damaged or soiled areas.
- .4 Provide protection to assure work remains undamaged during time between completion of installation and acceptance of total work.

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 05 50 00 Metal Fabrications

### 1.3 References

- .1 American National Standards Institute (ANSI)
  - .1 ANSI/ASME A17.1-2016 – Safety Code for Elevators and Escalators
  - .2 ANSI/NFPA 70 - National Electrical Code.
  - .3 ANSI/NFPA 80 - Fire Doors and Windows.
  - .4 ANSI/UL 10B - Fire Tests of Door Assemblies.
  - .5 ANSI A117.1 (2009) Standard for Accessible and Usable Buildings and Facilities.
- .2 United States Access Board
  - .1 ADAAG – Accessibility Guidelines for Buildings and Facilities
- .3 CSA Group (CSA)
  - .1 CAN/CSA C22.1-18 Canadian Electrical Code
  - .2 CSA B44.1-14/ASME-A17.5-2014 - Elevator and Escalator Electrical Equipment
- .4 Model and Local Building Codes H. ISO 9001: 2000 - Quality Management Systems - Requirements.

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer/installer's product data, including,
  - .1 Descriptive brochures or detail drawings of car and hall fixtures, cab ceilings, and product features.
  - .2 Power Information: Horsepower, starting current, running current, machine and control heat release, and electrical requirements.
- .3 Shop Drawings: Submit manufacturer/installer's shop drawings, including plans, elevations, sections, and details, indicating location of equipment, loads, dimensions, tolerances, materials, components, fabrication, fasteners, hardware, finish, options, accessories, and other information to render totally functional elevators.
- .4 Samples: Submit manufacturer/installer's samples of standard colors and finishes of finish materials.
- .5 Operation and Maintenance Manual: Submit manufacturer/installer's operation and maintenance manual; including operation, maintenance, adjustment, and cleaning instructions; trouble shooting guide; renewal parts catalogs; and electrical wiring diagrams for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.
- .6 Warranty: Submit manufacturer/installer's standard warranty.

### 1.5 Design Requirements

- .1 Arrange elevator components in control closet or machinery space so equipment can be removed for repairs or replaced with minimal disturbance to other equipment and components.
- .2 Where permitted by code, provide all elevator equipment including controls, drives, transformers, and rescue features within the elevator hoistway.

### 1.6 Quality Assurance

- .1 Manufacturer/Installer's Qualifications: Specialize in manufacturing and installing elevator equipment, with a minimum of 10 years successful experience.
- .2 Regulatory Requirements:
  - .1 Elevator design, clearances, construction, workmanship, materials, and installation, unless specified otherwise, shall be in accordance with ANSI/ASME A17.1, handicap accessibility, Americans with Disabilities Act, and other codes having legal jurisdiction.
  - .2 ANSI/ASME A17.1 shall govern, except where codes having legal jurisdiction include more rigid requirements or conflict with ANSI/ASME A17.1.
  - .3 Elevator shall follow design and manufacturing procedures certified in accordance with ISO 9001-2000 to meet product and service requirements for quality assurance for new products.
  - .4 Where product is in variance to the published ANSI/ASME A17.1 model code, provide a 3rd party AECO certification demonstrating equivalent function, safety, and performance.
- .3 Pre-installation Meeting:
  - .1 Convene pre-installation meeting before start of installation of elevators.
  - .2 Require attendance of parties directly affecting work of this section, including Contractor, Consultant, and elevator manufacturer/installer.
  - .3 Review examination, installation, field quality control, adjusting, cleaning, protection, and coordination with other work.

### 1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Delivery: Deliver materials to site in manufacturer/installer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer/installer.
- .3 Storage: Store materials in clean, dry area indoors in accordance with manufacturer/installer's instructions.
- .4 Handling: Protect materials during handling and installation to prevent damage.

### 1.8 Project Conditions

- .1 Temporary Electrical Power:
  - .1 Arrange for temporary 220 VAC, single-phase, 60 Hz., GFCI-protected electricity to be available for installation of elevator components.
  - .2 Comply with Section 01 51 00 - Temporary Utilities.
- .2 Installation of the Elevator:
  - .1 General Contractor will provide permanent three-phase power prior to installation start.
  - .2 General Contractor will provide clear, rollable access to a 6.0 x 3.0 m secure and dry storage



area prior to delivery.

- .3 General Contractor will provide a clean, dry, and complete hoistway along with temporary installation platform and all required OSHA-compliant barricades prior to delivery.

- .3 Temporary Use of Elevator:

- .1 Owner will negotiate with manufacturer/installer for temporary use of elevator, if required.
- .2 Temporary use of elevator shall be in accordance with terms and conditions of manufacturer/installer's temporary acceptance form.

- 1.9 Scheduling

- .1 Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays.

- 1.10 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

- 1.11 Maintenance Service

- .1 Elevator maintenance service shall be performed by elevator manufacturer/installer.
- .2 Elevators shall receive regular maintenance on each unit for period of 12 months after completion of work specified herein or acceptance thereof by beneficial use, whichever is earlier.
- .3 Trained employees shall make periodic examinations and perform work including necessary adjusting, greasing, oiling, and replacing parts to keep elevators in operation, except parts that require replacement because of accidents, vandalism, misuse, or negligence by parties other than manufacturer/installer.
- .4 Manufacturer/installer shall perform all Work, except emergency minor adjustment call-back service, during regular working hours. Manufacturer/installer shall provide emergency minor adjustment call-back service, 24 hours 7 days a week.
- .5 Should Owner request that examinations, cleaning, lubrication, adjustments, repairs, replacements, or emergency minor adjustment call-back service, unless specified herein, be performed on other than manufacturer/installer's regular working hours of regular working days, manufacturer/installer shall absorb straight-time labor charges and Owner will compensate manufacturer/installer for overtime premium, travel time, and expense at normal billing rates.
- .6 Elevator Control System:
  - .1 Include built-in remote diagnostic module to relay constant status of elevators and control system to a 24-hour, 7-days-a-week central-monitoring facility.
  - .2 Remote Monitoring Device: Transmit information on current status of elevators, including malfunctions, system errors, and shutdown.

- 1.12 Warranty

- .1 Manufacturer/installer shall guarantee materials and workmanship of equipment installed under these specifications and make good, defects not due to ordinary wear or to improper use, which may develop within 1 year after date of Substantial Performance.

## PART 2 PRODUCTS

### 2.1 Manufacturer

Schindler Elevator Corporation.

- .1 Elevator shall be installed by elevator manufacturer

### 2.2 Elevator System and Components

- .1 Electric Traction Passenger Elevators: Basis of design Schindler 3300 Gearless Traction Elevator.
- .2 Elevator Equipment Summary:
  - .1 Application: Machine Room Less (MRL)
  - .2 Counterweight Location: Side
  - .3 Machine Location: Top of the hoistway mounted on car and counterweight guide rails
  - .4 Control Space Location: Top landing entrance frame or entrance frame at one floor below the top landing
  - .5 Service: General Purpose Passenger
  - .6 Quantity: 1 Unit
  - .7 Capacity: 2100 lbs
  - .8 Speed: 100 fpm
  - .9 Travel: 22' 10"
  - .10 Landings: 3
  - .11 Front Openings: 3
  - .12 Rear Openings: 0
  - .13 Door Hand: Left
  - .14 Rear Door Hand: N/A
  - .15 Operation: Microprocessor Single Car Automatic Operation
  - .16 Clear Inside Dimensions: 5' 9-3/8" Wide X 4' 4-7/8" Deep
  - .17 Cab Height: 7' 9"
  - .18 Guide Rails: Equivalent to 12 lb. per foot
  - .19 Entrance Type and Width: Two Speed Side Opening 3' 0" Wide X 7' 0" High doors
  - .20 Entrance Height: 7'-0"
  - .21 Power Supply: 208 Volts 3 Phase 60 Hz
- .3 Performance:
  - .1 Car Speed: -10% to +5% of contract speed under any loading condition or direction of travel.
  - .2 Car Capacity: Safely lower, stop and hold up to 125% of rated load per code.
- .4 Ride Quality:
  - .1 Vertical Vibration (maximum): 25 mg
  - .2 Horizontal Vibration (maximum): 15 mg
  - .3 Vertical Jerk (maximum): 2 ft/sec<sup>3</sup>
  - .4 Acceleration (maximum): 1.6 ft/sec<sup>2</sup>
  - .5 In Car Noise: 53-60 dB(A)
  - .6 Stopping Accuracy: ±5mm
  - .7 Starts per hour (maximum): 180
- .5 Elevator Operation:
  - .1 Simplex Collective Operation: Using a microprocessor based controller, operation shall be automatic by means of the car and hall buttons. When all calls have been answered, the car

- shall park at the last landing served.
- .2 Group Automatic Operation with Demand-Based Dispatching: Provide reprogrammable group automatic system that assigns cars to hall calls based on a dispatching algorithm designed to minimize passenger waiting time.
- .6 Operating Features - Standard:
- .1 Door Light Curtain Protection
  - .2 Static AC Drive
  - .3 Phase Monitor Relay
  - .4 Cab Overload with Indicator
  - .5 Load-weighing
  - .6 Central Alarm
  - .7 Remote Monitoring
  - .8 Firefighter's Operation
  - .9 Automatic Evacuation
    - .1 When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. If the car is at a floor when the power fails, it remains at that floor, opens its doors, and shuts down. If the car is between floors, it is raised or lowered to the first available landing, opens its doors, and shuts down.
  - .10 Independent Service
- .7 Operating Features - Optional:
- .1 Shunt Trip Protection

### 2.3 Equipment: Control Components and Control Space

- .1 Controller: Provide microprocessor based control system to perform all of the functions of safe elevator operation, as well as perform car and group operational control.
  - .1 All high voltage (110v or above) contact points inside the inspection and test panel shall be protected from accidental contact in a situation where the access panels are open.
  - .2 The controller shall be distributed throughout the elevator system located in the overhead, cab and inspection and test panel. The inverter will be mounted in the overhead adjacent to the hoist machine and an inspection and test panel will be located in the door jamb at the top floor or one floor below the top floor. No elevator equipment mechanical rooms or closets are required.
  - .3 Provide multi-bus control architecture to reduce cabling, material and waste.
- .2 Drive: Provide a Variable Voltage Variable Frequency AC Closed Loop drive system. Provide stable start without high peak current, quickly reaching a low energy consumption level.
- .3 Inspection and Test Panel: Integrated control equipment, main inspection and test panel in door frame at top level served or at one floor below the top level served.

### 2.4 Equipment: Hoistway Components

- .1 Machine:
  - .1 Gearless asynchronous AC motor with integral drive sheave, service and emergency brakes.
  - .2 Design machine to enable direct power transfer, thereby avoiding loss of power.
  - .3 Design machine to be compact, lightweight and durable to optimize material usage and save space.
  - .4 Mount to structural support channels on top of guide rail system as applicable in hoistway overhead.

- .2 Governor:
  - .1 Tension type over-speed governor with remote manual reset.
  - .2 Mount to structural support channels as applicable in hoistway overhead.
- .3 Buffers, Car and Counterweight: Compression spring type buffers to meet code.
- .4 Hoistway Operating Devices:
  - .1 Emergency Stop switch in the pit.
  - .2 Terminal stopping switches.
  - .3 Emergency stop switch on the machine.
- .5 Positioning System: System consisting of proximity sensors and door zone vanes.
- .6 Guide Rails and Attachments: Provide Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- .7 Suspension System: Non-circular Elastomeric coated suspension media with high tensile grade steel cords.
- .8 Governor rope: Steel wire rope with 6 mm diameter.

## 2.5 Equipment: Hoistway Entrances

- .1 Hoistway Doors and Frames:
  - .1 UL rated with required fire rating.
  - .2 Doors: Rigid flush panel construction with reinforcement ribs.
  - .3 Frames: Securely fasten at corners to form unit frame. Frames shall be bolted.
- .2 Finish:
  - .1 Exposed Areas of Corridor Frames: Stainless Steel - All Floors
  - .2 Doors: Stainless Steel - All Floors
  - .3 Sills: Aluminum - All Floors
- .3 Entrance Markings and Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

## 2.6 Equipment: Car Components

- .1 Car Frame and Safety: Provide car frame with adequate bracing to support the platform and car enclosure. The safety shall be integral to the car frame and shall be flexible guide clamp type.
- .2 Platform: Provide platform of steel construction with plywood subfloor and aluminum threshold.
- .3 Car Guides: Provide sliding guide shoes mounted to top and bottom of both car and counterweight frame. Arrange each guide shoe assembly to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- .4 Provide central guiding system to reduce mechanical friction and energy consumption.
- .5 Steel Cab:
  - .1 Fire rating: Provide Class B fire rating for cab, or Class A fire rating where required by local Code.

- .2 Design cab to comply with LEED Indoor Environmental Quality requirements through use of Low-Emitting Materials on walls, ceiling and subflooring.
- .3 Car wall finish: Steel Plastic Laminate Finish selected from manufacturer's standard selections.
- .4 Base and frieze: Aluminum.
- .5 Car front finish: Brushed stainless steel.
- .6 Car door finish: Brushed stainless steel.
- .7 Ceiling: Canopy ceiling, finished in Painted Silver Metallic With Compact Fluorescent Lighting. Provide lighting consisting of four compact fluorescent energy saving lights located in two semi-oval lateral cutouts located on the center-sides of the cab ceiling, Lexan lens cover.
- .8 Handrail: 1-3/8" Round And Curved Brushed Aluminum. Locate on Rear Wall.
- .9 Flooring: By others. Not to exceed 3/8" finished depth.
- .10 Ventilation: Provide one-speed fan in canopy.
- .11 Emergency Car Lighting: Provide an emergency power unit employing a 12 volt sealed rechargeable battery and static circuits to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
- .12 Emergency Siren: Provide siren mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged.
- .13 Emergency Exit Switch: Provide an electrical contact to open the safety circuit when the emergency car top exit is opened. When the exit door is opened, the top exit switch shall signal the control and the car will be unable to move.
- .14 Emergency Exit Lock: Provide an emergency exit lock where required by local code.
- .15 Emergency Exit Guard: Provide emergency exit guard on top of car when required for hoistway wall to platform clearance exceeds 12" or for multiple cars in hoistway.

## 2.7 Door Operator and Reopening Devices

- .1 Door Operator: Provide a closed loop VVVF high performance door operator with frequency controlled drive for fast and reliable operation to open and close the car and hoistway doors simultaneously.
- .2 In case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Provide emergency devices and keys for opening doors from the landing as required by local code.
- .3 Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. Provide door open button in the car operating panel. Momentary pressing of this button shall reopen the doors and reset the time interval.
- .4 Provide door hangers and tracks for each car and hoistway door. Contour tracks to match the hanger sheaves. Design hangers for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed for life bearings.
- .5 Electronic Door Safety Device: Equip car doors with concealed transmitter and receiver infrared beam devices to detect presence of object in process of passing through hoistway entrance and car doorway (light curtain device).
  - .1 Use multi-beam scanning without moving parts to detect obstructions in door opening.
  - .2 Detector Device: Prevent doors from closing, or if they have already started closing, cause doors to reopen and remain open while object is within detection zone.
  - .3 Horizontal Beams: Minimum of 33 infrared beams to fill doorway from ground level to a height

of 6 feet.

## 2.8 Equipment: Signal Devices and Fixtures

- .1 Car Operating Panel: Provide a car operating panel with all push buttons, key switches and message indicators for elevator operation.
  - .1 Full height car operating panel shall be surface-mounted on front return.
  - .2 Comply with handicap requirements.
  - .3 Push Buttons: Mechanical, illuminating using long-lasting LEDs for each floor served.
  - .4 Emergency Buttons: Provide in accordance with code. Emergency alarm button, door open and door close buttons.
- .2 Features of the Car Operating Panel Shall Include:
  - .1 Audible chime to signal that the car is either stopping at or passing a floor served by the elevator.
  - .2 Raised markings and Braille provided to the left hand side of each push button.
  - .3 Car Lantern: Provide LED illuminated car lantern with direction arrows to comply with local code when hall lanterns are not provided.
  - .4 Door open and close push buttons.
  - .5 Firefighter's hat and Phase 2 Key-switch
  - .6 Inspection key-switch.
  - .7 Key-switch for optional Independent Service Operation
  - .8 Illuminated alarm button with raised marking.
  - .9 Elevator Data Plate marked with elevator capacity and car number.
  - .10 Help Button: Activation of help button will initiate two-way communication between car and a location inside the building, switching over to alternate location if call is unanswered, where personnel are available to take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
  - .11 Certificate Frame.
- .3 Hall Fixtures: Provide hall fixtures with necessary push buttons and key switches for elevator operation.
  - .1 Push buttons: Metallic tactile push buttons, up button and down button at intermediate floors, single button at each terminal floor.
  - .2 Height: Comply with handicap requirements.
  - .3 Illumination: Illuminating using long-lasting low power LEDs.
- .4 Hall Lanterns and Position Indicators.
  - .1 LED illuminated direction arrows with audible and visible call acknowledgement.
- .5 Hoistway access switches: Provide key-switch at top and/or bottom floor in entrance jamb as required by local code.
- .6 Firefighter's Phase 1 Service: Key switch in brushed stainless steel cover plate.
- .7 Fixture Cover Plates: For push buttons, hall lanterns and position indicators, resistant white back-printed glass, no screws required for mounting. Provide stainless steel cover plates for Firefighter's Phase I switch and hoistway access switches, with tamper resistant screws in same finish.
- .8 Mounting: Mount hall fixtures in entrance frames.

### PART 3 EXECUTION

#### 3.1 Examination

- .1 Examine hoistways, hoistway openings, and pits before starting elevator installation.
- .2 Verify hoistway, pit, overhead, and openings are of correct size, within tolerances, and are ready for work of this section.
- .3 Verify walls are plumb where openings occur and ready for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.
- .4 Verify hoistway is clear and plumb, with variations not to exceed -0 to +25 mm at any point. Verify projections greater than 100 mm must be beveled not less than 75 degrees from horizontal. No negative tolerance is permitted for minimum hoistway dimensions.
- .5 Verify minimum 2-hour fire-resistance rating of hatch walls.
- .6 Notify Consultant in writing of dimensional discrepancies or other conditions detrimental to proper installation or performance of elevators.
- .7 Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to manufacturer/installer.

#### 3.2 Installation

- .1 Install elevators in accordance with manufacturer/installer's instructions and ANSI/ASME A17.1.
- .2 Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.

#### 3.3 Field Quality Control

- .1 Perform tests of elevator as required by ANSI/ASME A17.1 and governing codes.

#### 3.4 Adjusting

- .1 Adjust elevators for proper operation in accordance with manufacturer/installer's instructions.
- .2 Adjust elevators for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- .3 Adjust doors to prevent opening of doors at landing on corridor side, unless car is at rest at that landing, or is in leveling zone and stopping at that landing.
- .4 Adjust automatic floor leveling feature at each floor to within 1/4 inch of landing.
- .5 Repair minor damages to finish in accordance with manufacturer/installer's instructions and as approved by Consultant.
- .6 Remove and replace damaged components that cannot be successfully repaired as determined by Consultant.

3.5 Protection

- .1 Protect installed elevators from damage during construction in accordance with the negotiated temporary use agreement between Owner and manufacturer's installer

3.6 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean elevators promptly after installation in accordance with manufacturer/installer's instructions.
- .3 Do not use harsh cleaning materials or methods that could damage finish.

End of Section



## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 62 00 Sheet Metal Flashing and Trim
- .2 Section 07 84 00 Firestopping
- .3 Section 07 92 00 Joint Sealants

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM A463/A463M-15 Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
- .2 National Fire Protection Association (NFPA)
  - .1 NFPA 82-2019 Standard on Incinerators and Waste and Linen Handling Systems and Equipment
- .3 Underwriters Laboratories of Canada (ULC)

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Catalog Cuts: Before the trash chute is delivered to the job site, submit catalog cuts to the Architect in accordance with these specifications, showing all details of installation and assembly and all requirements for work by other trades.
- .3 Product Data: Manufacturer's product specifications, standard details and recommendations for project conditions; indicate selected sizes and installation details specific to the project.
- .4 Shop Drawings:
  - .1 Plans: Scale 1:50; indicate locations, dimensions, and required associated construction activities.
  - .2 Elevations/Sections: Scale 1:50; indicate locations, dimensions, and required associated required construction activities.
  - .3 Details: Scale 1:50; indicate:
    - .1 Shop drawings specific to project conditions
    - .2 Interface with adjacent construction
    - .3 Dimensions and tolerances
    - .4 Products required for installation of the trash chute, but not supplied by trash chute manufacturer.
- .5 Quality Assurance/Control Submittals:
  - .1 Contractor's Certification that:
    - .1 Manufacturer's certification that installer of manufacturer's product is approved.
    - .2 Applicable standards: National Fire Protection Association standards as referenced herein.
- .6 Close-out Submittals:
  - .1 Submit operating and maintenance instructions for trash chutes, for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00-Closeout Submittals.

.2 Warranty Documents: Issued and executed by the manufacturer and installer of the system.

#### 1.5 Quality Assurance

##### .1 Qualifications:

- .1 Manufacturer: Minimum five years-documented experience producing products specified in this section.
- .2 Installer: Approved by the manufacturer and having a minimum of five years experience.

##### .2 Pre-Installation Meetings:

- .1 Convene at job site a minimum of seven calendar days prior to scheduled beginning of construction activities of this section to review requirements of this section.
- .2 Require attendance by representatives of the following:
  - .1 Trash chutes manufacturer or designated representative
  - .2 Installer.
  - .3 Other entities directly affecting, or affected by, construction activities of this section.
  - .4 Notify Consultant four calendar days in advance of scheduled meeting date.

#### 1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

#### 1.7 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

#### 1.8 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of one year from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

### PART 2 PRODUCTS

#### 2.1 Manufacturer

- .1 Acceptable manufacturers: Wilkinson-Chutes Canada; 23 Racine Road, Toronto ON M9W 2Z4; Tel: (866) 535 0558

#### 2.2 Components

- .1 Garbage Chutes shall comply with NFPA 82 and shall be ULC labelled.
- .2 The chute shall be 610 mm diameter of 1.524 mm aluminized steel conforming to ASTM A463.
- .3 Intakes Door: Stainless steel, 381 mm wide x 457 mm high, bottom hinged, hand operated self-closing positive latching doors bearing 1½ hour, Underwriters Laboratories "B" Label designation and rated for a 121 °C maximum door temperature rise over 30 minutes, with stainless steel trim in a UL approved, "B" Label, 1½ hour assembly. AODA compliant lever handle.
- .4 Discharge: 1.524 mm galvanized or aluminized steel type "A" open end chute discharge rolling steel door with 74 °C fusible link hold open on an inclined steel track at the bottom of the chute to

close automatically when the ambient temperature reaches 74 °C. as required by city or state building and/or fire codes.

- .5 Vent: Chute shall extend full diameter through roof to metal top vent cap 1220 mm above roof level with counter flashing and insect screen. A roof curb (1120 x 1120 mm x minimum of 200 mm high) is required for flat roof conditions.
- .6 Accessories: 19 mm IPS flushing spray head and 13 mm sprinkler head above highest intake. Additional 13 mm sprinkler heads at every second intake (counting from the top) or as required by local code.
- .7 Provide Disinfecting & Sanitizing unit for installation in line to the flushing spray head. Connection to flushing spray head, back flow prevention valve and electric control switch by others.
- .8 Provide 380 mm wide x 380 mm high right side hinged, hand operated, self-closing, positive latching, UL 1 1/2-hour. "B" labeled, stainless steel plumbing access door having stainless steel door trim for installation by forces erecting enclosing shaft wall. Door to have master keyed lock. Cylinder provided by others. Door for access to disinfecting & sanitizing unit above the highest intake door of the chute.
- .9 Offsets (bends) in the chute, if required, shall be made the same diameter as the chute of 1.524 mm aluminized steel and have an additional layer of 1.83 mm aluminized steel reinforcing the impact area. Offsets are not to deviate more than 150 mm off the vertical axis of the chute.
- .10 Provide Daubert 932 sound coat (or equal) vibration dampening compound to the exterior of the chute only. Include Korfund sound isolator pads at each floor support frame.
- .11 Sprinkler System: Chute shall be protected internally by automatic sprinklers. This requires a sprinkler at or above the top intake door of the chute, and in addition, a sprinkler shall be installed within the chute at alternate floor levels in building over two stories in height with mandatory sprinkler located at the lowest service level.

## 2.3 Fabrication

- .1 The trash chute shall be fully factory assembled and all joints, except those required to separate the sections for shipment and installation shall be welded or lock-seamed tight. The floor intake doors shall be bolted in place on throats formed into the chute. All chute sections shall flash inside the sections below and there shall be no bolts, clips, or other projections inside the chute to snag the flow of material. Pre-positioned support frames shall assure proper intake levels and there shall be an expansion joint in the chute between all support joints. Discharge hoppers and offsets, where required, shall be reinforced and separately supported in the impact area.

## PART 3 EXECUTION

### 3.1 Examination

- .1 Verification of conditions:
  - .1 Area in which system is to be located is correct size and location and is prepared for installation of trash chute and components.
- .2 Installer's examination:
  - .1 Examine conditions under which construction activities of this section are to be performed, then submit written notification if conditions under which construction activities of this section

- are to be performed are unacceptable.
- .2 Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
- .3 Verify and record chute alignment with installer immediately following installation.

3.2 Installation

- .1 Install trash chute in accordance with shop drawings and manufacturer's printed installation instructions.

3.3 Demonstration

- .1 Arrange demonstration of system operation, conducted by manufacturer's representative, to Owner's maintenance personnel.

3.4 Cleaning

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

End of Section

## PART 1 GENERAL

### 1.1 General

- .1 Conform to the requirements of Division 1.

### 1.2 Related Sections

- .1 Section 07 13 13 Bituminous Sheet Waterproofing
- .2 Section 07 21 13 Building Insulation

### 1.3 References

- .1 ASTM International (ASTM)
  - .1 ASTM D1248-16 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
- .2 CSA Group (CSA)
  - .1 CAN/CSA-A23.1-14 Concrete Materials and Methods of Concrete Construction.
  - .2 CAN/CSA-B182.1- 11 Plastic Drain and Sewer Pipe and Pipe Fittings.
- .3 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1840 Material Specification for Non-Pressure Polyethylene (PE) Plastic Pipe Products

### 1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's technical literature and installation instructions.

### 1.5 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

### 1.6 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.

## PART 2 PRODUCTS

### 2.1 Materials

- .1 Perforated plastic pipe and fittings: to CSA 182.1. Nominal pipe size 100 mm diameter. Manufactured from high density polyethylene resin which meets or exceeds the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C as per ASTM D1248.
- .2 Joining System: snap, insert or split coupler
- .3 Filter Sock: Woven polyester.
- .4 Acceptable product: Big 'O' Perforated Corrugated with Polyester Sock Filter as manufactured by Armtec Ltd.
- .5 Coarse filter aggregate: to CAN/CSA-A23.1, Table 2, Group 1, 20-5 mm.

- .6 Fine filter aggregate: to CAN/CSA-A23.1, Table 1.
- .7 Filter mat: Non Woven Polypropylene Geotextile
  - .1 Terrafix 200R by Terrafix Geosynthetics Inc.
  - .2 Mirafi 140N by TC Mirafi.
- .8 Drainage sheet: as specified in Section 07 13 13.

### PART 3 EXECUTION

#### 3.1 Layout

- .1 Establish grades and inverts from appropriate bench marks. Lay out lines as shown on Drawings.
- .2 Slope drainage pipes at least 1%. Pipe grade shall not vary more than 10% of internal diameter of pipe withing a given run. Such deviation shall be gradual and over a distance of not less than 9.0 m.
- .3 Lay pipe in straight lines; turn corners using 45° bends.

#### 3.2 Installation

- .1 Coordinate work of this Section with that of other related Sections.
- .2 Do not place pipe in direct contact with rigid materials such as rock, brick, or wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.
- .3 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points. Provide fittings such as elbows, bends, tees, adapters, reducers, as required to form a complete drainage system. Carefully tap tapered fittings into pipe; do not overdrive.
- .4 Install perforated pipe with holes and coupling slots facing down.
- .5 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.
- .6 Place aggregate materials by hand around and above pipe in successive 150 mm lifts.
- .7 Consolidate each lift by tamping moderately; prevent damage to pipes.
- .8 Do not cover pipes until inspected and approved by Consultant.
- .9 Supply rigid non-corrosive sleeves for insertion into foundation walls and other building elements where pipe penetrates such elements. Sleeve diameter shall be 50 mm larger than pipe diameter. Pack joint between pipe and sleeve with moisture resistant compressible pre-moulded filler.

#### 3.3 Perimeter Drainage

- .1 Provide perimeter drainage where indicated at base of foundation walls.
- .2 Connect to existing subdrainage system.
- .3 Place filter fabric into prepared excavation. Size filter fabric to completely wrap drainage course, lapping at joints minimum 300 mm.

- .4 Place minimum 150 mm coarse filter aggregate on top of filter fabric and consolidate.
- .5 Lay drainage pipe to layout shown. Unless other size is indicated, provide 100 mm diameter perforated pipe. Connect to existing outfall as directed by Owner's Representative.
- .6 Provide minimum 150 mm thick coarse filter aggregate at sides and top of drainage pipe.
- .7 Close filter fabric over top of drainage course and secure lap in place.
- .8 Cover filter fabric with 300 mm fine filter aggregate.

3.4 Inspection

- .1 Arrange for inspection of foundation drainage systems by Municipal Inspectors and the Consultant prior to placing of drainage sheet and backfill.

3.5 Cleaning

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

End of Section