EASTSIDE SECONDARY SCHOOL

WINDOW AND OPTIONAL DOOR REPLACEMENT & GREENHOUSE DEMOLITION

275 Farley Avenue, Belleville, Ontario

"ISSUED FOR TENDER"

Project 25042

DATE April 14th, 2025

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End of Section

LIST OF DRAWINGS

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
A000	List of Drawings, Key Plan, and OBC Matrix	2	-	March 28, 2025
ARCHITECTURAL				
A201	Overall First Floor Plan	2	-	March 28, 2025
A202	Part First Floor Demolition Plan	2	-	March 28, 2025
A203	Part First Floor Demolition Plan	2	-	March 28, 2025
A204	Part First Floor Plan	2	-	March 28, 2025
A205	Part First Floor Plan	2	-	March 28, 2025
A206	Greenhouse Demolition Plans and Sections	2	-	March 28, 2025
A301	Elevations – Window Demolition	2	-	March 28, 2025
A302	Building Elevations	2	-	March 28, 2025
A501	Plan Details	2	-	March 28, 2025
A502	Section Details	2	-	March 28, 2025
A901	Window and Door Schedules and Details	2	-	March 28, 2025
ELECTRICAL				
E-1	Electrical Specifications, Legend, Drawings List, and Details	1	-	March 24, 2025
E-2	Electrical Demolition Plans	1	-	March 24, 2025
MECHANICAL				
M-1.1	Mechanical Specifications	1	-	March 25, 2025
M-1.2	Mechanical Legend	1	-	March 25, 2025
M-2.1	Part Ground Floor Plan – Hydronic Demolition and New	1	-	March 25, 2025
M-2.2	Part Ground Floor Plan – Plumbing Demolition	1	-	March 25, 2025

End of Section

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 Work sequence
.7 Contractor use of premises
.8 Pre-ordered materials and equipment
.9 Work by others
.10 Engineer design
.11 Hazardous material discovery
.12 Building smoking environment
.13 Special conditions
.14 Site security
.15 “By Others”
.16 Protection of Drawings

1.2 Work Covered by Contract Documents

.1 Work of this Contract comprises of the Eastside Secondary School Renovations to a portion of ground floor windows and demolition of a green house as indicated on the drawings and specifications.

1.3 Owner

.1 Hastings and Prince Edward District School Board.

1.4 Location of Site

.1 The Work of this Contract is located at 275 Farley Avenue, Belleville, Ontario

1.5 Scheduling Requirements

.1 Refer to Instructions to Bidders

1.6 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.

1.7 Site Access

.1 Access to the site to be arranged by the Owner.
.2 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.
.3 Provide secure construction fencing as specified and where indicated.

1.8 Work Sequence

.1 Construct Work continuously.

1.9 Contractors Use of Premises

.1 Contractor has restricted use of site until Substantial Performance.

1.10 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.

1.11 Designated Substances: ACM and Others

.1 the Owner shall provide any prospective constructor or contractor a copy of building ACM surveys and information on designated substances that are known or suspected of being present within the area or scope of work.

.2 The constructor or General Contractor shall ensure that a copy of the ACM survey is provided to each contractor and subcontractor who will be working in the space.

.3 Any findings of undeclared ACM, or damaged ACM that could pose a risk to workers is to be brought to the attention of the Owner immediately, and work is to be stopped.

.4 All project design and construction activities must be carried out in compliance with the Regulations and the Owner's Asbestos Management Program.

.5 No asbestos-containing materials, as defined by O. Reg. 278/05, may be specified or used in any project.

1.12 Verification

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

1.13 Building Smoking Environment

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

1.14 Special Conditions

.1 The following general and special conditions apply:
  .1 All existing surfaces and finishes are to be repaired wherever damaged during the course of the Work.
  .2 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.15 Site Security

.1 Daily Inspection: Provide inspection of the work areas daily while the work is in progress and take whatever measures are necessary to secure the construction zones from theft, vandalism and unauthorized entry.

1.16 “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.

1.17 Use of Drawings

.1 Drawings are not to be scaled.

.2 Copies of architectural and structural “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. (Sample attached as Appendix ‘A’)

.3 Arrangements for use of sub-consultant drawings must be made with the appropriate sub-consultant.

1.18 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 expressed interest in the Project.

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

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 Consultants

.1 ARCHITECT:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Fax: (905) 666-5256
Email: wweima@bba-archeng.com
Attention: Mr. William Weima, OAA, MRAIC

.2 STRUCTURAL ENGINEER:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Fax: (905) 666-5256
Email: dmclaughlin@bba-archeng.com
Attention: Mr. Doug McLaughlin, P. Eng.

.3 ELECTRICAL ENGINEER:
Dynamic Designs and Engineering Inc.
111 Hodgson Avenue
Kettleby, Ontario L7B 0C7
Tel: (905) 841-7278
Email: dyneng@rogers.com
Attention: Mr. Tony Monopoli, P.Eng.

.4 MECHANICAL ENGINEER:
Giallonardo Engineering Inc.
220-4550 Highway 7
Woodbridge, Ontario L4L 4Y7
Tel: (905) 265-1052
Attention: Mr. Jeremy Hogan, P.Eng.

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Cash Allowances

1.2 References

.1 Canadian Construction Documents Committee CCDC2-2008 Stipulated Price Contract including the Supplementary Conditions.

1.3 Cash Allowances

.1 Refer to General Conditions, GC4.1.

.2 Unless otherwise specified, Cash Allowances shall cover the cost of the materials and equipment delivered F.O.B. job site, and all applicable taxes, except Harmonized Sales Tax. The Contractor's handling costs on the site, labour, installation costs, overhead and profit and other expenses shall be included separately in the Stipulated Price and not in the Cash Allowance.

.3 Where it is specified that a Cash Allowances is to include both supply and installation costs, such allowances shall cover the cost of the materials and equipment delivered and unloaded at the site, all applicable taxes and the contractor’s handling costs on the site, labour and installation costs and other expenses, except overhead and profit which shall be included separately in the Stipulated Price.

.4 If the cost of the Work covered by Cash Allowances, when determined, is more or less than the allowance, the Contract Sum shall be adjusted accordingly.

.5 In the event that the cost of the work covered by Cash Allowances should exceed the cash allowance, while the Contract Sum will be adjusted in conformity therewith, there shall be no adjustment to the Contractor's fee or other expenses such as overhead or profit, it being understood and agreed that the contract sum includes the Contractor's expenses and profit for all Cash Allowances whether or not they are exceeded.

.6 Progress payments on accounts of work authorized under Cash Allowances shall be included in monthly certificate for payment.

.7 Expenditures from Cash Allowances shall be authorized by Change Directive or Change Order.

.8 Cash Allowance for independent inspection and testing shall cover the cost of such services as provided by independent testing agency only. The Contractor's cost for labour, overhead and other expenses related to independent inspection and testing shall be included separately in the Stipulated Price and not in the Cash Allowance.

.9 Cause the work covered by Cash Allowances to be performed for such amounts and by such persons as the Consultant may select and direct or as required by the project drawings and specifications.

.10 Refer to Instructions to Bidders, for list of Cash Allowances.

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 information 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 Preconstruction Conference
.2 Project Meetings
.3 On Site Documents
.4 Closeout Procedures
.5 Cost Breakdown

1.2 Preconstruction Conference

.1 The Consultant will call for and administer a Preconstruction Conference at time and place to be announced.

.2 Contractor, all major Subcontractors, and major suppliers shall attend the Preconstruction Conference.

.3 Agenda will include, but not be limited to, the following items.
.1 Lines of communication and contact information
.2 Schedules
.3 Personnel and vehicle permit procedures
.4 Use of premises
.5 Location of any Contractor on-site facilities
.6 Security
.7 Housekeeping
.8 Submittal and RFI procedures
.9 Inspection and testing procedures, on-Site and off-Site
.10 Control and reference point survey procedures
.11 Health and Safety
.12 Contractor's Schedule of Values
.13 Contractor's Schedule of Submittals

.4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven days to submit comments or additions to minutes. Minutes will constitute final documentation of results of Preconstruction Conference.

1.3 Project Meetings

.1 The Contractor will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

.2 Meetings will be held minimum bi-weekly.

1.4 On-Site Documents

.1 Maintain at job site, one copy each of the following:
.1 Contract drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed shop drawings.
.5 Requests for Information (RFI's)

.6 Change orders.
.7 Other modifications to Contract.
.8 Field test reports.
.9 Geotechnical reports
.10 DSS reports
.11 Approved Work schedule.
.12 Manufacturers' installation and application instructions.
.13 Safety Data Sheets (SDS).
.14 Health and Safety Plan and other safety related documents.
.15 Other documents as specified.

1.5 Cost Breakdown

.1 Submit a detailed cost breakdown to Consultant at least ten working days prior to the submission of the first progress claim. After approval by Consultant the cost breakdown will be used as basis for progress payment.

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 or Services.
  .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 reviewed copy within 10 days after receipt.

.4 Resubmit finalized schedule within 7 days after return of reviewed 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 Progress Photographs
.6 Samples
.7 Mock-Ups
.8 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 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 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 new or existing 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 Progress Photographs

.1 Progress photograph to be electronically formatted and labelled as to location and view.

1.7 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.

1.8 Mock-Ups

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

1.9 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 Prevent unnecessary disturbance of top soil and underlying soil from vehicles and heavy equipment.

.6 Minimize stripping of topsoil and vegetation.

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 Known designated substances are identified in the Designated Substance Report.
.2 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.

.3 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.

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 and 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 and 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 Appointment and payment
.2 Manufacturer's field review

1.2 Related Sections

.1 Particular requirements for testing and inspection to be carried out by testing laboratory designated by the Consultant are specified under various sections of the specifications.

.2 Balancing and testing of systems under Divisions 21 through 28.

1.3 Appointment and Payment

.1 From time to time during the progress of the Work, the Owner will require that testing and inspection be performed to determine that materials provided in the Work meet the requirements of the Contract Documents.
  .1 Subcontractors shall verify with Contractor, in writing, portions of the Work that will require testing and/or inspection prior to commencing such affected work.

.2 The Owner will appoint testing and inspection companies, representing, reporting and responsible to the Owner. Cost of testing and inspection will be authorized as a disbursement of the Cash Allowances as specified in Section 01 21 13 unless otherwise indicated or specified and except for the following:
  .1 Testing and inspection required by laws, ordinances, rules, regulations or orders of public authorities.
  .2 Testing and inspection performed exclusively for Contractor's convenience.
  .3 Testing, adjusting and balancing of conveying systems, mechanical and electrical equipment and systems. Refer to mechanical specifications for in-contract air-balancing.
  .4 Mill tests and certificates of compliance.
  .5 Tests specified to be carried out by Contractor under supervision of the Consultant.
  .6 Where tests or inspections by designated testing laboratory reveal work not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work.
  .7 Additional testing required because of changes in materials, proportions of mixes, requested by the Contractor or Subcontractors as well as any extra testing of materials occasioned by lack of identification or failure of such materials being replaced to meet requirements of the Contract Documents or testing of structure or elements including load testing, shall be ac carried out at no additional cost to the Owner.
  .8 Where evidence exists that defective workmanship has occurred or that the Work has been carried out incorporating defective materials, the Consultant reserves the right to have tests, inspections or surveys performed, analytical calculation of structural strength made and the like in order to help determine the extent of defect and whether such work must be replaced. Tests, inspections or surveys carried out under these s circumstances will be made at the Contractor's expense and will not be paid for by the Owner.
  .9 Testing and compliance letters specified in other Sections.

.3 Inspection and testing company shall submit monthly invoice original to the Contractor for review, relating invoices to tests and inspection reports. Provide original receipts for disbursements. Invoices will be forwarded by Contractor to the Consultant for inclusion in progress payment

application.

.4 The Consultant will work with the Owner's representative and the Contactor's commissioning team to review the work of the Contract during closeout procedures. The Contractor shall be responsible to correct all deficiencies as reported by the Consultant and Owner's representative, and in accordance with the Contract documents. Refer to Sections 01 77 00 for requirements.

.5 Testing and Inspection shall be performed by qualified and/or certified personnel under professional supervision or performed directly by a professional engineer qualified in conformance with applicable codes and certification programs.

.6 Requirements of regulatory agencies:
- .1 Testing shall be conducted in accordance with the requirements of the building code.
- .2 Obtain certification where required by the building code and standards.

.7 Cooperation with testing and inspection company.
- .1 Provide inspection company with materials and installation information as required or as requested.
- .2 Provide access to the work for representatives of the inspection and testing companies.
- .3 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
- .4 Cooperate with testing and inspection companies and give adequate notification of any changes in source of supply, additional work shifts or other proposed changes.
- .5 No Product nor part of the Work shall be installed before it is tested when a test is specified or required, nor shall work be executed where a test or inspection is required and the inspector cannot attend. Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by the Consultant.
- .6 Cooperate in permitting access to the Work for testing and inspection company wherever Work is in progress, or wherever Products, materials or equipment are stored prior to shipping.
- .7 Supply labour required to assist testing and inspection company in sampling and making tests.
- .8 Repair work damaged as a result of testing and inspection work.
- .9 Costs of above labour and material shall be borne by applicable Subcontractors.
- .10 The testing and inspection service does not relieve the Contractor of responsibility for normal shop and site inspection, and quality control of production.
- .11 Pay costs for removal and replacement of Work, or for remedial measures necessitated by faulty workmanship and k materials which fail to meet requirement specified.

.8 Prepare schedule for testing and inspection in accordance with Section 01 33 00 and as follows:
- .1 Establishing Schedule:
  - .1 By advance discussion with the selected testing laboratory, determine the time required by the laboratory to perform its tests and issue each of its findings.
  - .2 Allow required time within Construction Schedule
- .2 Adherence to Schedule:
  - .1 Contractor shall advise testing and inspection laboratory in advance when testing of the Work is required.
  - .2 When testing and inspection laboratory is ready to test according to predetermined schedule, but is prevented from testing or taking specimens due to incompleteness of the parts of the Work scheduled for testing and inspection, extra costs for testing attributable to the delay may be back-charged to the Contractor at no increase in the Contract Price.
- .3 Notify Contractor and inspection company at least 3 Working Days before work required to be inspected commences, and arrange for a meeting at the Place of the Work, to be held one

Working day before the work starts with the following present:

.1 Contractor, a principal of the Sub-contractor whose work is to be inspected or tested, testing and inspection company, manufacturer's res presentative and Consultant.

.4 Give 2 Working Days prior notice to inspection company of the commencement of each phase of the Work requiring inspection and provide inspection company with materials and installation information.

.9 Reports and Documents:

.1 Testing and Inspection companies shall submit shop inspection and site inspection reports within 5 Working days of each inspection.

.2 Distribute reports as follows:

.1 Owner.

.2 Consultant.

.3 Contractor.

.4 Consulting engineers as applicable.

.3 Inspectors shall submit a written report on each inspection or test, including pertinent data such as conditions at the Place of the Work, dates, test references, locations of tested materials, actual product identification, procedures and descriptions, site instructions given, recommendations and/or any other information required by standard applicable reporting of tests and inspections.

.4 Clearly indicate in report failure of Product or procedures to meet applicable standards, give recommendations for retesting or correction. Contact Consultant immediately when Product or procedure fails to meet applicable standards.

.5 Upon completion of those parts of the Work subject to independent testing and inspection, submit to the Consultant duplicate certificates of acceptance of the installation issued by independent testing and inspection company.

.10 Inspection and Test Specimens:

.1 Testing and inspection will generally consist of procedures listed in the following paragraphs, but additional tests may be performed as required to verify conformance to Contract Documents.

.2 Specimens and samples for testing, unless otherwise specified in the Contract Documents, will be taken by the testing laboratory; sampling equipment and personnel will be provided by the testing laboratory; and deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

.3 Testing and inspection company shall take samples necessary to verify quality as specified by applicable standards or as specified herein. Taking of samples shall not endanger the structure or life and shall be taken so as to best represent the Work as a whole.

.4 Samples shall be handled, packaged, stored and delivers so as to best ensure the validity of tests that will be performed on them. Sample handling where required shall duplicate conditions at the Place of the Work (such as site cured concrete cylinders).

1.4 Manufacturer's Field Review

.1 Where manufacturer's field review is specified, manufacturer's representative shall review the relevant parts of work at the Place of Work, or wherever such affected work is in progress, to end sure that work is being executed in accordance with manufacturer's written recommendations.

.2 Manufacturer's field review is to ensure that the Products specified are being used in the Work and are being applied on surfaces prepared in accordance with their recommendations and the requirements of the Contract Documents.

.3 Manufacturer's representative shall undertake such review weekly, or additionally as necessary, to determine that the work is in accordance with manufacturer's written recommendations.
.4 Manufacturer's representative shall submit a type written report on manufacturer's letterhead within 2 Working days after each field review. Report shall document manufacturer's representative's field observations and recommendations.

.5 Manufacturer's field review reports to be prepared and distributed following the procedures specified for pe reparation and submittal of testing and inspection reports given above.

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 Scope and Purpose
  .1 This Section establishes the requirements for test specimens, apparatus, sampling, test procedures and test reports to be used in evaluating the performance of newly installed windows, storefronts, curtain walls and sloped glazing systems and their installation during construction; ("Test Area" hereafter referred to as "specimen").
  .2 The purpose of this specification is to provide a method which can be used to evaluate the installed performance of windows, storefronts, curtain walls and sloped glazing systems for air leakage and resistance to water penetration under controllable and reproducible test conditions intended to simulate wind driven rain events. Field air leakage testing is not recommended for a portion of continuous framing systems due to the complexity of compartmentalizing air chambers and cavities within these systems.

1.2 References

.1 ASTM International (ASTM)
  .1 ASTM E547-00 (2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential.
  .2 ASTM E783-02 (2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  .3 ASTM E1105-15 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
.2 American Architectural Manufacturers Association (AAMA)
  .1 AAMA 501-15 Methods of Test for Exterior Walls
  .2 AAMA 502-12 Voluntary Specification for Field Testing of Newly Installed Fenestration Products
  .3 AAMA 503-14 Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
  .4 AAMA 511-08 Voluntary Guideline for Forensic Water Penetration Testing of Fenestration Products
.3 CSA Group (CSA)
  .1 CSA A440-17 North American Fenestration Standard/Specification for Windows, Doors, and Skylights

1.3 Test Methods

.1 General
  .1 Field testing procedure and test apparatus shall meet the requirements of the following referenced ASTM test method.
  .2 Resistance to air infiltration using static air pressure difference: ASTM E783.
  .3 Resistance to water penetration using static air pressure difference: ASTM E1105.

.2 Test Chamber Arrangement
  .1 Joints (transition seals) between the specimen and the adjacent wall, curb or roof shall be permitted to be included in the test specimen. The test chamber shall be applied to the interior or exterior of the wall, curb or roof construction in such a manner as to create a pressure differential across the specimen assembly, including perimeter frame intersections and perimeter seals, subframes, receptors and flashing.

.2 It is not practical to install a chamber on a segment of a continuous horizontal or vertical member; therefore air leakage testing of these systems is not recommended.
.3 Testing shall be performed immediately after the first units have been installed and regularly thereafter. All testing is to be performed prior to the installation of drywall or interior finish wall/roof materials if the transition seal from the glazing system to the adjacent wall system is to be tested. If interior finish wall/roof materials have been installed, they shall be removed at the test area to allow visual access to these areas to check for water penetration, or other means of visual access shall be provided. The test chamber shall be applied to the wall/roof system in such a manner as to apply a pressure differential to all joinery conditions and minimize extraneous air leakage.

1.4 Sampling

.1 As soon as practical after installation has begun, and after the test specimen has been completely installed, adjusted, cleaned and perimeter sealed (including adequate time for the sealant to cure), the specimen shall be tested for air leakage and water penetration resistance as specified in Article 1.5.
.1 All trades and contractors involved and responsible for the test specimen performance (i.e. manufacturer, erector, glazier, perimeter caulking contractor, etc.) shall be made aware of the test date and invited to witness the testing.

.2 If any of the specimen(s) do not conform to the prescribed air leakage and water penetration resistance requirements, the manufacturer and/or the installer shall be afforded the opportunity to perform a site inspection and determine the reason for non-compliance. Non-compliant specimen(s) shall be repaired as required and retested as soon as practical. The remedial work shall be recorded and approved by the Consultant and/or Owner. Upon satisfactorily passing a retest, the remedial work performed shall become punch list items to randomly check for similar conditions on the remainder of the project. If water leakage is observed and the source of the leakage cannot be determined, a forensic evaluation using the procedures outlined in AAMA 511 shall be performed while maintaining the test pressures defined in the field testing specifications and employing the test methods defined in AAMA 503.

.3 Testing shall be performed by a qualified independent testing agency.

.4 The following testing schedule shall be followed:
.1 Test #1: Mock-up Sample, which is considered to be the first assembly installed on the project; installation of the project glazing assemblies is not to progress until the mock-up assembly testing is deemed a pass by the Consultant who shall provide instruction to continue with the glazing assembly installation irrespective of the mock-up results.
.2 Test one glazing assembly of each window frame type randomly selected by the Consultant.
.3 For every failure other than the mock-up assembly, test an additional 1 assembly.

.5 The test area specimen(s) shall conform to the following:
.1 The test specimen's size and location shall be selected by the Consultant. If the specimen location has not been pre-determined, the location shall be selected by the Consultant unless delegated to the independent testing agency or building envelope consultant.
.2 If no specimen size and/or location is identified in the construction documents, select an appropriate size specimen that will provide representative performance data, a minimum of 9.3 m^2. The specimen shall include, perimeter (transition) seals, typical splices, frame intersections, and, if applicable, at least two entire vision lites and two entire spandrel lites containing an intermediate vertical and an intermediate horizontal.

.3 The test specimen shall be representative of typical installations and construction for the project. The specimen(s) shall have no outstanding punch list items or visible damage or irregularities, nor be singled out because of obvious performance problems.
.4 After the specimen(s) locations have been selected, the Consultant shall direct the responsible contractor and/or manufacturer representative to remove interior finishes (if necessary), to clean the specimen(s) and remove adjoining gypsum board, trim, insulation or other materials, which could adversely affect the chamber attachment and visual inspection. Care shall be taken not to disturb the interior air seal, if present. Interior or exterior components that are required for product performance shall not be removed as some product installations require an interior air seal to perform as designed.

1.5 Test Procedures

.1 Air leakage resistance and water penetration resistance tests shall be performed at pressures specified in Paragraphs 1.5.2.1 and 1.5.2.2.
.1 Where both tests are to be conducted in sequence, the test for air leakage resistance shall be conducted before the test for water penetration resistance. If there is reason to believe that residual water from rain or other sources may be located in the specimen, a two-minute negative (outward) pressure test followed by a two-minute positive (inward) pressure test shall be conducted at the same pressure differential used for the performance test to purge the specimen of any residual water. The specimen gaskets or weatherstrips shall be examined and shall be dry before proceeding with the air leakage resistance test.

.2 All fenestration shall meet the following criteria and referred to the latest CSA A440 standard:
.1 Air leakage: A3 Fixed (maximum air leakage:0.55(m^3/h)m^(-1)).
.2 Water Penetration: B5

.3 Water Penetration
.1 Attributable to the surrounding condition shall be defined as the presence of uncontrolled water which did not originate from the product specimen or the joint between the product specimen and the wall/roof.
.2 Water penetration attributable to the product specimen shall be defined as the penetration of water beyond the primary seal/plane of water resistance.
.3 Water penetration attributable to the perimeter joint shall be defined as uncontrolled water that indisputably originates at the joint.

1.6 Test Reports

.1 The report shall include enough information to reproduce the test. At a minimum, the following information shall be included:
.1 The testing agency, name of the individual(s) performing the tests, test witnesses, date and time of test, date of report, identification and location of the building shall be identified. The date of the last equipment calibration and the location of calibration records shall also be included in the report.
.2 Glazing Product Description
.1 The manufacturer, model, operation type (if applicable), dimensions, materials, etc.; identification and location of specimen(s) within the building; physical condition of specimen; description of any modifications made to the specimen; number of retests, etc. The test agency shall report the plumb, level and square condition of the tested specimen.
.3 Sampling Procedures

.1 If applicable, describe or list the procedures established from Article 1.4.

.4 Test Parameters
.1 List or describe the specified static pressure differential(s) used in the test, whether the chamber was affixed to the interior or exterior of the wall/roof and provide a detailed description (include sketches showing location, if appropriate) of the chamber attachment to the specimen. Provide a written description of any measures that were taken to control ambient conditions. Clearly identify any elements of the specimen that were not tested. Verify in a statement that the sample was inspected immediately prior to the test or installation of the chamber if it conceals portions of the specimen, that the original conditions were observed and documented, and that all surfaces were dry, such that water observed during or after testing was produced by the test itself and no other possible source.

.5 Test Results
.1 Record the following:
.1 Actual and allowable air leakage for the product specimen.
.2 Actual and allowable water penetration for the product specimen.
.3 Actual and allowable water penetration for the perimeter condition.
.4 Environmental conditions as measured at the time of the test: wind speed, wind direction, precipitation, barometric pressure and ambient temperature.

.6 Additional Observations
.1 If problems with a specimen installation are observed, they shall be brought to the responsible contractor's and/or manufacturer representative's attention.
.1 The observations to be recorded shall include but not be limited to the following:
.2 Deterioration of building elements due to water penetration
.3 Deviations of the installation from the drawings of record
.4 Staining or discolouration of building components
.5 Evidence of damage to either the installed product or the surrounding building elements
.6 Unusual or unexpected evidence of water penetration or air leakage which would require remediation
.7 Any observed performance or installation details which might be deemed of importance to a subsequent forensic investigation.

.7 Compliance Statement
.1 Make a statement that the tests were conducted in accordance with this specification or completely describe any deviation. Also, state whether or not the results indicate compliance with the field testing specification requirements.

1.7 Cost

.1 The cost of the testing company associated with the mock-up testing and specified initial quality assurance testing shall be paid for through the project inspection and testing allowance. The costs associated with executing the testing such as access, preparation, providing water, electricity, labour to support testing, etc. is not be paid from the project cash allowance and is to be included as part of the construction project bid price.

.2 The Contractor will be responsible for all costs associated with any retesting or additional testing that is the result of failures of mock-up and initial QA testing. These costs are to include all construction, testing agency, and Owner representative consulting fees associated with the retesting.

1.8 Contractor Responsibilities

.1 The following shall be provided by the Contractor:
- .1 All access (interior and exterior) required to perform the testing on the units selected.
- .2 Adequate water and power supply per the requirements of the testing agency; including hoses and power cords.
- .3 One labourer to assist with the execution of the testing and clean-up following the testing.
- .4 Adequate water supply (standard garden-hose bib with minimum 1.5 m^3/h water flow at 310 kPa pressure) within 15 m of test area. A booster pump may be required if water flow and pressure cannot be maintained for the entire duration of test.
- .5 Contractor shall conduct a bucket-and-stopwatch check prior to test date to ensure adequate water supply.

Test Requirement	Maximum time allowed to fill a 22.7 gallon pail
2.4 x 2.4 m Spray Rack, A440 Water Test	50 Seconds
3.05 x 3.05 m Spray Rack, A440 Water Test	30 Seconds
AAMA 502 Field Check	40 Seconds

- .6 Electrical outlet, standard 115V, 15A within 15 m of test area.
- .7 Free and un-encumbered access to both the interior and exterior side of test area, such as removal of curtains and blinds, furniture, etc.
- .8 Free access to the wall cavity immediately beneath the window/door sill in order to inspect for any water penetration (as required by CSA A440). If such access was not provided, and if the window passes the water penetration test, the window would receive a "qualified Pass" with a note indicating that the area under the sill was not inspected.
- .9 Chamber installation requires installation of attachments and sealing to interior and exterior framing members and wall surfaces. This may result in unavoidable damage or staining of finished surfaces. Contractor shall allow for cleaning/repairing such damage or staining.
- .10 The Contractor shall be responsible to ensure that all areas of the jobsite affected by window testing are protected from unsafe conditions.
- .11 If testing of installation joints/interfaces with surrounding wall construction is required, then the Contractor shall provide access to the interior air barrier and the primary installation seal so that the testing company may include such features in the test chamber.

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 Existing sources of water can be made available to the Contractor at no charge, subject to operational requirements. Arrange for connection and pay all costs for installation, maintenance and removal. Conversions or alterations to existing sources of water to meet construction requirements are the responsibility of the Contractor.

.2 The points of delivery and limits on amount available will be determined on site by the Owner whose written permission must be obtained before any connection is made.

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. Owner will pay utility charges when temporary heat source is existing building equipment.

.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 Existing sources of electric power can be made available to the Contractor. Conversions or alterations to existing sources of electric power to meet construction requirements are the responsibility of the Contractor.

.2 The points of delivery and limits on amount available will be determined on site by the Owner whose written permission must be obtained before any connection is made.

.3 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Consultant provided that guarantees are not affected.

.4 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.

.5 All equipment used shall be CSA approved.

.6 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, cellular data, lines and all equipment necessary for Contractor’s 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 Construction Parking
.4 Offices
.5 Equipment, Tool 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
  .2 CAN/CSA Z797-18 Code of Practice for Access Scaffold

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 Scaffolding in accordance with CSA Z797.

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

.3 Enclose and heat scaffolding during cold weather.

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.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

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 Examine the site to determine the conditions under which work will be performed.

.2 Contractor shall formulate his own conclusions as to the extent of the existing conditions and shoring required.

.3 The method of shoring shall be according to the Contractor's and his Engineer's directions.

.4 All existing loads must be shored prior to commencement of demolition and removal of load bearing elements.

.5 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.

.6 All shoring shall be subject to the Consultant's review and approval prior to commencing demolition work.

.7 Completely remove all shoring after new structure is installed and all concrete is set.

.8 Submit shoring drawings and a proposed installation procedure stamped by a professional engineer registered in the Province of Ontario. Procedures shall follow the information provided on these drawings. The shoring design engineer shall be retained and paid for by the Contractor. The shoring engineer shall review all existing conditions on site prior to completing shoring design.

.9 Removal of existing materials without proper engineered shoring is a safety hazard and will not be permitted.

.10 Make good all damage to the existing structure and adjoining structures and bear full responsibility for failure to provide adequate shoring.

.11 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 existing 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 At interior locations, 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 barriers conforming to ASTM C825 - 19 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 Protection for Off Site and Public Property

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.10 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 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.

1.11 Protection of Surrounding Work

.1 Provide protection for finished and partially finished Work from damage.

.2 Provide necessary cover and protection.

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

1.12 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.

1.13 Fire Routes

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

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 Dielectric Separation
.5 Tolerances for Execution of Work.
.6 Protection of Work in progress.
.7 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 Dielectric Separation

.1 Ensure that a dielectric separator is provided in a permanent manner over entire contact surfaces to prevent electrolytic action (galvanic corrosion) between dissimilar materials. Similarly, prevent corrosion to aluminum in contact with alkaline materials such as contained in cementitious materials.

1.15 Tolerances for Execution of Work

.1 Unless specifically indicated otherwise, Work shall be installed plumb, level, square and straight.

.2 Unless acceptable tolerances are otherwise specified in specification sections, or are otherwise required for proper functioning of equipment, site services and mechanical and electrical systems:
.1 “Plumb and level” shall mean plumb or level within 1 mm in 1m.
.2 “Square” shall mean not in excess of 10 seconds lesser or greater than 90 degrees.
.3 “Straight” shall mean within 1 mm under a 1 m long straight edge.
.4 “Flush” shall mean within:
.1 6 mm for exterior concrete, masonry and paving materials.
.2 1 mm for interior concrete, masonry, tile and similar surfaces.
.3 0.5 mm for other interior surfaces.

.3 Allowable tolerances shall not be cumulative

1.16 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.

1.17 Existing Utilities

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

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

1.18 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 Safety Requirements
.2 Fire Protection
.3 Accident Reporting
.4 Records on Site

1.2 References

.1 Fire Commissioners of Canada, FC 301, Standard for Construction Operations.
.2 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
.3 Occupational Health and Safety Act.
.4 R.R.O. 1990, Reg. 860: Workplace Hazardous Materials Information System (WHMIS)
.5 National Fire Protection Agency (NFPA)
  .1 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
.6 Ontario Building Code.

1.3 Submittals

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

.2 Submit to Owner and Consultant copies of the following documents, including updates issued:
  .1 Notice of Project filed with Provincial Ministry of Labour or equivalent for Place of Work
  .2 Site-specific Health and Safety Plan prior to commencement of work on the work site. Plan shall include but not be limited to the following:
    .1 Name and contact info of Contractor's Health and Safety Representative for Work Site; including twenty-four (24) hour emergency contact phone numbers.
    .2 Phone numbers of local fire, police, and ambulance outside of 911 services.
    .3 Location of nearest medical facility and level of injury that each can service.
  .3 Submit to the Owner, Consultant and Municipal Fire Department, for review, a “Fire Safety Plan” conforming to Section 2.14 of the National Fire Code of Canada. Maintain a copy of the “Fire Safety Plan” on site.
  .4 Copies of certification for all employees on site of applicable safety training including, but not limited to:
    .1 WHMIS.
    .2 Fall arrest and protection.
    .3 Suspended Access Equipment.
    .4 Erection of Scaffolding.
    .5 License for powder actuated devices.
  .5 On-site Contingency and Emergency Response Plan addressing:
    .1 Standard procedures to be implemented during emergency situations.
    .2 Preventative planning and protocols to address possible emergency situations.

.3 Guidelines for handling, storing, and disposing of hazardous materials that maybe encountered on site, including measures to prevent damage or injury in case of an accidental spill.

.4 Incident and accident reports, promptly if and upon occurrence
  .1 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.

.2 Accident or Incident Reports, within 24 hours of occurrence.

.5 Submit other data, information and documentation upon request by the Consultant as stipulated elsewhere in this section.

1.4 Compliance Requirements

.1 Comply with the latest edition of the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.

1.5 Constructor

.1 Notify all regulatory bodies required for construction activities, (i.e., Notice of Project, employer notification, etc.). Notifications shall include, but not be limited to, the notification requirements laid out in OHSA Sec 51-53 and the requirements of Ontario Regulation 213/91 for Construction Projects, Sections 5, 6 and 7. For the purpose of this contract the Contractor shall be the "Constructor".

.2 The “Constructor” will be solely responsible for the safety of all persons on the Site.

1.6 Safety Requirements

.1 Observe and enforce all construction safety measures and comply with the latest edition and amending regulations of the following documents and in the event of any differences among those provisions, the most stringent shall apply:
- .1 Occupational Health and Safety Act and Regulations for Construction Projects, August 1997, Ontario Regulation 213/91 including amendments.
- .2 Hazardous Products Act and Canada Labour Code.
- .3 The Workplace Safety and Insurance Board, O-Reg 454.
- .4 Ontario Building Code Act, Ontario Regulation 332/12 including amendments.
- .5 National Building Code of Canada, Part 8: Safety Measures on Construction and Demolition Sites.
- .6 National Fire Code of Canada.
- .7 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2013 Edition
- .8 Environmental Protection Act.
- .9 The Power Commission Act.
- .10 The Boiler and Pressure Vessels Act.
- .11 The Elevators and Lifts Act.
- .12 The Operating Engineer's Act.
- .13 Municipal statutes.

.2 Obey all Federal, Provincial and Municipal Laws, Acts, Statutes, Regulations, Ordinances and By-laws which could in any way, pertain to the work outlined in the Contract, or to any employees of the Contractor. Satisfy all statutory requirements imposed by the Occupational Health and Safety Act and Regulations made thereunder, on a Contractor, and Constructor and/or Employer with respect to or arising out of the performance of the Contractors obligations under this Contract.

.3 Working at Heights: The supervisor of the project, will be responsible to ensure that his employees and subcontractors/suppliers have current Working at Heights and Fall Protection certification.

.4 The supervisor of the project will be responsible for his employees and subcontractors/suppliers maintaining standard safety practices, as well as the specific safety rules listed below, while

working on the Owner's property.

.5 The Owner reserves the right to order individuals to leave the site if the individual is in violation of any safety requirement or any Act. Any expense incurred will be the responsibility of the Contractor.

.6 Notify the Owner should any hazardous condition become apparent.

.7 Enforce the use of CSA approved hard hats, reflective vests and safety boots for all persons entering or working at the construction site. Refuse admission to those refusing to conform to this requirement.

.8 Provide safeguard and protection against accident, injury or damage to any person on the site, adjacent work areas and adjacent property.

1.7 Confined Space

.1 Confined Space: Where applicable, provide the Consultant and all Regulatory Authorities with a copy of the Contractors' Confined Space Entry Procedure. In the event that defined procedures are not available, abide by the applicable requirements of the Occupational Health and Safety Act and all regulations made thereunder.

.2 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.

.3 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.

.4 Provide all necessary safety equipment for entry into confined spaces.

.5 Where workers are required to enter a confined space, as defined by the OHSA, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all Subcontractors follow the requirements of the above legislation, including but not limited to:
.1 Having a method for recognizing each confined space to which the program applies
.2 Having a method for assessing the hazards to which workers may be exposed
.3 Having a method for the development of confined space entry plans (which include on-site rescue procedures)
.4 Having a method for training workers
.5 Having an entry-permit system.
.6 Supply the necessary tools and equipment to perform the confined space entry. These items include, but are not limited to, required documentation, gas detectors, breathing equipment, fall protection and rescue equipment.

1.8 Safety Meetings

.1 Site toolbox safety meetings will be held weekly for all Contractor employees and all sub trade contractors.

.2 Where a Joint Health and Safety Committee is required on a project, workers and supervisors, selected, as members of the committee must attend.

1.9 Workplace Hazardous Materials Information System (WHMIS)

.1 Be familiar with WHIMIS regulations and be responsible for compliance.

.2 Provide to the Consultant a list of Designated Substances that will be brought to the site prior to commencing work. Safety Data Sheets (SDS) and the hazardous material inventory for each substance listed must be kept on the Project.

.3 Be responsible for all other requirements of regulations as applicable to Employers.

.4 All controlled products to be properly labelled and stored.

.5 Immediately inform Owner and Consultant if any unforeseen or peculiar safety-related factor, hazard, or condition becomes evident during performance of Work.

1.10 Fire Protection

.1 Provide and maintain safeguard and protection against fire in accordance with current fire codes and regulations.

.2 Provide temporary fire protection throughout the course of construction. Particular attention shall be paid to the elimination of fire hazards.

.3 Comply with the requirements of FCC No. 301 Standards for Construction Operations issued by the Fire Commissioner of Canada and the National Building Code.

.4 Provide and maintain portable fire extinguishers during construction, in accordance with Part 6 of the National Fire Code of Canada 2015 and NFPA 241.

.5 Maintain unobstructed access for firefighting at all areas in accordance with the National Building Code of Canada.

1.11 First Aid

.1 Provide such equipment and medical facility as required by WSI Act to supply first aid services to anyone who may be injured at the place of Work. Report all accidents or injuries to the proper authorities and to the Owner and Consultant.

1.12 Accident Reporting

.1 Investigate and report incidents and accidents as required by Occupational Safety and Health Act, and the Regulations made pursuant to the Act.

1.13 Records on Site

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

.2 Upon request, make copies available to 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 Field Engineering survey services.
.2 Survey services to establish and confirm inverts for Work.
.3 Recording of subsurface conditions found.

1.2 References

.1 Owner's identification of existing survey control points and property limits.

1.3 Submittals

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

.2 Submit name and address of Surveyor to Consultant.

.3 On request of Consultant, submit documentation to verify accuracy of field engineering work.

.4 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

1.4 Examination of Work and Site

.1 Examine the site and existing building 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.

.4 As-found damage: Record by photography and submit evidence to Consultant before commencing work, any found damaged surfaces or materials adjacent to new work, and not included under scope of this new work. Remedial work to any damage, not so recorded, shall be the responsibility of the Contractor.

1.5 Qualifications of Surveyor

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

1.6 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.

1.7 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.

1.8 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.

.6 All existing concrete floor slabs shall be scanned prior to any cutting or breaking of concrete. Employ a qualified concrete scanning company or inspection and testing agency to scan and map floor slabs for reinforcing, plastic and metal conduit, piping, grounding cables, embedment and the like. Map all slabs and provide copies to the Owner and Consultant.

1.9 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. Include existing equipment which affects or will be affected by the work.

.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.

.10 Unless specifically indicated by the Consultant, interference drawings will be received for information only and will not be reviewed.

1.10 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.

1.11 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

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

1.3 Materials

.1 As specified and required for original installation.

.2 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, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

3.2 General

.1 Carry out all cutting, fitting 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. Include any openings in existing building elements created by removal of existing services or equipment.

.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 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

.4 Temporary Support: Provide temporary support of work to be cut.

.5 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.

.6 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.

.7 Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

.8 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.

.9 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, colour, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour 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.

.10 Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.4 Subfloor Levelling

.1 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove all flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Clean, patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer's instructions and ASTM F710-21. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.

.2 Where new flooring is to be installed on new concrete slab or on framed floors, subfloor shall be levelled in accordance with flooring manufacturer's specifications and tolerances and with ASTM F710-21 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

3.5 Fire Barrier Seals

.1 Ensure fire separations are maintained as indicated on the drawings. patch and firestop all penetrations accordingly.

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 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 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.

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

.6 Clean lighting reflectors, lenses, and other lighting surfaces. Clean and/or replace lamps, light fixtures, grilles and lenses.

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

.8 Thoroughly vacuum clean interior of electrical equipment.

.9 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

.10 Clean and seal concrete floor surfaces with non-skid matte sealer.

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

.12 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.13 Broom clean and wash exterior paved areas, walks, steps and surfaces; rake clean other surfaces of grounds.

.14 Remove dirt and other disfiguration from exterior surfaces.

.15 Clean and sweep roofs. Clear all drains, scuppers, gutters and downspouts.

.16 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.17 Remove snow and ice from access to building.

.18 Under direction of Consultant, aim adjustable luminaires.

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.
.2 O. Reg. 278/05, Occupational Health and Safety Act

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: Submit a Waste Management Plan within 10 calendar days after receipt of Notice of Award of Contract, or prior to any waste removal, whichever occurs sooner. 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. Containers for volatile wastes shall be closed containers and shall be removed from site daily.

.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 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 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. Provide duplicate copies on memory stick

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 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 The National Building Code of Canada, Part 8-Safety Measures on Construction and Demolition Sites.
.2 ASTM International (ASTM)
  .1 ASTM F710-19e1 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
.3 CSA Group (CSA)
  .1 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
.4 Ontario Regulation 102/94 Waste Audits and Waste Reduction Work Plans.
.5 Ontario Regulation 103/94 Environmental Protection Act.
.6 Ontario Regulation 213/07 The Fire Code.
.7 Ontario Regulation 232/98 Landfilling Sites.
.8 Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
.9 Ontario Regulation 347 Environmental Protection Act, General — Waste Management.
.10 Ontario Regulation 332/12 The Building Code.
.11 The Workplace Health and Safety Act, and Regulations for Construction Projects.
.12 The Contractors Health and Safety Policy.
.13 Laws, rules and regulations of other authorities having jurisdiction.

1.4 Submittals

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

.2 Submit detailed written schedule, methodology and proposed procedures for demolition, including a Safe Work Plan for review prior to commencement of demolition.

.3 Where required by authorities having jurisdiction, submit for approval drawings, diagrams or details clearly showing sequence of disassembly work or supporting structures and underpinning.

.4 Drawings for structural elements of the demolition process including shoring, underpinning and installation of new lintels or beams in existing load bearing walls, shall bear signature and stamp of qualified professional engineer registered in the Province of Ontario.

.5 Submit proposed dust-control measures.

.6 Submit proposed noise-control measures.

.7 Submit schedule of demolition activities indicating the following:

.1 Detailed sequence of demolition and removal work, including start and end dates for each activity.
.2 Dates for shutoff, capping, and continuation of utility services.

.8 If hazardous materials are encountered and disposed of, landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

.9 At Project Closeout: Submit record drawings in accordance with Section 01 78 00. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions

1.5 Permits

.1 Obtain and pay for all permits and comply with all laws, rules, ordinances, and regulations relating to Demolition of Building and preservation of Public Health and Safety.

.2 The Consultant will complete General Review during demolition in accordance with the Ontario Building Code. All other engineering required for shoring design and for other structural elements of the demolition work will be completed by the Contractor's own engineer and paid for by the Contractor.

1.6 Waste Management Plan

.1 All work of this section shall be completed in accordance with the contractors approved Waste Management Plan specified in Section 01 74 19.

1.7 Definitions

.1 Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.

.2 Demolition Waste: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, plastic pipe, and steel. The materials may include rock, soil, tree stumps, and other vegetative matter resulting from land clearing and landscaping for construction or land development projects.

.3 Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human or animal life; affect other species of importance to humanity; or degrade the utility of the environment for aesthetic, cultural or historical purposes.

.4 Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively for the purpose of disposal.

.5 Inert Solids/Inert Waste: Non-liquid solid waste including, but not limited to, soil and concrete that does not contain hazardous substances or soluble pollutants at concentrations in excess of water-quality standards established by a regional water board and does not contain significant quantities of decomposable solid waste.

.6 Landfill: A landfill that accepts non-hazardous materials such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations. A landfill must have a solid waste facilities permit from the Ministry of the Environment and be in conformance to O. Reg 232/98.

.7 Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

.8 Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.

.9 Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.

.10 Solid Waste: All putrescible and non-putrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge which is not hazardous waste, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. "Solid waste" does not include hazardous waste, radioactive waste, or medical waste as defined or regulated by law.

1.8 Quality Assurance

.1 Demolition Firm Qualifications: Demolition contractor shall be an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

.2 Regulatory Requirements: Comply with governing regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Obtain and pay for all permits required.

.3 Pre-demolition Conference: Conduct a conference at Project site.
.1 Review the environmental goals of this Project and make a proactive effort to increase awareness of these goals among all labor forces on site.
.2 Review schedule and scheduling procedures.
.3 Review health and safety procedures.
.4 Review of Project conditions including review of record photographs.

1.9 Project Conditions

.1 Construct safety barriers, barricades, fencing and hoarding to separate public from work areas as described in Section 01 56 00.

.2 The Owner assumes no responsibility for the actual condition of the structures to be demolished.

.3 Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. Variations within the structures may occur by the Owner's salvage operations prior to start of demolition.

1.10 Designated Substances

.1 Project specific Designated Substances and Hazardous Building Materials Survey, Moira Secondary School, 275 Farley Avenue, Belleville, Ontario, #7048-001 dated April 12, 2018 by Cambium Inc.

.2 Should any other material not identified in the above referenced reports resembling asbestos or other hazardous substances be encountered in course of demolition work, immediately stop work and notify the Owner's Representative. Refer to Section 01 41 00.

.3 All designated substances abatement, removal and disposal shall conform in accordance with O. Reg 278/05 and all other applicable legislation. Refer to Specifications included in the Designated Substance Survey for abatement requirements.

PART 2 PRODUCTS

2.1 Materials

.1 Provide all materials necessary for temporary shoring. On completion, remove temporary materials from site.

.2 All building materials removed from the building shall become the property of the Contractor unless specified otherwise and shall be reused in new construction or removed from the Site.

.3 All concrete, masonry, asphalt and similar materials shall be crushed prior to disposal.

2.2 Salvage

.1 All items of salvageable value must be salvaged.

.2 Provide a schedule of items to be salvaged and clearly indicate which items are to be retained by Owner. Clearly identify and tag each salvageable item.

.3 Transport salvaged items from the site as they are removed.

.4 Items of salvageable value to the Contractor may be removed from the structure as the work progresses, if such items are not claimed by the Owner.

2.3 Reuse

.1 Salvage and reuse materials as indicated on the drawings.

2.4 Recycle

.1 All materials from demolition and land clearing which can be recycled through local municipal programs and which is not scheduled for salvage shall be sorted and separated in accordance with Regional, Provincial and Municipal standards and regulations.

.2 Provide recycling receptacles for the duration of construction activities at the building site.

PART 3 EXECUTION

3.1 Examination

.1 Survey existing conditions and correlate with requirements indicated to determine extent of demolition, salvage and recycling required.

.2 Verify that utilities have been disconnected and capped.

.3 Survey condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

.4 Retain a licensed and qualified civil or structural engineer to provide analysis, including calculations, necessary to ensure the safe execution of the demolition work.

.5 Perform surveys and tests as the Work progresses to detect hazards resulting from demolition activities.

.6 Preliminary Survey:
- .1 The Demolition Plans indicate the general extent of existing conditions based upon drawings provided by the Owner and existing site conditions. Review all areas of work to determine full extent of areas to be demolished, altered or renovated and become familiar with actual conditions and extent of work required.
- .2 Before commencing demolition operations, examine Site and provide engineering survey to determine type of construction, condition of structure, and Site conditions. Assess strength and stability of damaged or deteriorated structures.
- .3 Assess potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed.
- .4 Assess effects of demolition at adjacent structures and consider need for underpinning, shoring and/or bracing.
- .5 Investigate for following conditions:
  - .1 load bearing walls and floors
  - .2 structure suspended from another
  - .3 effects of soils, water, lateral pressures on retaining or foundations walls
  - .4 presence of tanks and other piping systems
  - .5 presence of designated substances and hazardous materials.

.7 After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

3.2 Preparation

.1 Erect and maintain dustproof and weatherproof partitions as required to prevent spread of dust, fumes and smoke to other parts of building. Maintain fire exits. On completion, remove partitions and make good surfaces to match adjacent surfaces of building.

.2 Provide all shoring and bracing required for the execution of the work.

.3 Ensure all sedimentation controls as required are in place prior to commencement of demolition activities.

.4 Before commencing demolition, verify that existing water, gas, electrical and other services in areas being demolished are cut off, capped diverted or removed as required. Post warning signs on electrical lines and equipment which must remain energized to serve adjacent areas during period of demolition.

.5 Conduct demolition operations and remove materials from demolition to ensure minimum interference with roads, streets, walks, and other adjacent occupied and utilized facilities.

.6 Do not close or obstruct streets, walks, or other adjacent occupied or utilized facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.3 Utilities

.1 Contact authorities or utility companies for assistance in locating and marking services passing under, through, overhead or adjacent to structure to be demolished. Such services include:
- .1 Electrical power lines
- .2 Gas mains
- .3 Communication cables
- .4 Fibre optic cables
- .5 Water lines.
- .6 Drainage piping (storm and sanitary).

.2 Before disconnecting, removing, plugging or abandoning any existing utilities serving the building:
- .1 Notify the Owner, applicable utility companies, and local authorities having jurisdiction.
- .2 Cut off and cap utilities at the mains on the property or in the street as required by the Owner and responsible utility company. Maintain fire protection to the existing buildings at all times.
- .3 Remove, cut off and plug, or cap all utilities within the existing building areas to be demolished, except those designated to remain

3.4 Protection

.1 Erect and maintain temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction. Maintain such areas free of snow, ice, water and debris. Lighting levels shall be equal to that prior to erection.

.2 Provide safe access and egress from working areas using entrances, hallways, stairways or ladder runs, protected to safeguard personnel using them from falling debris.

.3 Do not interfere with use and activities of adjacent buildings and site. Maintain free and safe passage to and from buildings.

.4 Where demolition operations prevent normal access to adjacent properties, provide and maintain suitable alternative access.

.5 Provide flagmen where necessary or appropriate, to provide effective and safe access to site to vehicular traffic and protection to Owner's personnel. Refer to Division 1 for safety requirements.

.6 Protect existing site improvements, appurtenances, and landscaping that are designated to remain in place.

.7 Ensure that all necessary controls are in place at the beginning of each work period which will prevent the spread of contaminated material beyond the work area limits. Stop work immediately if there exists any possibility of the spread of contaminated materials.

.8 Keep dust from entering existing facilities and areas of building not affected by the Work. Comply with Ministry of Health requirements regarding debris control.

.9 Ensure scaffolds, ladders, equipment and other such equipment are not accessible to public. Protect with adequate fencing or remove and dismantle at end of each day or when no longer required.

.10 Take precautions to guard against movement, settlement or collapse of adjacent structures, services or driveways. Be liable for such movement, settlement or collapse caused by failure to take necessary precautions. Repair promptly such damage when ordered.

.11 If Owner considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Owner's orders.

.12 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing premises.

.13 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.

.14 At all times protect the structure from overloading.

.15 Provide protection around floor and/or roof openings.

.16 Protect from weather, parts of adjoining structures not previously exposed.

.17 Protect interiors of building parts not to be demolished from exterior elements at all times.

.18 At end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling.

3.5 Temporary Ventilation

.1 Provide all required temporary ventilation for demolition work.

3.6 Environmental Controls

.1 Comply with provincial and municipal regulations pertaining to water, air, solid waste, recycling, chemical waste, sanitary waste, sediment and noise pollution.

.2 Protection of Natural Resources:

.1 Preserve the natural resources.
.2 Confine demolition activities to areas defined by public roads, easements, and work area limits indicated on the drawings.
.3 Water Resources: Comply with applicable regulations concerning the direct or indirect discharge of pollutants to underground and natural surface waters. Provide sedimentation control where necessary.
.4 Store and service construction equipment at areas designated for collection of oil wastes.
.5 Oily Substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water in such quantities as to affect normal use, aesthetics, or produce a measurable ecological impact on the area.

.3 Dust Control, Air Pollution, and Odour Control: Prevent creation of dust, air pollution and odors.
.1 Use temporary enclosures and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
.2 Store volatile liquids, including fuels and solvents, in closed containers.
.3 Properly maintain equipment to reduce gaseous pollutant emissions.

.4 Noise Control: Perform demolition operations to minimize noise.
.1 Provide equipment, sound deadening devices, and take noise abatement measures that are necessary to comply with municipal regulations.

.5 Salvage, Re-Use, and Recycling Procedures:
.1 Identify re-use, salvage, and recycling facilities.
.2 Develop and implement procedures to re-use, salvage, and recycle demolition materials.
.3 Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.
.4 Source-separate clean and uncontaminated demolition materials including, but not limited to the following types:
.1 Concrete, Concrete Block, Concrete Masonry Units (CMU), Brick.
.2 Metal (ferrous and non-ferrous).
.3 Wood.
.4 Glass.
.5 Plastics and Insulation.
.6 Gypsum Board.
.7 Porcelain Plumbing Fixtures.
.8 Fluorescent Light Tubes.
.9 Paper: Bond, Newsprint, Cardboard, Paper, Packaging Materials.
.10 Other materials as appropriate.

3.7 Performance

.1 Ensure demolition work is supervised by competent foreman at all times.

.2 Demolition shall proceed safely in systematic manner. Work on each floor level shall be complete before commencing work on supporting structure and safety of its supports are impaired. Parts of building which would otherwise collapse prematurely shall be securely shored. Walls and piers shall not be undermined.

.3 Until acceptance, maintain and preserve active utilities traversing premises.

.4 Provide enclosed chutes for disposal of debris from heights more than 1 storey in accordance with CSA S350.

.5 Maintain safety of site by shoring below-grade-structures and excavations resulting from demolition against collapse.

3.8 Demolition

.1 Review demolition procedures to ensure no personnel or equipment are located or working without additional safe working platforms or working surface adequate to support the operations.

.2 Any damage caused to the adjacent buildings or properties by the neglect of the Contractor or any of his forces shall be made good at the expense of the Contractor including all costs and charges which may be claimed by the Owner for damages suffered.

.3 Demolish in a manner to minimize dusting. Keep dusty materials wetted at all times.

.4 Demolition: Use methods required to complete Work within limitations of governing regulations and as follows:
- .1 Locate demolition equipment throughout the building and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- .2 Demolish concrete and masonry in sizes that will be suitable for acceptance at recycling or disposal facilities.
- .3 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- .4 Break up and remove concrete slabs on grade in small sizes, suitable for acceptance at recycling or disposal facilities, unless otherwise shown to remain.
- .5 Remove all disconnected, abandoned utilities.
- .6 Remove all finishes, fixtures, fitments and services as indicated
- .7 Damages: Promptly repair damages to adjacent facilities caused by demolition operations.
- .8 Prevent access to excavations by means of fences or hoardings.

3.9 Selective Demolition

.1 Carefully dismantle and remove all items in as shown and as necessary to complete the work.

.2 Salvage items scheduled for reuse or to be handed over to the Owner.

.3 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger the existing buildings.

.4 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer’s instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.

.5 Return areas to condition existing prior to the start of the work unless indicated otherwise.

.6 At exterior and interior bearing walls to be removed, include breaking out and removal of existing concrete foundations to a minimum of 200 mm below new finished floor level.

3.10 Handling of Demolished Materials

.1 Conform to the approved Waste Management Plan.

.2 Do not allow demolished materials to accumulate or be stored on-site for more than 5 days.

.3 Do not burn, bury or otherwise dispose of rubbish and waste materials on project site.

.4 Pallet and shrink-wrap materials scheduled for re-use and stockpile where directed on site.

.5 Disposal: Transport demolished materials off Owner's property and legally reuse, salvage, recycle, or dispose of materials. Legally transport and dispose of materials that cannot be delivered to a source separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.

.6 Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.

3.11 Cleaning

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

.2 Clean adjacent streets and driveways of dust, dirt and materials caused by demolition operations.

.3 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

.4 Upon completion of demolition work, remove debris, trim surfaces and leave work site clean.

.5 Video storm and sanitary sewers and jet clean where debris may have accumulated

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 10 00 Concrete Forming and Accessories

1.3 References

.1 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-1.205-94 Sealer for Application of Asbestos-Fibre Releasing Materials.
.2 Department of Justice Canada (Jus)
  .1 Canadian Environmental Protection Act, 1999 (CEPA).
  .2 Canadian General Standards Board (CGSB).
.3 O.Reg. 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
.4 Transport Canada (TC)
  .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
.5 Environmental Property Assessment – XXXXXXXXXXXXXXXXX

1.4 Submittals

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

.2 Submit proof satisfactory to Consultant that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.

.3 Submit Provincial and/or local requirements for Notice of Project Form.

.4 Submit proof of Contractor's Asbestos Liability Insurance.

.5 Submit to Consultant necessary permits for transportation and disposal of asbestos-containing waste and proof that asbestos-containing waste has been received and properly disposed.

.6 Submit proof that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.

.7 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Consultant. Minimum of one supervisor for every ten workers.

.8 Submit proof satisfactory to Consultant that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

.9 Submit Worker's Compensation Board status and transcription of insurance.

.10 Submit documentation including test results, fire and flammability data for chemicals or materials including:
.1 Encapsulants;
.2 Amended water;
.3 Slow drying sealer.

1.5 Definitions

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Amended Water: water with nonionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.

.3 Asbestos-Containing Materials (ACMs): materials that contain 1 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust.

.4 Asbestos Work Area: area where work takes place which will, or may, disturb ACMs.

.5 Authorized Visitors: Engineers, Consultants or designated representatives, and representatives of regulatory agencies.

.6 Competent worker: in relation to specific work, means a worker who:
.1 Is qualified because of knowledge, training and experience to perform the work.
.2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.
.3 Has knowledge of all potential or actual danger to health or safety in the work.

.7 Friable material: means material that:
.1 When dry, can be crumbled, pulverized or powdered by hand pressure, or
.2 Is crumbled, pulverized or powdered.

.8 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.

.9 Occupied Area: any area of the building or work site that is outside Asbestos Work Area.

.10 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

.11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.

.12 Type I Asbestos Work: Also known as Low Risk Work or Minimum Precautions non-friable asbestos related activities or abatements. Work conducted in the proximity to Friable ACM, where that ACM is not disturbed, removal of non-friable ACMs or using hand tools equipped with a HEPA filters to affect non-friable ACMs.

.13 Type II Asbestos Work: Also known as Medium Risk Work or Moderate Precautions asbestos related activities or abatements. Work involving the handling of small amounts of friable ACM (less than 1.5 sq.m), or working in proximity of Friable ACM, where a disturbance may occur.

.14 Type III Asbestos Work: Also known as High Risk Work or Maximum Precautions asbestos related or abatement projects. Work involving the handling of friable ACM or work in proximity of friable ACM, where there is a high level of control necessary to prevent exposure of excessive concentrations of airbourne asbestos fibres. Also included in this are: use of hand tools not equipped with a HEPA filter to affect Non-friable ACMs.

.15 Glove Bag: prefabricated glove bag as follows:
- .1 Minimum thickness 0.25mm polyvinyl-chloride bag.
- .2 Integral 0.25mm thick polyvinyl-chloride gloves and elastic ports.
- .3 Equipped with reversible double-pull double throw zipper on top.
- .4 Straps for sealing ends around pipe.
- .5 Must incorporate internal closure strip if it is to be moved or used in more than one specific location

1.6 Quality Assurance

.1 Regulatory Requirements: comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications, more stringent requirement applies. Comply with regulations in effect at time Work is performed.

.2 Health and Safety:
- .1 Perform construction occupational health and safety in accordance with Section 01 70 03 - Safety Requirements.
- .2 Safety Requirements: worker protection.
  - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
    - .1 At a minimum, Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
    - .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the Asbestos work area, and the protective clothing shall consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin

under the protective clothing to include suitable footwear, and to be repaired or replaced if torn.

.2 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.3 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a DOP (dioctylpthalate) tested and approved vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.

.4 Ensure workers wash hands and face when leaving Asbestos Work Area. Contractor to provide facilities for washing.

.5 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

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 Reports and information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this project are bound into this specification as Appendix A.

.2 Notify Consultant of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material pending instructions from Consultant.

1.9 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 Place materials defined as hazardous or toxic in designated containers.

.4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.5 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

.6 Provide manifests describing and listing waste created that was ultimately removed from site and properly disposed. Transport containers by approved means to licensed facility for treatment, etc.

1.10 Scheduling

.1 Hours of Work: perform work during normal working hours.

1.11 Owner's Instruction's

.1 Before beginning Work, provide Consultant satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.

.2 Instruction and training related to respirators includes, following minimum requirements:
- .1 Fitting of equipment.
- .2 Inspection and maintenance of equipment.
- .3 Disinfecting of equipment.
- .4 Limitations of equipment.

.3 Instruction and training must be provided by a competent, qualified person.

PART 2 PRODUCTS

2.1 Materials

.1 Drop Sheets:
- .1 Polyethylene: 0.15 mm thick.
- .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of asbestos-containing material.

.3 Waste Containers: contain waste in two separate containers.
- .1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
- .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
- .3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.

.4 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.

.5 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.

.6 Encapsulant: surface film forming type conforming to CAN/CGSB-1.205 ULC listed.

PART 3 EXECUTION

3.1 Procedures

.1 Do construction occupational health and safety in accordance with Section 01 70 03 Safety Requirements.

.2 Before beginning Work, isolate Asbestos Work Area using, minimum, preprinted cautionary asbestos warning signs in both official languages that are visible at access routes to Asbestos Work Area.
  .1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
  .2 Use a DOP (dioctylpthalate) tested and approved HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
  .3 Do not use compressed air to clean up or remove dust from any surface.

.3 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.
  .1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in Asbestos Work Area where dust and contamination cannot otherwise be safely contained. Drop sheets are not to be reused.

.4 Wet materials containing asbestos to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
  .1 Use garden reservoir type low – velocity fine - mist sprayer.
  .2 Perform Work to reduce dust creation to lowest levels practicable.
  .3 Work will be subject to visual inspection and air monitoring.
  .4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.

.5 Frequently and at regular intervals during Work and immediately on completion of work:
  .1 Dust and waste to be cleaned up and removed using a DOP (dioctylpthalate) tested and approved vacuum equipped with a HEPA filter, or by damp mopping or wet sweeping, and placed in a waste container, and .2 Drop sheets to be wetted and placed in a waste container as soon as practicable.

.6 Cleanup:
  .1 Place dust and asbestos containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste; wet and fold these items to contain dust, and then place in plastic bags.
  .2 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Asbestos Work Area.
  .3 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that the appropriate guidelines and regulations for asbestos disposal are followed.
  .4 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

3.2 Air Monitoring

.1 Contractor will be responsible to cooperate with hired agency that will do the air monitoring in accordance with applicable Provincial Occupational Health and Safety Regulations.

.2 If air monitoring shows that areas outside Asbestos Work Area enclosures are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area.

.3 Ensure that respiratory safety factors are not exceeded.

.4 During the course of Work, Contractor will assist and cooperate with environmental agency to measure fibre content of air outside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).
  .1 Stop Work when PCM measurements exceed 0.01 f/cc and correct procedures.
  .2 Minimum sampling schedule for each individual building:
    .1 2 samples to be taken before abatement is started (as background) for the building.
    .2 Two samples to be taken each day while abatement work is underway.
    .3 Two samples to be taken after work is completed.

.5 Air sampling reports to be available within 24 hours of sample collection.

.6 Following completion of the Work, air samples must be taken within the work area prior to allowing entry to unprotected occupants. If PCM measurements exceed 0.01 fibres/cc as outlined in PWGSC(DIR:057) Respecting Asbestos Management in Federal Owned or Leased Buildings or Facilities containing Asbestos, the contractor must clean the area until exposure limits are achieved.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 20 00 Concrete Reinforcing
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 05 50 00 Metal Fabrications
.4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 American Concrete Institute (ACI)
  .1 ACI 117-10 Standard Specifications for Tolerances for Concrete Construction and Materials.
  .2 ACI 347R-14 Guide to Formwork for Concrete
  .3 ACI SP-4-14 Formwork for Concrete
.2 CSA Group (CSA)
  .1 CSA-A23.1-14/ CSA-A23.2-14 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
  .2 CSA O86-14 Engineering Design in Wood
  .3 CSA S269.1-16 Falsework and Formwork.
.3 Canadian General Standards Board (CGSB)
  .1 CGSB 41-GP-35M Polyvinyl Chloride Waterstop.

1.4 Submittals

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

.2 Shop Drawings:
  .1 Submit shop drawings showing type, extent and locations of items to be built into concrete.
  .2 Sleeving Drawings: Submit drawings showing sleeves required through floors, roof and other structural members.
  .3 Submit drawings showing size and spacing of conduits and piping, if requested by Consultant.
  .4 Coordinate with other Divisions prior to submittal.
  .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 Consultant will review and return submitted drawings in accordance with an agreed schedule. Consultant's review will be for conformity to design concept and for general arrangement and shall not relieve Contractor of responsibility for errors or omissions in submitted drawings or of responsibility for meeting requirements of Contract Documents.
  .8 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.

.9 Do not commence placing sleeves, conduits, or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.
.10 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.

.3 Submit shop drawings as follows:
.1 4 copies for review before any Work commences.
.2 1 additional copy for distribution as directed by Consultant.
.3 1 copy to Inspection and Testing Company.

.4 Required by Regulatory Agencies: Submit shop drawings bearing signature and seal of Professional Engineer responsible for formwork design, as may be required by regulatory Agencies. Proceed with construction of formwork only with their approval.

1.5 Requirements of Regulatory Agencies

.1 Conform to local and provincial regulations, including construction safety regulations.

1.6 Quality Assurance

.1 Obtain a copy of CSA A23.1-14/A23.2 and maintain on site

.2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CAN/CSA S269.1 and CAN/CSA O86, as applicable.
.1 The design and engineering of the formwork, as well as its' construction, shall be the responsibility of the Contractor.

.3 Formwork shall be designed for the loads and lateral pressures outlined in the ACI publication "SP-4 Formwork for Concrete" and wind pressures and allowable stresses as set down in the National Building Code and in accordance with CSA A23.1 and A23.2. Formwork shall be of sufficient strength and rigidity to support all concrete and construction loads, taking into account proposed rate and method of pouring concrete so that the resultant finished concrete shall conform to the shapes, lines and dimensions of the members shown on the drawings.

1.7 Shipping, Handling and Storage

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

.2 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.

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 All materials shall be new, in accordance with referenced standards.

.2 Plywood: Douglas Fir, conforming to CSA O121. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 17mm thickness.

.3 Lumber: Conforming to CSA O141, with grade stamp clearly visible.

.4 Chamfers: Cut from 19mm x 19mm wood, smooth with no open defects.

.5 Form Ties: snap ties, with spreader washer and 25mm break back.

.6 Void Form: Honeycomb cellular core structure manufactured from kraft fibre. Top and sides protected with wax coated corrugated board, and bottom unprotected.

.7 Round Column Fibre Forms: Sonotube “W” Coated, by Sonoco Limited.

.8 Joint Tape: non-staining, water impermeable, self-release.

.9 Nails, Spikes and Staples: Galvanized, conforming to CSA B111.

.10 Form Release Agent: Colourless mineral oil which will not stain concrete.

.11 For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Notify the Consultant of any conditions which would prevent proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 Erection

.1 Verify lines, levels and centres before proceeding with formwork. Ensure dimensions agree with drawings.

.2 Align joints and make watertight, to prevent leakage of cement paste and disfiguration of concrete.

.3 Construct formwork to produce concrete with dimensions, lines and levels within tolerances specified in ACI 347R-14.

.4 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

.5 Install chamfers at all external corners exposed to view.

.6 Voidform: Install voidform and place 7.5 mm thick plywood over voidform, to provide firm surface for supporting reinforcement.

.7 Round Fibre Forms:
.1 At concealed locations, provide uncoated fibre form.
.2 Provide round fibre form where indicated for piers, equipment bases, light pole bases, fence foundation and wherever indicated or required.

.8 Adequately brace and shore formwork to sustain loads (both concrete and working loads) applied during construction.

.9 Be responsible for safety of the structure both before and after the removal of forms, until the concrete has reached its specified 28 day strength.

3.3 Built-In Work

.1 Form openings and build in anchors, inserts, sub-frames, key-ways, sleeves, miscellaneous metal items, reglets and similar items furnished under Work of other Sections, which are indicated on Drawings and on shop drawings of other trades, and as required for proper completion of Work.

.2 Do not embed wood in concrete.

.3 Anchor Bolts: Tie anchor bolts securely in position to prevent movement during concrete placing. Use template to locate bolts. Verify that bolts have specified projection above concrete.

.4 Openings or Sleeves Not Shown on Structural Drawings:
.1 Obtain Consultant's written approval before forming openings of sleeves through columns and beams, or through slabs within 1800 mm of their supports.
.2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm square in any location.

.5 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:
.1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.

.6 Confirm that built-in items that penetrate surface waterproofing are installed to meet requirements of waterproofing trade.

3.4 Construction Joints

.1 Form construction and expansion joints with bulkheads to ensure straight lines. Immediately before subsequent pour at construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.

.2 Review with Consultant proposed location and details of construction joints in walls, columns, beams and slabs.
.1 Construction joints shall present appearance of normal form panel joint.
.2 Install continuous shear key in construction joints in walls and framed floors which are 152mm or more thick.
.3 Provide vertical construction joints in walls at not more than 20 metres centre to centre.
.4 Provide waterstops in accordance with manufacturer’s instructions at construction joints in

walls which retain earth. Waterstops shall be continuous.

3.5 Treatment of Formwork Surfaces

.1 Form Release Agent:
- .1 Coat formwork with form release agent before reinforcement, anchors, accessories, and other built in items are installed.
- .2 Do not coat plywood forms pre-treated with release agent.
- .3 On surfaces to receive finish materials, adhesives, sealers, paint or other coatings or materials, use a compatible release agent.

3.6 Stripping of Formwork

.1 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations.

.2 Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.

.3 Take particular care not to damage external corners when stripping formwork.

.4 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.7 Defective Work

.1 Movement and displacement of formwork during construction, variations in excess of specified tolerances, marked and disfigured surfaces, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective work.

.2 Replace defective work, as directed by Consultant.

.3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if work has proven to be deficient.

.4 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost.

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 03 10 00 Concrete Forming and Accessories
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 03 41 16 Precast Concrete Slabs
.4 Section 04 05 19 Masonry Anchorage and Reinforcing
.5 Section 04 22 00 Concrete Unit Masonry
.6 Section 04 27 00 Multiple Wythe Unit Masonry
.7 Section 05 50 00 Metal Fabrications
.8 Section 32 16 23 Sidewalks

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A143/A143M-07(2014) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
  .2 ASTM A497 - 99 Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
  .3 ASTM A1064/A1064M-17 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  .4 ASTM A775/A775M-17 Standard Specification for Epoxy-Coated Steel Reinforcing Bars
.2 American Concrete Institute (ACI)
  .1 ACI SP-66 (04) ACI Detailing Manual.
.3 CSA Group (CSA)
  .1 CSA-A23.1-14/ CSA-A23.2-14 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
  .2 CSA A23.3-14 Design of Concrete Structures.
  .3 CSA G30.18-09 (R2014) Carbon Steel Bars for Concrete Reinforcement.
  .4 CSA G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  .5 CSA W186-M1990 (R2012) Welding of Reinforcing Bars in Reinforced Concrete Construction
.4 Reinforcing Steel Institute of Canada (RSIC)
  .1 RSIC Reinforcing Steel Manual of Standard Practice.

1.4 Submittals

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

.2 Shop Drawings:
  .1 Submit shop drawings, including placing drawings and bar lists.
  .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice, the typical details included with Contract Documents.
  .3 Prepare placing drawings to minimum scale of 1:50.
  .4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to architectural or structural Drawings.

.5 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.
.6 Show concrete cover to reinforcement.
.7 Show location of construction joints.

.3 Inspection Reports: Inspection and Testing Company shall submit reports of inspections and tests.
.1 Distribute inspection reports as follows:
.1 Consultant.
.2 Contractor.

.4 Quality Assurance Submittals:
.1 Mill Test Report: upon request, provide Consultant with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.
.2 Upon request submit in writing to Consultant proposed source of reinforcement material to be supplied.

1.5 Quality Assurance

.1 Obtain a copy of CSA A23.1-09, and maintain on site.

.2 Qualifications: Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA W186.

.3 Source Quality Control: Source Quality Control may be performed by an Inspection and Testing Company appointed by Consultant.

.4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.

.5 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.

.6 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne or part thereof supplied for incorporation in Work.

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 Materials

.1 In accordance with reference standards.

.2 Substitute different size bars only if permitted in writing by Consultant.

.3 Bar Reinforcing Steel:
.1 Bars which are to be welded by arc-welding process: to CSA G30.18, Grade 400W.
.2 Other bars: to CSA G30.18, Grade 400R.

.4 Plain round bars: to CSA G40.20-04/G40.21.

.5 Epoxy Coated Bar Reinforcing Steel: to ASTM A775.

.6 Welded Wire Fabric: to ASTM A1064/A1064M and in flat sheets, not rolls.

.7 Cold-drawn annealed steel wire ties: to ASTM A497.

.8 Chairs, bolsters, bar supports, spacers: to CSA A23.1.

.9 Mechanical splices: subject to approval of Consultant.

2.2 Fabrication

.1 Fabricate reinforcing steel only in permanent fabricating shop.

.2 Fabricate reinforcing steel in accordance with shop drawings.

.3 Tag reinforcing bars to indicate placement as designated on shop drawings.

.4 Splices:
.1 Provide splices only where specifically indicated on Drawings.
.2 Stagger alternate mechanical splices 750 mm apart.
.3 Stagger alternate end bearing splices 750 mm apart.
.4 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which affects this work.

.2 Examine formwork to verify that it has been completed, and adequately braced in place.

.3 Notify the Consultant of any conditions which would prejudice proper completion of this work.

.4 Commencement of work implies acceptance of existing conditions.

3.2 Installation

.1 Place reinforcing steel in accordance with reviewed placing drawings, typical details, and CSA A23.3.

.2 Adequately support reinforcing and secure against displacement within tolerances permitted.

.3 Place reinforcing steel to provide minimum spacing and proper concrete cover as noted on drawings.

.4 Do not cut reinforcement to incorporate other Work.

.5 Relocate or rebend bars only on written instructions of Consultant.

.6 Tie reinforcement in place. Do not weld.

3.3 Adjusting

.1 Adjust and secure reinforcement in correct position immediately before concrete is placed.

.2 Remove contaminants which lessen bond between concrete and reinforcement.

3.4 Field Quality Control

.1 Provide competent supervisor, with at least three years of experience in reinforcement placement, to direct placement of reinforcement.

.2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.

.3 Consultant's periodic review of selected areas of reinforcement are for verification of conformity to design concept and general arrangement only and shall not relieve Contractor of responsibility for quality control, errors, or omissions, or conformance with requirements of Contract Documents.

3.5 Defective Work

.1 Incorrectly fabricated, misplaced or omitted reinforcement, will be considered defective Work.

.2 Replace or adjust defective reinforcement before concrete is placed as directed by Consultant.

.3 Replace or strengthen concrete work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.

.4 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if Work has proven to be deficient.

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 03 10 00	Concrete Forming and Accessories
.2	Section 03 20 00	Concrete Reinforcing
.3	Section 03 41 16	Precast Concrete Slabs
.4	Section 04 05 19	Masonry Anchorage and Reinforcing
.5	Section 04 22 00	Concrete Unit Masonry
.6	Section 04 27 00	Multiple Wythe Unit Masonry
.7	Section 05 31 00	Steel Deck
.8	Section 05 50 00	Metal Fabrications
.9	Section 07 92 00	Joint Sealants
.10	Section 10 80 00	Miscellaneous Specialties
.11	Section 32 16 23	Sidewalks

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM C260/C260M-10a (2016) Standard Specification for Air Entraining Admixtures for Concrete
- .2 ASTM C309-11 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
- .3 ASTM C330/C330M-14 Standard Specification for Lightweight Aggregates for Structural Concrete
- .4 ASTM C494/C494M-15a Standard Specification for Chemical Admixtures for Concrete
- .5 ASTM C881/C881M-14 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- .6 ASTM C1017/C1017M-13e1 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
- .7 ASTM C1107/C1107M-14a Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- .8 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- .9 ASTM D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
- .10 ASTM D1751-18 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- .11 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness

.2 American Concrete Institute (ACI)
- .1 ACI 117-10, Standard Specifications for Tolerances for Concrete Construction and Materials.
- .2 ACI 232.1R-12, Use of Raw or Processed Natural Pozzolans in Concrete

.3 CSA Group (CSA)
- .1 CSA-A23.1-14/ CSA-A23.2-14 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
- .2 CSA A283-06 (R2011) Qualification Code for Concrete Testing Laboratories.
- .3 CSA A3000-18 Cementitious Materials Compendium

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 1010, Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
.2 OPSS 1212, Material Specification for Hot-Poured Rubberized Asphalt Joint Sealing Compound.

1.4 Submittals

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

.2 Samples: Submit for inspection, material samples of specified mix designs.

.3 Concrete Mix Designs:
.1 Submit concrete mix designs for review. Specify intended use for each mix design.
.2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
.3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
.4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1.
.5 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
.6 Submit in writing, proposed method of in-situ strength testing.

.4 Inspection Reports: Inspection and Testing Company shall:
.1 Submit written reports of inspection and tests.
.2 Distribute reports as follows:
.1 Consultant;
.2 Contractor.
.3 On concrete cylinder test reports, include:
.1 Specific location of concrete represented by sample
.2 Design strength.
.3 Unit weight of sample
.4 Class of exposure
.5 Aggregate size and mixtures incorporated
.6 Date, hour and temperature at time sample taken
.7 Percentage air content
.8 Test strength of cylinder
.9 Type of failure if test fails to meet specification.

1.5 Quality Assurance

.1 Obtain a copy of CSA A23.1-14/A23.2 and maintain on site.

.2 Pre-Construction Conference:
.1 At least 35 days prior to the start of concrete construction schedule, conduct a meeting to review proposed mix designs and to discuss detailed requirements of the proposed concrete operations. Review requirements for submittals, coordination, and availability of materials. Establish work progress and sequencing schedules and procedures for material testing, inspection and certifications.

.3 Source Quality Control:

.1 Both source quality control, and field quality control specified in Article 1.5.4, may be performed by an Inspection and Testing Company appointed by Consultant.
.2 Review provided by Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over Work. Performance or non- performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
.3 Inspection and Testing Company shall be certified under CSA A283, Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.
.4 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
.5 Payment for additional tests (including testing of structure and its performance and load testing) required by changes of materials or mix design requested by Contractor, and failure of completed Work to meet specified requirements, shall be made at Contractor's expense.
.6 Perform Work of source quality control in accordance with CSA A23.2 and to include:
    .1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.
    .2 Review of proposed concrete mix designs.
    .3 Sampling, inspection, and testing of materials as may be required.

.4 Field Quality Control:
.1 Inspection and Testing Company, when appointed as specified for Source Quality Control, shall perform sampling, inspection and testing of concrete work at site.
.2 Perform sampling, inspection and testing in accordance with CSA A23.2, and to include:
    .1 Making of standard slump tests.
    .2 Obtaining of three standard specimens for strength tests from each 100 m of concrete, or fraction thereof, of each mix design of concrete placed in any one day. In addition, for slabs-on-grade, obtain beam specimens for determination of modulus of rupture.
    .3 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.
    .4 Making compression tests of each set of three specimens, one at 7 days and two at 28 days; modulus of rupture tests at 90 days.
    .5 Verification of air content of air-entrained concrete.
        .1 For Class of exposure F-1, and C-2, test at frequency in accordance with CSA A23.1.
        .2 Make first test before placing any concrete.
        .3 After stable air content has been established, frequency of tests will be determined by Consultant.
        .4 For other Classes of exposure, test at time of obtaining strength test specimens.
.3 Inspection for Tolerances:
    .1 Confirm that concrete work meets specified tolerance requirements.
    .2 Use the elevation survey records of elevations of finished concrete surfaces specified in Section 03 10 00 and this section as basis for judging compliance.
    .3 Use approved aluminum straightedge to judge compliance with specified slab tolerances, except use dipstick equipment where F-number tolerance is specified.
.4 Slabs-on-Grade:
        .1 Observe application of curing compound to sample slab, recording rate of application.
        .2 Monitor on a random basis acceptable to the Consultant, that slab is being saw cut before slab temperature starts to fall.
        .3 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years of experience.
        .4 Sample of Finish Flooring:

.1 Finish an area of floor slab where directed by Consultant to provide sample of finish for approval.
.2 Protect new sample area until finish is approved.
.3 If liquid membrane curing compound is to be used on Project, determine and apply correct quantity required to meet rate of coverage recommended by manufacturer for measured test area.
.4 Approved sample will provide standard by which subsequent finishing will be judged and will be incorporated into Work.

1.6 Tolerances

.1 In accordance with ACI 117-10 and CSA A23.1.

.2 Difference between elevation of high point and low point in specified area not to exceed:
.1 In any bay up to 100 m^2: 12 mm.
.2 In any bay up to 400 m^2: 25 mm.

.3 Straightedge method: Finish floor slabs to meet following tolerances when measured at 72 +/- 12 hours after completion of floor finishing, before shores are removed from formed slabs, by placing a freestanding unleveled straight edge anywhere on slab and allowing it to rest on two high points. Gap between straightedge placed on two high points and slab not to exceed:
.1 3 metre straightedge: 8 mm (Class A).
.2 2 metre straightedge: 4 mm.

1.7 Shipping, Handling and Storage

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

1.8 Job Conditions

.1 Protect floor slabs, and concrete surfaces exposed to view or on which finishes are to be applied, from grease, oil, and other soil which will affect the appearance of the concrete, or impair the bond of finish material.

.2 Environmental Conditions: In addition to Cold Weather and Hot Weather Requirements of CSA A23.1, the following shall apply to Work of this Section:
.1 Provide protection or heat, or both, so that temperature of concrete at surfaces is maintained at not less than 21 ° C for three days after placing, not less than 10 ° C for the next two days and above freezing for the next two days.
.2 Do not permit alternate freezing and thawing for fourteen days after placing.
.3 Vent exhaust gases from combustion type heaters to atmosphere outside protection enclosures.
.4 Provide protection to maintain concrete continuously moist during curing period.
.5 For field cured cylinders representing strength development of in-situ concrete, provide same specified hot and cold weather protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.
.6 Do not place concrete during rain. Should rain commence during placing, cover freshly placed concrete.
.7 Do not place bonded toppings on rough slabs that are less than 15 °C.
.8 Do not grout at ambient air temperatures or concrete surface temperatures less than 5 ° C, or when temperature is forecast to fall to less than 5 ° C within 24 hours of grouting.

.9 Do not apply sealants at ambient air temperatures or concrete surface temperatures less than 5 ° C.

1.9 Project Records

.1 Maintain record of all concrete pour related to time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep records on site until project is completed.

.2 Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, Project, Class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.

.3 Record Drawings:
.1 Record on a set of Drawings:
.1 founding elevations of all footings
.2 variations of foundation Work from that indicated on Drawings.
.2 Make record drawings available for Consultant's inspection at all times.

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 To meet specified requirements of referenced Standards.

.2 Cement:
.1 Portland Cement: to CSA A3000.
.2 Cementitious Hydraulic Slag: to ACI 232.1R

.3 Fine Aggregate: For slabs-on-grade, fineness modulus of fine aggregate to be between 2.7 and 3.1.

.4 Coarse Aggregates:
.1 20 mm to 5 mm (No. 4 sieve) except as specified below.
.2 For slabs-on-grade 125 mm and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 5 Group II of CSA A23.1, one of which is to be 40 mm, to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.
.3 For slabs-on-grade: Abrasion loss not to exceed 35%. Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295/C295M Standard Guide for Petrographic Examination of Aggregates for Concrete.
.4 For toppings 50 mm thick and less and for slabs over open web steel joists: 12 mm to 5 mm (No. 4 sieve).

.5 Admixtures:
.1 Conform to Reference Standards for chemical and air-entraining admixtures.
.2 Provide only admixtures that are free of chlorides.

.3 When requested, provide evidence acceptable to Consultant that superplasticizer does no increase shrinkage of concrete.

.6 Premoulded Expansion Joint Filler:
.1 Bituminous impregnated fibre board conforming to ASTM D1751.

.7 Curing-Sealing Compound: Membrane curing-sealing compound formulated from chlorinated rubber resins, or acrylic emulsion, solvent free for use in occupied buildings, to ASTM C309, type 1.
.1 Basis-of-Design Product: Subject to compliance with requirements, provide Euclid Chemical Company; Floor Coat. or a comparable product by one of the following:
.1 BASF Corporation - Construction Systems.
.2 Sika Corporation
.3 W.R. Meadows
.2 For areas which will be exposed to sunlight:
.1 Diamond Clear by Euclid.

.8 Bonding Agent: To ASTM C881/C881M, 100% reactive, 2 component, low viscosity, high modulus bonding adhesive.

.9 Non-Metallic Hardener: Natural and synthetic materials with Mohs hardness 7 minimum, premixed with Portland cement.
.1 Basis-of-Design Product: Subject to compliance with requirements, provide Euclid Chemical Company; Surflex. or a comparable product by one of the following:
.1 BASF Corporation - Construction Systems.
.2 Sika Corporation

.10 Non-Oxidizing Metallic Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of Portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.
.1 Basis-of-Design Product: Subject to compliance with requirements, provide Euclid Chemical Company; EUCO-PLATE H.D. or a comparable product by one of the following:
.1 BASF Corporation - Construction Systems.
.2 Sika Corporation

.11 Saw Cut Filler: Semi-rigid flexible epoxy joint filler shall be a two-component, pourable, moisture insensitive formulation and possess the following characteristics:
.1 Compliance to ACI 302.1R for joint fillers used in control and construction joints.
.2 Solids, % by weight, ASTM D1259: 100%.
.3 Tensile adhesion to concrete 24 ° C, ASTM D5329: 290 psi.
.4 Shore D Hardness (7 days), ASTM D2240: 60.
.5 Shore A Hardness (7 days), ASTM D2240: 95.
.6 Tensile Strength, ASTM D638.
.1 24 ° C, (3 days): 4550 kPa.
.2 24 ° C, (7 days): 5310 kPa.
.7 Elongation, ASTM D638-10.
.1 24 ° C, (3 days): 72%.
.2 24 ° C, (7 days): 53%
.8 Water Absorption 24 ° C (24 hrs.), ASTM D570: 0.56% by weight.

.12 Premoulded joint fillers: Bituminous impregnated fiber board: to ASTM D1751.

.13 Sealant: Refer to Section 07 92 00 – Joint Sealants

.14 Mechanical Anchors: 'Kwik' Bolts, 'Cinch' Anchors or Parabolts.

.15 Weep hole tubes: plastic.

.16 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

.17 Stair Tread Inserts:
.1 Abrasive stair tread inserts for exterior concrete steps as specified in Section 10 80 00.

2.2 Concrete Mixes

.1 Ready Mix, with 28 day compressive strength as indicated on Drawings.

.2 Design concrete mix in conformance with CSA A23.1, Tables 1, 2, 5 (Alternative 1) and 17, and as follows. Provide concrete meeting water/cementing materials ratio and air content of Table 14 in accordance with Class of exposure specified in following sub-paragraphs, and minimum strength specified on Drawings. Note that concrete designed in accordance with water/cementing materials ratio of Table 14 may yield strength exceeding minimum strength specified on Drawings.
.1 Class of exposure C-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for pavements, sidewalks, curbs and gutters.
.2 Class of exposure F-2 with 25 percent Portland cement replaced with cementitious hydraulic slag: for grade beams, and for exposed exterior beams, columns, walls and slabs.
.3 Slabs-on-Grade:
.1 Use type 20 Portland cement, or replace 35 percent type Portland cement with cementitious hydraulic slag.
.2 When mean daily temperature exceeds 25 ° C at time of placement, replace 25 percent of type 20 cement, or 50 percent of type 10 cement, with cementitious hydraulic slag.
.3 Use water/cementing materials ratio 0.45 maximum.
.4 Use aggregates specified in paragraphs 2.1.3.
.5 Cementing materials content 325 kg/m.
.6 Modulus of rupture 3.5 MPa average, 3.0 MPa minimum.
.7 Slump at delivery, before addition of superplasticizer, 50 mm; add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.
.4 Interior Concrete, other than specified above, and not exposed to freezing and thawing or the application of deicing chemicals: select water/cementing materials ratio and cementing materials content on basis of strength, workability, and finishing requirements.

.3 Submit evidence, and material samples, if requested, acceptable to the Inspection and Testing Company, to verify that the proposed concrete mix design will produce specified quality of concrete.

.4 List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Consultants approval.

.5 Concrete Weight: Air dry unit weight: minimum 2,300 kg/m; adjusted proportionally for maximum air content listed in CSA A23.1, Clause 15, Table 10.

2.3 Admixtures

.1 Chemical Admixture: Incorporate water-reducing admixture, type WN, in all concrete.

.2 Air Entraining Agent: Incorporate air-entraining agent in addition to chemical admixture in concrete of relevant Class of exposure, in accordance with CSA A23.1, Clause 15, Table 10.

.3 Chloride: Do not use calcium chloride or admixtures containing chloride in concrete.

2.4 Concrete Toppings

.1 Provide topping with minimum 28 day compressive strength of 32 MPa.

2.5 Premixed Grout

.1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107, Compressive strength at 28 days: 48 MPa.
.2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107. Compressive strength at 28 days: 59 MPa.

.3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107. Compressive strength at 28 days: 59 MPa.

PART 3 EXECUTION

3.1 Examination

.1 Before starting this work, examine work done by others which effects this work.

.2 Notify Consultant of any condition which would prejudice proper completion of this work.

.3 Commencement of work implies acceptance of existing conditions.

.4 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.

.5 Confirm that reinforcement, dowels, control joints, inserts and all other built in work are in place and secured.

3.2 Treatment of Formed Surfaces

.1 Conform to the requirements of CSA A23.1, and as additionally specified herein.

.2 Treat concrete surfaces which will be exposed or painted in the completed building to provide a "Smooth Rubbed Finish" in accordance with CSA A23.1, uniform in colour and texture.

.3 Plugs at Recessed Ties:
.1 Clean tie holes to remove all foreign matter.
.2 Coat plugs by dipping in adhesive and insert in hole.
.3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.

.4 Obtain Consultant's approval of finished exposed concrete and grind or otherwise correct to the satisfaction of the Consultant.

3.3 Placing Concrete

.1 Place concrete in accordance with requirements CSA A23.1/A23.2.

.2 Notify Consultant and inspection and testing firm at least 24 hours prior to commencement of concrete placing operation and 24 hours before wall forms are closed in.

.3 Do not place concrete in water or open frozen surfaces.

.4 Remove contaminants which lessen concrete bond to reinforcement before concrete is placed.

.5 Maintain accurate records of cast in place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

.6 Ensure that reinforcement, inserts, embedded items, formed expansion joints and the like, are not disturbed during concrete placement.

.7 Joint fillers:
- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
- .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .3 Locate and form isolation, construction and expansion joints as indicated.
- .4 Install joint filler.

.8 Provide construction joint as indicated on the drawings. Ensure dowels are adequately anchored and placed at right angles to the joint before placing concrete.

.9 Place floor slabs to depth indicated on the drawings with 25 MPa minimum concrete unless otherwise noted on drawings but consistent with minimum cement content specified for exposed floors in this specification.

.10 Sloping Surfaces and Slabs: commence concrete placement at bottom of sloping surfaces.

.11 Obtain Geotechnical Engineer’s confirmation that thickness, elevation and compaction of sub-grade meets specifications before placing concrete.

3.4 Finishing Concrete

.1 Perform finishing operations on plastic concrete surfaces in accordance with CSA A23.1, and as specified herein.

.2 Refer to the drawings for floor finishes and coverings.

.3 Screed the top of rough floor slabs to an even level or sloping surface at the proper elevation to receive the finish or topping specified on the drawings and in finish schedule.

.4 Provide a smooth steel trowel finish on all areas scheduled to receive a covering, or painted finish.

.5 Exposed Floor Surfaces: Provide hard, smooth, dense, steel troweled surface, free from blemishes, and of uniform appearance.

.6 Non-slip Surfaces: Provide swirl trowel or broom finish of texture acceptable to Consultant.

.7 Curb Edging: Finish external corners of curbs rounded and smooth.

.8 Hardened Floor Finish:
.1 Apply premixed material to total of 7.5 kg/m² of floor surface.
.2 Apply in two shakes, of half total specified amount in each shake; the second shake at right angles to the first.
.3 Follow manufacturer's special finishing instructions if concrete is air entrained.

.9 Stair Tread Non-Slip Inserts:
.1 Install one non-slip insert specified in Section 10 80 00 at each tread and landing; place 40 mm from edge of nosings and extend for full width of nosings except for 80 mm at each end.
.2 Install in accordance with manufacturer’s instructions.

3.5 Curing

.1 Cure concrete in accordance with CSA A23.1 and as specified herein.

.2 Curing Compound Method:
.1 Use curing and sealing compound specified except:
.1 On surfaces to receive epoxy or similar paint finish.
.2 On surfaces to which architectural finishes will be adhered, the adhesives for which are incompatible with the curing compound.
.3 Air-entrained concrete for exterior slabs and sidewalks placed between October 1 and April 1.

.3 Select acrylic water compound except that if ambient conditions extend drying time unduly and if area is well ventilated and unoccupied by other workers, solvent based compound may be used.

.4 Apply curing compound in accordance with manufacturer’s instructions, increasing application rate as necessary to cover surface completely.

.5 Curing Blanket or Wet Burlap Method: For exterior sidewalks and other finished concrete surfaces that will be exposed to freezing and thawing or deicing chemicals:
.1 Cover with curing blanket or wet burlap overlaid with 0.102 mm thick polyethylene and maintain in place for the additional curing for durability period in accordance with CSA A23.1 but in no case for less than 7 days.
.2 Wet blanket or burlap regularly to maintain in moist condition. Do not allow to dry out.

.6 Cure finished concrete surface with an approved curing and sealing compound which will leave the surface with a uniform appearance and with a minimum of discolouration after drying. Ensure that the curing compound will be compatible with the architectural finishes or adhesives for finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.

.7 Protect surface which will be exposed to direct sunlight during the curing period, with a light coloured, laminated waterproof paper immediately after the curing and sealing compound has hardened sufficiently for the paper to be placed without damage to the sealed surface. Lap the paper a minimum of 100 mm and seal the laps. Leave the paper in place for at least seven days.

3.6 Grouting

.1 Mix prepackaged grout with water in accordance with manufacturer's printed instructions.

.2 Dampen concrete surfaces immediately before installing grout.

.3 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.

.4 Slope grout beyond edge of plate at 45 degrees.

.5 Provide same environmental protection and curing as specified for concrete.

3.7 Joint Sealant

.1 Apply sealant to thoroughly dry surfaces only, at ambient air temperatures above 5 ° C.

.2 Provide sealant on top of joint filler with a polyethylene bond breaker between joint filler and joint sealant applied in accordance with manufacturer's direction.

.3 Confirm that preformed joint filler and backer rod are compatible with sealant.

.4 Caulk joints in accordance with the following:
.1 Do not commence joint preparation until concrete is at least 28 days old.
.2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.
.3 Blow clean with compressed air with oil trap on line, or vacuum clean.
.4 Install backer rod of diameter 25 percent greater than joint width, and type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm.
.5 Prime joint if required, as recommended by sealant manufacturer.

3.8 Defective Work

.1 Variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work.

.2 Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Consultant.

.3 Replace or repair defectively placed or finished concrete as directed by the Consultant.

.4 Testing and Replacement of Deficient Concrete in Place:
.1 Pay for additional testing and related expenses if concrete has proven to be deficient.
.2 Replace or strengthen deficient concrete work as directed by the Consultant, and pay for all testing and related expenses for replaced work until approved by the Consultant.

3.9 Cleaning

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

.2 Clear away from the building site excess and waste materials and debris resulting from Work of this Section.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 03 41 16 Precast Concrete Slabs

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C779/C779M-12 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
.2 CSA Group (CSA)
  .1 CSA-A23.1-14/ CSA-A23.2-14 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
.3 American Concrete Institute (ACI)
  .1 ACI 308 Standard Specification for Curing Concrete
.4 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1113-96 Architectural Coatings.
  .2 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 product data and application instructions for concrete floor treatments.

1.5 Performance Requirements

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

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

1.6 Environmental Requirements

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

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

.3 Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
.4 Ventilation:
  .1 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
  .2 Provide continuous ventilation during and after coating application.

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.

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

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

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

PART 2 PRODUCTS

2.1 Sealing Compounds

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

.2 Liquid densifier/sealer: VOC Compliant, high performance, deep penetrating concrete densifier; an odourless, colourless and non-yellowing blend of silicate and siliconate designed to harden, dustproof and protect concrete floors.

.3 Basis of Design Product: Euco Diamond Hard by The Euclid Chemical Co.
  .1 Acceptable alternate:
    .1 Liqui- Hard by W.R. Meadows
    .2 Sikafloor 3S by Sika Canada.
    .3 MasterTop 333 by BASF

.4 Compliance:
  .1 Maximum VOC content: 400 g/L
  .2 VOC Content: 0 g/L.
  .3 USDA approved.
  .4 Ultraviolet resistant.
  .5 Blush resistant.
  .6 Non-yellowing.
  .7 No odour.

2.2 Mixes

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

PART 3 EXECUTION

3.1 Examination

.1 Examine concrete surfaces to receive sealer. Notify Consultant if surfaces are not acceptable.

.2 Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 Surface Preparation

.1 Prepare concrete surfaces in accordance with manufacturer's instructions.

.2 Cure concrete in accordance with ACI 308 and as specified in Section 03 30 00.

3.3 Application

.1 Apply sealer to concrete surfaces in accordance with manufacturer's instructions.

.2 Do not leave excess sealer residue on treated concrete surfaces. Remove excess hardened sealer.

.3 Do not use as a curing compound.

.4 Do not dilute sealer.

.5 After floor treatment is dry, seal control joints and joints at junction with vertical surfaces with sealant.

3.4 Cleaning

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

.2 Clean overspray. Clean sealant from adjacent surfaces.

3.5 Protection

.1 Protect finished installation in accordance with manufacturer's instructions.

.2 Protect horizontal surfaces from traffic until sealer has cured.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 10 00 Concrete Forming and Accessories
.2 Section 03 30 00 Cast-In-Place Concrete
.3 Section 04 22 00 Concrete Unit Masonry
.4 Section 05 50 00 Metal Fabrications
.5 Section 06 20 00 Finish Carpentry
.6 Section 07 21 13 Building Insulation
.7 Section 07 26 00 Vapour Retarders
.8 Section 08 11 00 Metal Doors and Frames

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A123/A123M-17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  .2 ASTM A653/A653M-20 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
  .3 ASTM D2559 - 12a(2018) Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions
  .4 ASTM F1667 – 18a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
.2 CSA Group (CSA)
  .1 CSA A247- M86 (R1996) Insulating Fiberboard.
  .2 CSA B111-1974(R2003) Wire Nails, Spikes and Staples.
  .3 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  .4 CSA O80 SERIES-15 Wood Preservation
  .5 CSA O86-14 Engineering Design in Wood
  .6 CSA O121-17 Douglas Fir Plywood.
  .7 CSA O141-05 (R2014) Softwood Lumber
  .8 CSA O151-17 Canadian Softwood Plywood
  .9 CSA O437 Series-93 (R2011) Standards on OSB and Waferboard
  .10 CSA Z809-08 Sustainable Forest Management
.3 Underwriters Laboratories Canada (ULC)
  .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.4 National Lumber Grading Authority (NGLA)
  .1 Standard Grading Rules for Canadian Lumber, Latest Edition.
.5 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.

.3 Submit shop drawings for wood trusses stamped and signed by a Professional Engineer registered in the Province of Ontario. Include statement that manufactured wood trusses and beams are designed in accordance with the referenced standards.

.4 Certified Wood:
.1 Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.

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 Certified Wood: submit listing of wood products and materials used in accordance with CSA Z809 or FSC or SFI.

.3 Design of wood roof structural system including wood trusses and stick framed roof members (rafters, joists, ties etc.) and design of wood stairs 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 roof framing connections to resist uplift loads required by the referenced standards

.5 Provide Independent Specialty Engineer’s letters of review and sign-off letters as specified in Section 01 78 00 for pre-engineered roof trusses and engineered lumber.

1.6 Shipping, Handling and Storage

.1 Protect materials, under cover, both in transit and on the site.

.2 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.

.3 Store sheathing materials level and flat, in a dry location. Protect panel edges from moisture at all times.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Timber Material shall be 'Grade Stamped'.

.2 CSA Z809 or FSC Certified.

.3 Construction Lumber: To CSA O141 Softwood Lumber graded to NLGA Standard Grading Rules for Canadian Lumber, published by the National Lumber Grades Authority. All lumber shall bear grade stamps. Moisture content of softwood lumber not to exceed 19% at time of installation.
- .1 Framing lumber, plates, furring, blocking, No. 1 SPF.
- .2 Nailing strips, furring and strapping: No. 4 S-P-F.
- .3 Fitment framing: No. 1 S-P-F.

.4 Canadian Softwood Plywood: to CSA O151-M, standard construction, good one or both sides as required, thickness as shown or specified.
- .1 Douglas Fir Plywood: To CSA O121-M, standard construction, good one side, thickness as shown on the drawings.
- .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-080.1, and all treated materials shall bear a ULC approval stamp.
- .3 Poplar Plywood: to CSA 0153, standard construction.
- .4 Mat formed structural panel board (oriented strand board): to CSA O437.0, square edge, 12.7 mm thickness.

.5 Nails, Spikes and Staples: To ASTM F1667.

.6 Bolts: 12.5 mm diameter, galvanized, complete with nuts and washers.

.7 Proprietary Fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.8 Nailing Discs: flat caps, minimum 25 mm diameter, minimum 0,627 mm thick, sheet metal, formed to prevent dishing.

.9 Sealant: 'Mono' as manufactured by Tremco Manufacturing Ltd. or equivalent by Dow-Corning.

.10 Wood Preservative to CSA O80 SERIES.

.11 Adhesive: Contractors gun grade cartridge loaded wood adhesive, general purpose, to ASTM D2559.

.12 Building Paper: to CAN2-51.32-M, 15# asphalt impregnated paper.

.13 Vapour Retardant: 0.152 mm polyethylene film to CGSB 51.34 Type 1.

.14 Fibreglass Insulation: to CSA A101, loose batt type, minimum density of 24 kg/m^3.

.15 Galvanizing: to CSA-G164. Use galvanized fasteners, and hardware for exterior work, preservative treated lumber, and materials in contact with concrete or masonry.

.16 Fire Retardant Treatment
- .1 Arch Wood Protection, Inc., "Dricon FRT" or equal by Chemical Specialties, Inc., D-Blaze", Hoover Treated Wood Products "Pyro-Guard" or Osmose Wood Preserving Co., Inc. "FirePRO" interior Type A fire-retardant wood treatment.

.2 Pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 (lumber) and C27 (Plywood), respectively, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction.
- .1 Treated materials shall meet FR-S ratings of not more than 25 for flame spread, smoke developed and fuel contributed when tested in accordance with UL 723 or ASTM E84, with no increase in flame spread and evidence of significant progressive combustion upon continuation of test for additional 30 minutes.
- .2 No increase in above ratings when subjected to standard ASTM D2898 rain test.
- .3 For interior locations use fire-retardant chemical formulation that produces "Interior Type A" treated lumber and plywood with the following properties under conditions present after installation:
  - .1 No reduction takes place in bending strength, stiffness and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for this Project under elevated temperature and humidity conditions simulating installed conditions.
  - .2 No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
  - .3 No corrosion of metal fasteners results from their contact with treated wood.
- .4 Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.
- .5 Kiln-dry all lumber and plywood materials after treatment to maximum 15% moisture content.

PART 3 EXECUTION

3.1 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 Rough Hardware: Include rough hardware such as nails, bolts, nuts, washers, screws, clips, hangers, connectors, strap iron, and operating hardware for temporary enclosures.

.3 Erection of Framing Members
- .1 Install members true to line, levels and elevations. Space framing members and frame all openings as detailed on the drawings.
- .2 Construct continuous members from pieces of longest practical length.
- .3 Install spanning members with crown edge up.
- .4 Anchor wood framing to supporting walls with galvanized metal strap ties.

.4 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.

.5 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.

.6 Blocking: Provide solid wood backing to support millwork, cabinetwork, equipment, fixtures, railings and accessories and the like, as required. Coordinate with work of other Sections and install all required backing. Any such equipment mounted on gypsum wallboard assemblies or similar assemblies shall be adequately supported.

.7 Roof Blocking, Curbs and Copings:
  .1 Provide and install framing, blocking, curbs and copings as indicated on the drawings. Anchor blocking securely in permanent manner.
  .2 Provide minimum 10 mm Douglas Fir plywood copings on all built-up wood copings and curbs as detailed.
  .3 All wood curbs shall be filled with fibrous insulation specified in Section 07 21 13.
  .4 Provide shims and blocking necessary for levelling of roof hatches and equipment curbs.

3.1 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 30 00 Cast-in-Place Concrete
.2 Section 04 22 00 Concrete Unit Masonry
.3 Section 06 10 00 Rough Carpentry
.4 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.5 Section 07 92 00 Joint Sealants
.6 Section 08 11 00 Metal Doors and Frames
.7 Section 08 50 00 Aluminum Doors, Windows and Screens
.8 Section 31 23 10 Excavating, Trenching and Backfilling

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 C578-19 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
  .4 ASTM C612-14(2019) 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 C1620-16e1 Standard Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants
  .7 ASTM D1621-16 Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  .8 ASTM D1623-17 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
  .9 ASTM E1677-17 Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
  .10 ASTM E84-21a 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
  .3 ULC 704 Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
.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.

.3 Submit installation instructions.

.4 Submit certification that product complies with specification requirements and is suitable for the use indicated.

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.

1.8 Warranty

.1 Provide written warranty that the actual thermal resistance of the extruded polystyrene foam insulation will not vary by more than 10% from its published thermal resistance.

.2 Warranty period is 15 years after date of Substantial Performance.

PART 2 PRODUCTS

2.1 Batt Insulation

.1 Fibreglass friction fit batts or mineral fibre to CAN/ULC 702.1 Type 1 for wall application, width and thickness as shown on details:
  .1 Owens Corning ProPink Wall Insulation, unfaced.
  .2 Owens Corning Thernmafiber Ultrabatt
  .3 Roxul Batt Insulation.

2.2 Spray Foam Insulation

.1 Spray Foam Insulation: to ASTM C1620, 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.
.4 Hilti CF 812 Window and Door Pro.

2.3 Accessories

.1 Sealing Tape: minimum 65 mm width, polypropylene sheathing tape with acrylic adhesive.

.2 Rough Hardware: Nails and staples as required for installation of insulation and membrane materials, galvanized to CSA B111 and B34.

.3 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.

.4 Vapour Retarder: As specified in Section 07 26 00.

PART 3 EXECUTION

3.1 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.

.6 Insulation board materials shall be 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.

3.2 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.

3.3 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 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.

3.4 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.

3.5 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 04 27 00 Multiple Wythe Unit Masonry
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 21 29 Sprayed Insulation
.5 Section 07 52 00 Modified Bituminous Roofing
.6 Section 07 62 00 Sheet Metal Flashing and Trim
.7 Section 07 92 00 Joint Sealants
.8 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  .2 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
  .3 ASTM D4541-22 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
  .4 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
  .5 ASTM E330/E330M-14(2021) 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 E1186-22 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
  .8 ASTM E2178-21a 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.m² 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.m² 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.

PART 2 PRODUCTS

2.1 Material

.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 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.m² @ 75 Pa to ASTM E283
  .3 Vapour permeance: 1.6 ng/Pa.m².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 Sopraseal Stick 1100T by Soprema

2.3 Adhesives and Primers

.1 As recommended by manufacturer.

2.4 Mastics and 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 countertop roller to ensure proper surface bond and effect the seal.

.7 Tie-in to window frames, door frames, roofing systems, 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 All joints, interconnections, and penetrations of the air barrier components including lighting fixtures shall be indicated on manufacturer’s standard details.

.9 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 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D957 - 21 Standard Practice for Determining Surface Temperature of Molds for Plastics
  .2 ASTM E84-23d Standard Test Method for Surface Burning Characteristics of Building Materials
  .3 ASTM E136 – 22 Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C
  .4 ASTM E2768-11(2018) Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 min Tunnel Test)
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 51.32 Sheathing, Membrane, Breather Type.
  .2 CAN/CGSB 93.2 Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
  .3 CAN/CGSB-93.3 Prefinished Galvanized and Aluminum- Zinc Alloy Steel Sheet for Residential Use.
  .4 CAN/CGSB-93.4 Galvanized and Aluminum-Zinc Alloy Coated Steel Siding Soffits and Fascia, Prefinished, Residential.
  .5 CGSB 93.5 Installation of Metal Residential Siding, Soffits and Fascia.
.3 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC S114 Standard method of test for determination of non-combustibility in building materials.
.4 American Architectural Manufacturer’s Association (AAMA)
  .1 AAMA 2606-05 Voluntary Specification, Performance requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
  .2 AAMA 2604-Voluntary Specification, Performance requirements and Test Procedures for High Performing Organic Coatings on Aluminum Extrusions and Panels.
  .3 AAMA 2603 -Voluntary Specification, Performance requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

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 data sheet.

.3 Shop drawings to indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, soffits, fascia, metal furring, and related work.

.4 Submit duplicate 100 mm x 150 mm samples of siding material, of colour and profile specified.

.5 Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards
.6 Submit manufacturer's 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.

1.7 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of fifteen 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 Vicwest. 362 Lorne Avenue West, Stratford ON, N5A 6S4, 1-800-387-7135, or similar.

2.2 Aluminum Cladding Components

.1 AD200 series or similar
.1 Thickness: 20 Gauge base metal thickness.
.2 Profile: 1.5" nominal plank AD200 series

2.3 Accessories

.1 Exposed trim: inside corners, outside corners, wide starter strip, j-track, Flat-cap and base, U-cap and base, Finishing-cap and base, two-piece corner, perforated 2.5 vent strip, 2.5 non-perforated strip in same material and finishes as siding.

2.4 Finishes
.1 Finish coating: powder coated finish
.2 Colour: colour selected by Consultant. Preference is Dark Brown (56062).
.3 Gloss: 30 ± 5.

PART 3 EXECUTION

3.1 Installation

.1 Install cladding in accordance with CGSB 93.5, reviewed shop drawings and manufacturer's written instructions

.2 Install wide starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as required.

.3 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.4 Maintain joints in exterior cladding, true to line, tight fitting, hairline joints.

.5 Attach components in manner not restricting thermal movement.

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 03 30 00 Cast-in-Place Concrete
.2 Section 04 22 00 Concrete Unit Masonry
.3 Section 06 10 00 Rough Carpentry
.4 Section 07 21 13 Building Insulation
.5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.6 Section 07 62 00 Sheet Metal Flashing and Trim
.7 Section 08 44 13 Glazed Aluminum Curtain Walls
.8 Section 08 50 00 Aluminum Doors, Windows and Screens
.9 Section 08 80 05 Glazing

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 (2019) Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
  .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 C1247-20 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(2020) 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 U. S. Environmental Protection Agency (EPA)
  .1 EPA 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.

.4 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.

.4 Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit samples of each substrate or adjacent material that will be in contact with or affect joint sealants. Current manufacturer test data of products on matching substrates will be acceptable.

.5 Adhesion: Use ASTM C719 and ASTM C794 to determine requirements for joint preparation, including cleaning and priming.

.6 Compatibility: Use ASTM C1087 to determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant colour.

.7 Stain Testing: Use ASTM C510, ASTM C1248, or ASTM D2203 to verify non-staining characteristics of proposed sealants on specified substrates.

.8 Pre-construction manufacturer laboratory testing is not required when sealant manufacturer can furnish data acceptable to Consultant based on previous testing for materials matching those of the Work.

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.

.5 Stain Test Characteristics: Where sealants are required to be non-staining, provide sealants tested per ASTM C1248 as non-staining on porous joint substrates specified.

2.3 Silicone Joint Sealants

.1 SJS#1: Single-Component, Nonsag, Non-Staining, Moisture-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#2: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT; SWRI validated.
- .1 Basis of Design Product: Tremco Spectrem 2.
- .2 Volatile Organic Compound (VOC) Content: 50 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.

.3 SJS#3: Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT.
- .1 Basis of Design Product: Tremco Spectrem 3.
- .2 Volatile Organic Compound (VOC) Content: 20 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.

.4 SJS#4: Multi-Component, Nonsag, Non-Staining, Field-Tintable Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT.
- .1 Basis of Design Product: Tremco Spectrem 4-TS.
- .2 Volatile Organic Compound (VOC) Content: 20 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.

.5 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#3: Single-Component, Nonsag, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
- .1 Basis of Design Product: Tremco Vulkem 116.
- .2 Volatile Organic Compound (VOC) Content: 60 g/L maximum.
- .3 Colour: As selected by Consultant from manufacturer's standard line.

.4 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.

.5 UJS#5: Immersible, Multi-Component, Pourable, Traffic-Grade Polyurethane Joint Sealant: ASTM C920, Type M, Grade P, Class 35, Use T, O, and I.
- .1 Basis of Design Product: Tremco Vulkem 445SSL.
- .2 Tensile Strength, ASTM D412: 1.7 MPa, at 100 percent elongation.
- .3 Tear Strength, ASTM D412: 6.1 kN/m.
- .4 Adhesion to Concrete, After Water, ASTM C794: 4.4 kN/m
- .5 Hardness, ASTM C661: 40 durometer Shore A, minimum.
- .6 Accelerated Weathering, ASTM C793: Pass.
- .7 Volatile Organic Compound (VOC) Content: 106 g/L maximum.
- .8 Colour: As selected by Consultant from manufacturer's standard line.

.6 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 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 Standard: 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 Liquid 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 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.

.7 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 Field Quality Control

.1 Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A.
- .1 Perform 5 tests for the first 300 m of joint length for each kind of sealant and joint substrate, and one test for each 300 m of joint length thereafter or 1 test per each floor per building elevation, minimum.
- .2 For sealant applied between dissimilar materials, test both sides of joint.

.2 Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.

.3 Submit report of field adhesion testing to Consultant indicating tests, locations, dates, results, and remedial actions taken.

3.5 Exterior Joint Sealant Schedule

.1 Exterior concealed transition joints in air barrier.
- .1 SJS#1: Single-component neutral-curing low-modulus silicone sealant.
- .2 UJS#1: Single-component non-sag urethane sealant.
- .3 Compatibility: Compatible with air barrier components specified in Section 07 27 13.

.2 Exterior construction joints in cast-in-place
- .1 SJS#1, SJS#2: Single-component neutral-curing non-staining silicone sealant.
- .2 SJS# 4: Multi-component neutral-curing non-staining field tintable silicone sealant.
- .3 UJS#1, UJS#2, UJS#3: Single-component non-sag urethane sealant.

.3 Exterior movement joints in concrete unit masonry.
- .1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.
- .2 SJS#4: Multi-component neutral-curing non-staining field tintable silicone sealant.
- .3 UJS#1, UJS#2, UJS#3: Single-component non-sag urethane sealant.

.4 Exterior movement joints in brick masonry.
- .1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.
- .2 SJS#4: Multi-component neutral-curing non-staining field tintable silicone sealant.
- .3 UJS#1, UJS#2, UJS#3: Single-component non-sag urethane sealant.

.5 Exterior joints between different materials listed above.
- .1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.
- .2 SJS#4: Multi-component neutral-curing non-staining field tintable silicone sealant.
- .3 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.6 Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers.

.1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.
.2 SJS#4: Multi-component neutral-curing non-staining field tintable silicone sealant.
.3 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.7 Exterior joints within aluminum storefront framing, curtain walls, and window systems:
.1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.

.8 All other exterior non-traffic joints.
.1 SJS#1, SJS# 2: Single-component neutral-curing non-staining silicone sealant.
.2 SJS#4: Multi-component neutral-curing non-staining field tintable silicone sealant.
.3 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.9 Exterior horizontal traffic and traffic isolation joints:
.1 UJS# 4, UJS#5: Single-component pourable urethane sealant.

3.6 Interior Joint Sealant Schedule

.1 Interior vertical movement joints in interior concrete and unit masonry.
.1 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.2 Interior movement joints in interior unit masonry.
.1 UJS#1, UJS#2: Single-component non-sag urethane sealant.

.3 Interior perimeter joints of exterior aluminum frames.
.1 UJS#1: Single-component non-sag urethane sealant.

.4 Interior perimeter joints of interior frames.
.1 UJS#2: Single-component non-sag urethane sealant.
.2 LJS#1: Siliconized acrylic latex

.5 Interior sanitary joints between plumbing fixtures, food preparation fixtures, and casework and adjacent walls, floors, and counters.
.1 SJS#5: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.

.6 Interior traffic joints in floor and between floor and wall construction.
.1 UJS# 4, UJS#5: Single-component pourable urethane sealant.

.7 Interior non-moving joints between interior painted surfaces and adjacent materials.
.1 LJS#1: Siliconized acrylic latex
.2 Joint-Sealant Colour: Paintable.

.8 Interior concealed sealants at thresholds and sills.
.1 BJS#1: Butyl-rubber-based joint sealant.

.9 Interior exposed and non-exposed acoustical applications.
.1 AJS#1: Acoustical joint sealant.

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 05 12 23 Structural Steel
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.5 Section 07 92 00 Joint Sealants
.6 Section 08 50 00 Aluminum Doors, Windows and Screens
.7 Section 08 80 05 Glazing
.8 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM A36/A36M-19 Standard Specification for Carbon Structural Steel
- .2 ASTM A276/A276M-17 Standard Specification for Stainless Steel Bars and Shapes
- .3 ASTM A1008/A1008M-20 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
- .4 ASTM A1011/A1011M-18a 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
- .5 ASTM B221-14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .6 ASTM C612-14 (2019) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
- .7 ASTM C864-05(2019) Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
- .8 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
- .9 ASTM E283/E283M-19 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- .10 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .11 ASTM E331-00(2009) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- .12 ASTM E413-16 Classification for Rating Sound Insulation.
- .13 ASTM E547-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential.
- .14 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- .15 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
- .16 ASTM E1300-16 Standard Practice for Determining Load Resistance of Glass in Buildings

.2 The Aluminum Association, Inc (AA)
- .1 DAF-45 Designation System for Aluminum Finishes.

.3 American Architectural Manufacturers Association (AAMA)
.1 AAMA 501 Methods of Test for Exterior Walls
.2 AAMA 609 & 610.2 Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
.3 AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
.4 AAMA 2603 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
.5 AAMA 2604 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
.6 AAMA CW-11 Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing
.7 AAMA CW-DG-1 Aluminum Curtain Wall Design Guide Manual
.8 AAMA MCWM-1 Metal Curtain Wall Manual
.9 AAMA T1R-A1 Sound Control for Fenestration Products.
.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-12.20-M89 Structural Design of Glass for Buildings.
.5 Canadian Standards Association (CSA)
.1 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
.2 CSA S157-05/S157.1-05 (R2010) Strength Design in Aluminum.
.3 CSA W59.2-M1991 (R2008) Welded Aluminum Construction.
.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 Samples: Submit duplicate 300 mm long sample sections of all component parts of aluminum extrusions, finished in specified colours.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate materials and profiles and provide full-size, scaled details for components.
.3 Indicate interior trim and exterior junctions with adjacent construction.
.4 Indicate junctions between combination units. Indicate elevations of units. Indicate core thicknesses of components.
.5 Indicate: Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, accessories and caulking materials. Indicate location of caulking.
.6 Indicate arrangement of hardware and required clearances to surrounding structure.
.7 Indicate assembly details and dimensions of fabrication.
.8 Indicate installation details and sequencing, method of glass installation, and location and method of sealing air and vapour barrier to curtain wall frame components.
.9 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anticipated deflection under load, affected related work, weep drainage network, expansion and contraction joint location and details, and field welding required.
.10 Indicate methods of accommodating thermal expansion and contraction, provisions for structural deflections, contractions, expansion and other normal movements.
.11 Indicate design loads and maximum support reactions.

.4 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 Structural design.
.3 Wind load resistance.
.4 Thermal resistance.
.5 Air infiltration.
.6 Water tightness
.7 Condensation resistance.
.8 Anodized finish, weathering characteristics.
.9 Design and components not complying with above requirements will not be accepted.

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

.6 Design Calculations:
.1 Submit design calculations of curtain wall system. Be responsible for the design of all components and accessories thereof and connections in accordance with the requirements of the Ontario Building Code.
.2 Make thorough examination of all drawings and details, check interfacing with work of other Contracts and other factors influencing the engineering design and performance of the work and be fully cognizant of requirements.
.3 The engineering design calculations and drawings for the curtain wall shall be prepared by a registered Professional Engineer registered to practice in Ontario. The said Engineer shall affix his seal and signature to the design calculations and drawings.
.4 Design to withstand without failure the positive and negative forces imposed by wind, earthquake, temperature and shrinkage stress, deflections of the supporting or adjacent structures, all with deflection limitations governed by the design of the supporting structure. The external pressure of suction due to wind on part or all of the surface of the units shall be calculated in accordance with the requirements of the Ontario Building Code.

.7 Operations and Maintenance Data: At completion of the project submit three copies of manufacturer's maintenance, cleaning and maintenance instructions for curtain walls for inclusion into Operation and Maintenance Manuals specified in Section 01 78 00.

1.5 Quality Assurance

.1 The installers executing the work of this Section shall have had at least ten years continuous Canadian experience in the successful manufacture and installation of work of the type and quality shown and specified and shall be approved by the systems manufacturer.

.2 Design Engineer for curtain wall systems shall have a minimum five years of experience in the design of similar systems. Submit proof of experience on request.

.3 Pre-installation Conference: Conduct a pre-installation conference to review and verify project requirements, substrate conditions, manufacturer's installation instructions and warranty requirements. Meeting shall be attended by manufacturer's representative, sealant manufacturer's representative, installer, Contractor and Consultant.

.4 Perform work in accordance with AAMA CW-DG-1.

.5 Perform welding work in accordance with CSA W59.2.

1.6 Performance Requirements

.1 Structural members including intermediate mullions and horizontals, shall be designed to withstand loading in accordance with the Ontario Building Code.

.2 Design system to accommodate, without damage to components or deterioration of seals:
.1 Movement within system.
.2 Movement between system and perimeter framing components.
.3 Dynamic loading and release of building structural loads.
.4 Deflection, shortening or creep of structural support framing.

.3 Design system to accommodate expansion and contraction within system components caused by cycling temperature range of 10° C over a 12 hour period, without causing detrimental effect to system components.

.4 Structural performance shall be based on ASTM E330 and CSA S157-05/S157.1 “Strength Design in Aluminum” and a maximum deflection of 1/175 of the span of unsupported span with full recovery of glazing materials.

.5 Design system as thermally broken, pressure-equalized vented and drained assembly.

.6 Insulating glass units in combination with curtain wall framing shall be designed by the supplier to comply with ASTM E1300.

.7 Insulating glass units in combination with curtain wall 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.

.8 Air infiltration shall not exceed 0.0003 $m^3/s.m^2$ when tested in accordance with ASTM E283 at a pressure differential of 298.77 Pa.

.9 Water penetration: To ASTM E331: None, with static pressure of 718.2 Pa.

.10 Drain water entering joints, condensation occurring in glazing channels or migrating moisture occurring within system, to exterior by weep drainage network.

.11 Provide continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound. Position thermal insulation on exterior surface of air and vapour barrier.

.12 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

1.7 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.

1.8 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 curtain wall 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/ft2, 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.

1.9 Sequencing

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

1.10 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.

1.11 Shipping, Handling and Storage

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

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions. Handle work of this section in accordance with AAMA CW-10.

.3 Store materials indoors in dry location. Ensure materials do not come in contact with ground or other damp substrates.

.4 Cover exposed pre-finished surfaces with pressure-sensitive, heavy protection paper or apply strippable plastic coating before shipping to job site. Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.12 Waste Management and Disposal

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

1.13 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 after acceptance of the building. 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: Aluminum sections and products manufactured by Alumicor form the basis of the drawings and specifications. The following manufacturers are considered as acceptable alternates subject to approval by the Consultant, of supporting technical literature, samples, drawings, engineering data and performance data:
.1 Kawneer Company Canada Ltd.
.2 Commdoor
.3 CRL United States Aluminum
.4 Oldcastle
.5 Windspec

.2 It is a mandatory requirement that all curtain walls and aluminum doors, frames, windows and screens specified in Section 08 50 00 be supplied by the same manufacturer.

2.2 Materials

.1 System Description: Vertical, glazed, pre-finished aluminum curtain wall system including thermally broken tubular steel reinforced aluminum sections. Double- glazed, hermetically sealed vision glass and insulated spandrel panels. Related flashings, anchorage and attachment devices.

.2 Assembled system to permit re-glazing of individual glass and infill panel units without requiring removal of structural mullion sections.

.3 Extruded aluminum: To ASTM B221, AA 6063-T54 or 6063-T6 alloy and temper.

.4 Member Wall Thickness: Each framing member shall provide structural strength to meet or exceed specified performance requirements.

.5 Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

.6 Curtain wall framing shall be designed to suit glass thickness indicated.

.7 Extruded aluminum sills to size and shape to suit wall conditions, complete with end drip deflectors, cover plates and necessary anchors.

.8 Flashings: Pre-finished aluminum where exposed to view. Finish: To match curtain wall sections. Secured with concealed fasteners.

.9 Fasteners: Where exposed shall be stainless steel, to ASTM A276, 300 series or 400 series stainless steel cadmium plated of sufficient size and quantity to suit their intended purpose.

.10 Steel Reinforcement, Weld Plates, Structural Sections and Anchors: Complying with ASTM A36 for structural shapes, plates and bars; ASTM A1008 for cold-rolled sheet and strip or ASTM A1011 for hot-rolled sheet strip.

.11 Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

.12 Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides for silicone adhesion. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

.13 Pressure plates: Mechanically fastened fibreglass pressure plate of sufficient size and strength to provide adequate bite on glass and infill panels.

.14 Exterior pressure plate cover: Extruded aluminum, standard sizes and profiles as detailed and to suit job conditions. Snap-on. Finish to match curtain wall framing.

.15 Glass and Glazing: Glass and Glazing shall be as specified in Section 08 80 05.

.16 Weathering and glazing gaskets: to ASTM C864, extruded silicone compatible EPDM rubber that provides for silicone adhesion.

.17 Weathering and glazing gaskets: Exterior glazing system.

.18 Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, containing no asbestos, formulated for 0.762 mm thickness per coat

.19 Sealant: Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, Use NT as specified in Section 07 92 00 – Joint Sealants.

.20 Adhesives: as recommended by manufacturer of materials to be bonded.

.21 Spandrel Panel Insulation: To ULC 702 Type 1 or ASTM C612 Type IVB, semi rigid stone wool insulation board, unfaced, square edged. Density 56 kg/m$^{3.}$ Thickness as indicated.

.1 Curtainrock. by Roxul
.2 MinWool Curtainwall by Johns Manville
.3 Fasteners and adhesive
  .1 Adhesive types as recommended by insulation manufacturer for application.
  .2 Insulating clips to be adhesive bonded pin and disc type.

2.3 Curtain Wall System

.1 Curtain wall framing profile: 65 mm wide thermally broken with interior tubular section insulated from exterior pressure plate. Mullion depths: 190 mm or as required by engineered design. Exterior caps: 19 mm. Stick system with shear block connections. Pressure-equalized rain screen design with drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.

.2 Glazing: all locations: 25 mm thick glass except at spandrel glass.

.3 Glazed Spandrel Panels 8.0 mm thick tempered spandrel glass as specified in Section 08 80 05, stone wool insulation with 0.84 mm galvanized sheet steel metal back-up as indicated on the drawings.

.4 Spandrel Panels at Concealed Locations: 0.84 mm galvanized sheet steel exterior panel, stone wool insulation with 0.84 mm galvanized sheet steel metal back-up as indicated on the drawings.

2.4 Fabrication

.1 Fabricate in accordance with manufacturer's written instructions.

.2 Take field measurements prior to fabrication.

.3 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly without adversely affecting installation and dynamic movement of perimeter seal.

.4 Design and fabricate coupling mullions to eliminate seam joints on exterior, to provide functional split, to permit modular construction and to allow for thermal expansion.

.5 Framing joints to be accurately machined, fit, assembled, secured and sealed to provide tight, hairline, flush, neat weathertight joints and corners.

.6 Prepare components to receive anchor devices. Install anchors.

.7 Arrange fasteners and attachments to ensure concealment from view.

.8 Reinforce framing members for external imposed loads.

.9 Fabricate glazed pockets and insulation cavities with vents and drains, and pressure equalize to form rain screen assembly. Fabricate frames square to profiles shown and prepare for glazing. Fill frames with manufacturer's insulation.

.10 Design and fabricate necessary brackets and anchorage devices so that, when installed, they will compensate for unevenness and dimensional difference in the structure to which they are secured, will allow full expansion and contraction of framing members as a result of such

expansion and contraction of framing members and will adequately sustain themselves, the curtain wall framing, superimposed wind and rain loads and all other stresses.

.11 Welding of component members will be permitted providing it does not in any way mar the surface appearance and with joints made tight, in true plane, ground and sanded smooth, flush with base metal. Do all welding on concealed surface.

.12 Provide thermal break to maintain the interior surface of frames and glass free from condensation and frosting under conditions of minimum -12° C outside temperature with 24° C inside temperature at 35% relative humidity. All frame members to have extruded silicone compatible elastomeric thermal break integrated with the inner and outer aluminum extrusions by a roll-crimping process to form a rigidly interconnected assembly without the use of fasteners or other thermal bridging elements.

.13 Equip sill base with splice plate back up sections at joint in long runs. Seal ends and jambs to provide neat, weather tight joints.

.14 Provide adequate, shielded drainage and pressure equalization where required.

.15 Aluminum Sills: Extruded to size and shape as detailed, complete with end drip deflectors, expansion cover plates and necessary anchors.

.16 Form continuous flashings with intermediate clips, anchorages and reinforcing and as much as possible, be shop assembled. Provide all filler and closure pieces as required.

2.5 Air Barriers and Vapour Retarders

.1 Equip curtain wall framing 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.

2.6 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.

2.7 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 Coating material shall be low VOC type conforming to SCAQMD Rule 1113-96.

PART 3 EXECUTION

3.1 Examination

.1 Verify dimensions, tolerances and method of attachment with other work on site.

.2 Verify that wall openings and adjoining air barrier materials are prepared and ready to receive work of this Section and match reviewed shop drawings.

.3 Commence installation only when variations or discrepancies on the Site which will prevent satisfactory installation of this Section's work are corrected.

3.2 Installation

.1 Install curtain wall system in accordance with manufacturer's written instructions and reviewed shop drawings and AAMA MCWM-1 Metal Curtain Wall Manual. Install in accordance with manufacturer’s written instructions to achieve vented and drained, pressure-equalized rain screen assembly.

.2 Provide all fastenings or anchors to be built in under other Sections. Coordinate location and connection details for intermediate support framing with Section 05 12 23.

.3 Attach to exterior wall panels to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.4 Provide alignment attachments and shims to permanently fasten system. Clean weld surfaces. Apply protective primer to field welds and adjacent surfaces.

.5 Align assembly and install plumb and level, square, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.6 Provide thermal isolation where components penetrate or disrupt building insulation.

.7 Install sill flashings.

.8 Co-ordinate attachment and seal of perimeter air barrier and vapour barrier materials.

3.3 Site Tolerances

.1 Maximum variation from plumb: 1.6 mm per .91 m non-cumulative or 12.7 mm per 30.48 metres, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 12.7 mm.

3.4 Semi Rigid Curtain Wall Insulation

.1 Install board insulation in curtain wall construction as indicated, in accordance with curtain wall manufacturer's written instructions.

.2 Place insulation within panel, adhered to exterior face of interior sheet, over entire area with impale fasteners spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching glass.

.3 Arrange fasteners and attachments to ensure concealment from view.

.4 Maintain cavity width of dimension indicated between insulation and glass.

.5 Seal voids and gaps.

3.5 Glazing

.1 Install glass in accordance with Section 08 80 05 - Glazing, to glazing method required to achieve performance criteria and to recommendations of manufacturer.

3.6 Caulking

.1 Refer to Section 07 92 00 – Joint Sealants. Install perimeter sealant to method required to achieve performance criteria.

3.7 Cleaning

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

.2 Remove protective material from pre-finished aluminum surfaces.

.3 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.4 Perform cleaning of aluminum components in accordance with AAMA 609 & 610.2.

.5 Remove excess sealant by moderate use of solvent acceptable to sealant manufacturer.

.6 Visible manufacturer's identification labels are not permitted.

3.8 Protection

.1 Protect finished work from damage.

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 21 13 Building Insulation
.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 44 13 Glazed Aluminum Curtain Walls
.8 Section 08 71 10 Finishing Hardware
.9 Section 08 80 05 Glazing
.10 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM B221-20 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  .2 ASTM B456-17 Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
  .3 ASTM B633-19 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
  .4 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
  .5 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
  .6 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
  .7 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 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights
  .2 CSA A440S1-09 Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights
  .3 CSA-A440.4-07(R2012) Window, Door, and Skylight Installation
  .4 CSA-A440.2-14/A440.3-14 Fenestration energy performance/User guide to CSA A440.2-14, Fenestration energy performance.
  .5 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
.4 Aluminum Association (AA), Designation System for Aluminum Finishes (2000)

.5 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.
.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 a complete finishing hardware schedule for each door.

.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 Anodized 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 Closeout Submittals: Provide operation and maintenance data for doors, windows 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 aluminum window or 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 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/ft2, 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.

1.9 Sequencing

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

1.10 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

1.11 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.

.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

.2 It is a mandatory requirement that all aluminum doors, frames, windows screens and curtain walls specified in Section 08 44 13 be supplied by the same manufacturer.

.3 It is a requirement that you use Trenton Glass. Contact information listed as follows:

Trenton Glass
679 Old Highway 2
Trenton, Ontario
Phone: 613.394.3597
Fax: 613.394.5993
Email: shea@trentonglass.net

2.2 Materials

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:
- .1 Sash: aluminum, thermally broken.
- .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: 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.

2.3 Window and Screen Types

.1 Exterior Windows:
- .1 Alumicor, Shadowline 970 thermally broken window frames.
- .2 150 mm deep profile.
- .3 Clear anodized finish.
- .4 25 mm sealed, glazed units as specified in Section 08800.
- .5 Install with high performance thermally broken sill receptor.
- .6 Operable units where indicated.
  - .1 Casement: opening out, with removable double glazing, insulating glass. Anderberg friction arms and spring loaded locking device to automatically lock window in closed position. Maximum opening 100 mm. Casement units to be compatible with fixed window framing.
  - .2 Screens: to CAN/CGSB-79.1.
    - .1 Insect screening mesh: count 18 x 16.
    - .2 Fasteners: tamper proof.
    - .3 Screen frames: aluminum, colour to match window frames.

.2 Entrance Framing:
- .1 Exterior Units: Thermally Broken Storefront Framing: thermally broken, inside glazed.
  - .1 Classification rating: to CSA-A440/A440.1.
  - .2 Air Tightness: A3.
  - .3 Water tightness: B3.
  - .4 Wind load resistance: C3.
  - .5 Surface condensation control: compliant with standard CSA-A440.2/A440.3.
  - .6 Forced Entry: Pass test for resistance to forced entry.
  - .7 Basis of Design: Alumicor, Flush Glaze BF 3400
- .2 Interior Units: Non-Thermally Broken Storefront Framing.
  - .1 Basis of Design: Alumicor, Flush Glaze TL 1800
- .3 Depth of framing units as indicated or as required by engineered design.

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.
- .7 Interior glass: clear, 6.0 mm thick, tempered specified in Section 08 80 05.

.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 Provide flush stops for insulating glass in exterior doors.
- .10 Exterior glass: 25 mm sealed units, insulating glass specified in Section 08 80 05.

2.5 Door Hardware

.1 Provide hardware for aluminum doors, as appropriate to location and configuration. Hardware minimum requirements shall be as indicated on the Architectural drawings outlining hinges, locking mechanism, closers, panic bars, kick plates, weatherstripping, and door pulls. All hardware shall be commercial grade or better. Door hardware supply and installation shall be included as part of the base bid drawings.

.2 Submit a Hardware Schedule for review prior to fabrication and installation.

2.6 Glazing

.1 Glaze doors, windows and screens in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

.2 Glass: As scheduled and as specified in Section 08 80 05– Glazing.

2.7 Fabrication

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 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.

2.8 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.

2.9 Aluminum Finishes

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.2 Clear anodic finish: AA-M10C21A41 / AA-M45C22A41, AAMA 611, Architectural Class I Clear Anodic Coating not less than 18 micrometre thick.

2.10 Isolation Coating

.1 Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 0.762 mm thickness per coat.

PART 3 EXECUTION

3.1 Window and Screen 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 Erect and secure window 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 window frame manufacturer.

.6 Conceal all anchors and fitments. Exposed heads of fasteners not permitted.

.7 Mechanically fasten flexible membrane air and vapour seal to window 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 window 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.

.7 All hardware shall be installed by technicians skilled in the application of architectural hardware and satisfactory to the aluminum door supplier. Instruction sheets, details and templates shall be read and understood before installation.

.8 Coordinate installation of electrically operated hardware with Electrical and Security subcontractors.

.9 Coordinate installation of Automatic Door Operators with Section 08 71 10.

3.4 Caulking

.1 Seal joints between windows and window sills 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.

3.5 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.

3.6 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 20 00 Finish Carpentry
.2 Section 08 11 00 Metal Doors and Frames

1.3 References

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
  .1 ANSI/DHI A115.1G-1994, Installation Guide for Doors and Hardware
  .2 ANSI/BHMA A156.1-2013, American National Standard for Butts and Hinges.
  .3 ANSI/BHMA A156.2-2011, Bored and Preassembled Locks and Latches.
  .4 ANSI/BHMA A156.3-2014, Exit Devices.
  .5 ANSI/BHMA A156.4-2013, Door Controls - Closers.
  .6 ANSI/BHMA A156.6-2010, Architectural Door Trim.
  .7 ANSI/BHMA A156.8-2010, Door Controls - Overhead Stops and Holders.
  .8 ANSI/BHMA A156.10-2011, Power Operated Pedestrian Doors.
  .9 ANSI/BHMA A156.13-2012, Mortise Locks and Latches Series 1000.
  .10 ANSI/BHMA A156.15-2011, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
  .11 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
  .12 ANSI/BHMA A156.17-2014, Self-closing Hinges and Pivots.
  .13 ANSI/BHMA A156.18-2012, Materials and Finishes.
  .14 ANSI/BHMA A156.19-2013, Power Assist and Low Energy Power - Operated Doors.
.2 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
.3 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:
  .1 Submit manufacturer's product literature, specifications and data sheets.

.3 Samples:
  .1 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
  .2 After approval samples will be returned for incorporation in the Work.

.4 Hardware List:
  .1 Submit contract hardware list.
  .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

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

.6 Closeout Submittals
.1 Provide operation and maintenance data for door closers, locksets, door holders, electrified hardware and fire exit hardware for incorporation into Operations and Maintenance manuals specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Regulatory Requirements:
.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 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.

.3 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Receive the delivery of the Finishing Hardware and identify all items against the Finishing Hardware Schedule. Ensure each hardware item is accompanied by the correct template, installation instructions, special tools, fastening devices and other loose items. Advise the finish hardware supplier and Consultant in writing of errors or omissions.

.5 Storage and Protection: Store finishing hardware in locked, clean and dry area.

.6 Remove all hardware from doors and frames prior to painting. After painting is complete and dry, reinstall all hardware to manufacturer’s recommendations.

1.7 Waste Management and Disposal

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

1.8 Maintenance

.1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

1.9 Warranty

.1 Warrant all hardware against defects of workmanship and material, for a period of one year, except for door closers which shall be warranted for ten (10) 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 hardware shall be supplied as specified in the Finishing Hardware Schedule.

.2 All finishes shall be as indicated in the Finishing Hardware Schedule by international codes and in accordance with ANSI/BHMA A156.18.

.3 All door handles shall be lever type meeting requirements of the Ontario Building Code.

2.2 Fastenings

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.3 Keying

.1 New buildings locksets must be by one manufacturer and the master key system documentation must be supplied as part of the Operations and Maintenance manual specified in Section 01 78 00.

.2 Keying shall be to Owners Master Key system.

.3 Provide construction cores which will be removed at Substantial Performance.

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

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

.2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 Examination

.1 Before installing any hardware, carefully check all architectural drawings of the work requiring hardware, verify door swings, door and frame materials and operating conditions, and assure that all hardware will fit the work to which it is to be attached.

.2 Check all shop drawings and frame and door lists affecting hardware type and installation, and certify to the correctness thereof, or advise the hardware supplier and Consultant in writing of required revisions.

3.3 Templates

.1 Check the hardware schedule, drawings and specifications, and furnish promptly to the applicable trades any patterns, templates, template information and manufacturer's literature required for the proper preparation for and application of hardware, in ample time to facilitate the progress of the work.

3.4 Installation

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.2 Installation of hardware shall be in accordance with ANSI A115.1G, manufacturer’s templates and instructions.

.3 Coordinate installation of electric door strikes, keypad locks, card readers, washroom duress systems, and other electronic door control and security devices with Electrical contractor including supply and installation of wiring and all terminations.

.4 All hardware shall be installed by carpenters, skilled in the application of architectural hardware and satisfactory to the hardware supplier. Refer to Section 06 20 00 - Finish Carpentry. Instruction sheets, details and templates shall be read and understood before installation.

.5 Install all materials as listed in the Finishing Hardware Schedule on the doors and frames listed. Interchanging of hardware will not be allowed.

.6 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.7 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.8 Remove construction cores when directed by Owner’s Representative.

.9 After installation, templates, installation instructions and details shall be put in a file and turned over to the Owner, when building is Substantially Performed.

3.5 Adjusting

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition,

safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

3.6 Inspection

.1 After installation of all hardware and before building is accepted, inspect the installation of all hardware and certify in writing to the Consultant that the hardware is properly installed and supplied in accordance with the manufacturer's recommendations, and finishing hardware schedule.

3.7 Cleaning

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

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

.3 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.4 Remove protective material from hardware items where present.

3.8 Demonstration

.1 Brief maintenance staff regarding:
- .1 Proper care, cleaning, and general maintenance of projects complete hardware.
- .2 Description, use, handling, and storage of keys.
- .3 Use, application and storage of wrenches.

.2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

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 44 13 Glazed Aluminum Curtain Walls
.4 Section 08 50 00 Aluminum Doors, Windows and Screens
.5 Section 08 88 13 Fire Resistant Glazing
.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 D1929-20 Standard Test Method for Determining Ignition Temperature of Plastics
  .9 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
  .10 ASTM E84-20 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 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard 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 discolouration.

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, 6 mm thick unless indicated otherwise. Type 2-tempered.
  .1 Class B-float.
  .2 Category 1 11.
  .3 Edge treatment: ground, bevel edge.

.4 Mirror Glass: Silvered mirror glass: to ASTM C1503, minimum 6 mm thick.
  .1 Type 1B-Float glass for high humidity use. All edges ground and polished.

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 argon filled.
- .4 Glass coating: surface number 2, SOLARBAN 60 low "E".
- .5 Inert gas fill: argon.

2.3 Spandrel Glass

.1 Spandrel Glass: to CAN/CGSB-12.9, 8 mm thick.
- .1 Type 2 Heat strengthened.
- .2 Class A-Float.
- .3 Style 1 Opacifying coating on the No. 2 (inboard) surface.
- .4 Form M-Monolithic.
- .5 Colour to be selected by the Consultant from full range of manufacturer's standards. Up to two (2) colours will be selected.

2.4 Fire Rated Glass

.2 Refer to Section 08 88 13

2.5 Transparent Mirror Glass

.3 To ASTM C1376-15. "Mirropane" by Pilkington, or approved equivalent. 6.0 mm thick. Visible transmittance 11%; Visible reflectance (coated side) 68%, Visible reflectance (glass side) 16%.

2.6 Glazing Products

.4 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.

.5 Setting blocks: Neoprene 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.6 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.

.7 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.

.8 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.

.9 Lock-strip gaskets: to ASTM C542.

.10 Glazing Gaskets: To ASTM C864.

.11 Mirror adhesive: Synthetic rubber based adhesive, waterproof and mildew resistant: Lepage PL 610 Construction Mirror Adhesive. Low VOC compliant to SCAQMD Rule 1168-03.

.12 Mirror Clips: CRL zinc plated steel Vancouver type 'H' clips. Size to suit.

.13 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 Mirrors

.1 Coordinate work with Section 06 20 00.

.2 Install frameless mirrors in adhesive and with steel H clips, concealed fasteners.

.3 Install mirrors in one piece unless shown otherwise.

.4 Framed mirrors are specified in Section 10 28 10.

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 26 00 Vapour Retarders
.4 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.5 Section 07 84 00 Firestopping
.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(2020) Standard Specification for Nails for the Application of Gypsum Board
  .3 ASTM C840-20 Standard Specification for Application and Finishing of Gypsum Board
  .4 ASTM C954-18 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 C1002-18 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 (2019) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
  .7 ASTM C1177/C1177M-17 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
  .8 ASTM C1178/C1178M-18 Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
  .9 ASTM C1278/C1278M-17 Standard Specification for Fiber-Reinforced Gypsum Panel
  .10 ASTM C1280 - 18 Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.
  .11 ASTM C1396/C1396M - 17 Standard Specification for Gypsum Board
  .12 ASTM C1629/C1629M-19 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
  .13 ASTM E90-09 (2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
  .14 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
  .15 ASTM E1966-15 (2019) 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.
.6 Wall and Ceiling Bureau
.1 Technical Bulletin Control Joint Placement in Gypsum Board Assemblies

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.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.

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.

.5 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.

1.6 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 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.

1.8 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.

1.9 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 for rated applications, 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 Glass Mat Water-Resistant Gypsum Board: to ASTM C1178 with glass mat facings, both sides, regular and Type X, thicknesses as indicated on drawings, 1200 mm wide x maximum practical length, ends square cut, long edges tapered.

2.2 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 Sheathing Screws: To ASTM C1002, corrosion resistant, heat treated self-tapping sheet metal screws minimum 32 mm long.

.3 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.

.4 Joint Filler and Topping: To ASTM C475 vinyl or latex base, slow setting.

.5 Joint Treatment for Gypsum Sheathing: 50 mm wide, 10 x 10 woven threads per 25 mm, self-adhering fibreglass joint tape and Borden HPPG Elmer's Siliconized Acrylic Latex Caulk.

.6 Laminating Compound: as recommended by manufacturer, asbestos-free.

2.3 Acoustic Insulation

.1 Acoustic Attenuation: Min 50 STC in accordance with ASTM E90.

.2 Acoustic Insulation: Mineral or Glass Fibre Acoustic Insulation:
.1 Mineral Fibre Acoustic Insulation: To ASTM C665, Mineral fibre blanket insulation, minimum density of 40 kg/m^3:
.1 AFB Acoustical Fire Batts manufactured by Roxul Inc.
.2 Creased SAFB manufactured by Owens Corning Canada.

.2 Glass Fibre Acoustic Blanket Insulation: To CAN/ULC-S702, type 1, pre-formed unfaced glass fibre batt acoustic insulation.
.1 QUIETZONE Acoustic Blanket insulation manufactured by Owens Corning Canada.

.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

.4 Thickness to suit depth of wall framing and as indicated.

.5 Acoustic sealant: as specified in Section 07 92 00 - Joint Sealants.

2.4 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 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.

.3 Control Joints: DRM-50-25 2PC extruded aluminum as manufactured by Fry Reglet Corporation to provide a 6 mm reveal.

.4 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 Apply gypsum board at right angles to framing members or furring using screw fasteners. Maximum spacing of screws 300 mm o.c.

.4 Install fibre gypsum abuse resistant panels at all ceilings and bulkheads except as noted below. Treat joints with fibreglass reinforced joint tape in accordance with manufacturer’s instructions.

.5 Apply water or moisture resistant gypsum wallboard where indicated. Apply water resistant sealant to edges, ends and cut outs which expose gypsum core.

.6 Laminate gypsum board to existing masonry wall surfaces where indicated.

.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. Neatly cope gypsum board to fill deck flutes where gypsum board abuts floor or roof deck.

3.4 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. Construct control joints in accordance with ASTM C840 and as described in Wall and Ceiling Bureau Technical Bulletin “Control Joint Placement in Gypsum Board Assemblies”. Place control joints consistent with lines of building spaces as indicated. Where not indicated install as directed at maximum 6.0 m spacing. Control joints shall be supported with metal studs or furring channels on both sides of the joint Construct joints using back-to-back casing beads filled with a low modulus sealant capable of flexible joint movement. Maintain fire-resistance rating of wall assemblies. Control joints shall be provided:
.1 At abutting structural elements, steel columns.
.2 At expansion or control joints in the substrate;
.3 At each door jamb.

3.5 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.

3.6 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.

3.7 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 05 41 00 Structural Metal Stud Framing
.2 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM).
  .1 ASTM A653/A653M-20 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .2 ASTM C645-18 Standard Specification for Nonstructural Steel Framing Members
  .3 ASTM C754-20 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 C1002-18 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(2019) Standard Test Method for Fire-Resistive Joint Systems
.2 Canadian General Services Board (CGSB).
  .1 CAN/CGSB-1.40-97 Primer, Structural Steel, Oil Alkyd Type.
.3 Underwriters Laboratories of Canada (ULC)
  .1 ULC List of Equipment and Material, Volume III, Fire Resistance Ratings.
.4 CSSBI Lightweight Steel Framing Manual

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 metal framing and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
  .1 Submit duplicate 300 mm long samples of non-structural metal framing.

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 Stud Framing Systems

.1 Non-load bearing channel stud framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
.1 Thickness of materials to conform to referenced standards unless noted otherwise.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.

.3 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Tie Wire: 0.90 mm, galvanized, soft annealed, steel wire or clip as recommended by the manufacturer of furring channels.

.5 Wind bearing light weight steel stud framing for exterior wall applications is specified in Section 05 41 00.

2.2 Metal Furring and Suspension Systems

.1 Channel framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
.1 Thickness of materials to conform to referenced standards unless noted otherwise.

.1 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: to ASTM C645 , 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 Deflection Track: Bailey Multi-Slot Track MST 250, size to suit studs, and top deflection clips TDC 350 and TDC 587.

.5 Horizontal Flange attachment: Bailey Horizontal Flange Attachment Clip (HFA Clip)
.6 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild steel rods.

2.2 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 ASTM C1002, self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.

2.3 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 Examination

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

3.2 Erection

.1 Comply with ASTM C754.

.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 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum. Provide top deflection tracks where indicated or as required to permit structural deflection. Install top deflection clips as necessary to increase load capacity,

.4 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.5 Place studs vertically at 400 mm on centre unless noted otherwise and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.6 Erect metal studding to tolerance of 1:1000.
.7 Attach studs to bottom and ceiling track using screws.

.8 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.9 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.10 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.11 Install heavy thickness single jamb studs at openings.

.12 Erect track at head of door/window openings and sills of window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.13 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.14 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.15 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.16 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.

.17 Install continuous insulating strips to isolate studs from un-insulated surfaces.

.18 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 Wall Furring

.1 Install wall furring for gypsum board wall finishes in accordance ASTM C754 and ASTM C841 except where specified otherwise and indicated 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.

3.4 Suspended and Furred Ceilings and Bulkheads

.1 Erect hanger and runner channels for suspended gypsum board bulkheads in accordance with ASTM C754 and ASTM C841 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 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.

3.5 Gypsum Board

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

3.6 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 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A780/A780M-20 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
.2 Environmental Protection Agency (EPA)
  .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
.3 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, 2018.
  .2 Standard GPS-1-08 and GPS-2-08 MPI Green Performance Standard for Painting and Coatings.
.4 Society for Protective Coatings (SSPC)
  .1 Systems and Specifications, SSPC Painting Manual 2009.
.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.
.7 National Fire Code of Canada.

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 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.

.4 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Consultant.

.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 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.
  .3 Deliver to Owner and store where directed.

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, hexavelant 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 Hexavelant 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 Concrete Vertical Surfaces:
  .1 EXT 3.1K - Latex semi-gloss finish (over alkali resistant primer).

.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 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements and SSPC-SP 6. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.4 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 Protect factory finished products and equipment.

.4 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 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Consultant.

.4 Apply coats of paint as 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, including such surfaces as projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 Mechanical/Electrical Equipment

.1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces.

.2 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

3.7 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.

3.8 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.

3.9 Restoration

.1 Remove protective coverings and warning signs as soon as practical after operations cease.

.2 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 12 23 Structural Steel
.2 Section 05 31 00 Steel Deck
.3 Section 05 50 00 Metal Fabrications
.4 Section 06 20 00 Finish Carpentry
.5 Section 08 11 00 Metal Doors and Frames
.6 Section 09 21 16 Gypsum Board
.7 Section 09 91 13 Exterior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A780/A780M-20 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
.2 Environmental Protection Agency (EPA)
  .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
.3 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, 2018
  .2 Standard GPS-1-08 and GPS-2-08 MPI Green Performance Standard for Painting and Coatings.
.4 Society for Protective Coatings (SSPC)
  .1 Systems and Specifications, SSPC Painting Manual 2009
.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.
.8 National Fire Code of Canada

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 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 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 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.
  .3 Deliver to Owner and store where directed.

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 Concrete Horizontal Surfaces:
  .1 INT 3.2A Latex floor enamel [gloss] [low gloss] finish.
  .2 Concrete Floor Sealer: Refer to Section 09 67 00-Fluid Applied Flooring.

.2 Structural Steel:
  .1 INT 5.1X Latex G5 semi-gloss finish (over quick dry shop primer).

.3 Metal Fabrications:
  .1 INT 5.3A Latex G5 semi-gloss finish

.4 Zinc Coated Metal Deck:
  .1 INT 5.3H. Interior Latex semi-gloss, dry fog/fall type.

.5 Galvanized Metal: interior doors, frames, railings, misc. steel, pipes, and ducts.
  .1 INT 5.3A Latex G5 semi-gloss finish

.6 Concrete Masonry:
  .1 INT 4.2D High performance architectural latex G5 semi-gloss finish.

.7 Concrete masonry units at wet areas and change rooms:
  .1 INT 4.2G Epoxy (tile-like) finish.

.8 Wood Clear Polyurethane Finish:
  .1 INT 6.3K Polyurethane varnish G6 gloss finish.

.9 Electrical Equipment Backboards;
  .1 INT 6.4P Fire retardant, pigmented coating. Low odour/low VOC. Semi-gloss (UL/ULC rated).

.10 Gypsum Board: Walls and Bulkheads.
  .1 INT 9.2A Latex G3 eggshell finish over latex sealer.

.11 Gypsum Board: Ceilings and Bulkheads:
  .1 INT 9.2A Latex G2 velvet finish over latex sealer.

.12 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 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  .2 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 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 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 06 10 00 Rough Carpentry
.2 Section 08 50 00 Aluminum Doors, Windows and Screens

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D5116-17 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
  .2 ASTM D6670-18 Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
.2 Underwriters Laboratories of Canada (ULC)
  .1 ULC 109-14 Flame Tests of Flame Resistant Fabrics and Films
.3 National Fire Protection Association (NFPA)
  .1 NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
.4 Canadian Electrical Code.

1.4 Submittals

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

.2 Submit shop drawings. Clearly indicate, by large scale details, anchorage, assembly, materials, components, finishes, and perimeter construction conditions.

.3 Submit duplicate 300 mm x 300 mm samples of fabrics in selected colours.

.4 Submit manufacturer's maintenance data in the form of printed instructions for cleaning and maintaining roller shades, for inclusion in Operation and Maintenance Manuals specified in section 01 78 00 – Closeout Submittals

1.5 Quality Assurance

.1 Work of this Section shall be by forces in the direct employ or under control of the system manufacturer, skilled, trained and experienced in work of similar scope and complexity.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section, with a minimum of ten years of experience.

.3 Mock-Ups: Erect one full size mock-up of each roller shade type for review. Completed and accepted mock-up shall act as the standard to which the balance of the work will be judged.

1.6 Shipping, Handling and Storage

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

.2 Test all operable components prior to shipping.

.3 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 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 Manufacturer's Warranty: Submit manufacturer's standard 10 year product warranty executed by an authorized company official.

PART 2 PRODUCTS

2.1 Manufacturers

.1 Roller Shade System shall be glazing frame mounted electrical Operated Motorized & non-electrically Operated Solar Shades as manufactured by Solarfective Products Limited.

.2 Basis of Design:
.1 The Legrand Shading Systems Solarfective Teleshade (TS)

.3 Subject to compliance with the contract documents, acceptable equivalent products of the following manufacturers may be used upon approval:
.1 Elite Window Fashions
.2 Lighting Harvesting Shading Solutions
.3 Mechoshade Systems Inc.
.4 Nysan Solar Control
.5 Sun Glow Window Covering Products of Canada
.6 SunProject Inc.

2.2 Hardware – Manually Controlled Shades

.1 Chain Operated with infinite positioning. Left or right hand operation and banding as applicable to project conditions.
.1 Drive assembly:
.1 Must allow fingertip control and include a built-in shock absorber system to prevent chain breakage under normal operating conditions.
.2 Factory set for size and travel of shades.
.3 Capable of being field adjusted from the exterior of the shade unit without having to disassemble the hardware.
.4 Drive Chain: No. 10 stainless steel bead chain formed in a continuous loop. The chain shall have passed a 40kg load test. Chain may be positioned at either, or both ends of the shade without disassembly of the shade unit.
.1 Supply and install child safe chain retainers.

.5 Supply and install counter balancing mechanism designed to offset the weight of the shade and give fingertip control.

.2 Control shades and room darkening shades independently.

2.3 Assembly

.1 Supply and install fully factory assembled shade units consisting of 2 shade brackets, shade tube, extruded aluminum fascia, hembar and fabric as specified.

.2 Factory modify housings where necessary to bypass columns and other obstructions.

.3 End Brackets: 2 piece molded ABS construction with nylon drive sprocket. Bracket colour coordinated with fascia colour.

.4 Shade tube; Minimum 1.52 mm thick extruded aluminum with 3 equally spaced continuous stiffening fins, non-sag design, maximum deflection under full load of fabric L/700.

.5 Fascia: One piece extruded aluminum 1.7 mm thickness complete with three continuous screw flutes. Anodized. Colour as selected by the Consultant. Extruded aluminum snap lock fascia which continuously fits on the end and center brackets as a one-piece section.

.6 Hembar: extruded aluminum with matching plastic end finials.

2.4 Shade Mounting System

.1 Extruded aluminum bracket designed to accept preassembled shade system.
.1 Brackets shall be used to facilitate the alignment with shade opening.

.2 Modular Construction: shades must be removable as a complete modular unit without any component disassembly required.

2.5 Aluminum Finish

.3 Exposed aluminum: Baked enamel, colour to be selected by the Consultant.

.4 Unexposed aluminum: mill finish.

2.6 Shade Fabric

.1 Sun control fabric: dimensionally stable shade fabric.
.1 Acceptable Products: 3% open area:
.1 Phifer Sheerweave, Style 4600.
.2 Colour: to be selected by the Consultant.

.2 Performance: fabric shall hang flat, without buckling or distortion. Edge, where trimmed, shall hang true and straight, without shifting sideways more than 3 mm in either direction due to warp distortion or weave design.

.3 Fabric shall be certified by an independent laboratory to pass the small scale vertical burn requirements test ULC S109 and NFPA 701.

2.7 Fabrication

.1 Finished assemblies shall be square, true to size and free from distortion, twist or other defects that could affect their strength, operation or appearance.

.2 Factory applied finish shall be uniform, smooth and without blemishes.

.3 The fabric shall be colour fast, retain its shape, not be affected by moisture or heat, and shall be non-flammable. Cut fabric to eliminate glare and reflection from shining surfaces while maintaining exterior view. The top of the fabric shall be retained in the recessed spline of the shade roller and the bottom of the fabric shall be retained by the hem bar.

PART 3 EXECUTION

3.1 Installation

.1 Install shading devices in accordance with manufacturer's instructions.

.2 Take field measurements prior to fabrication to ensure fit.

.3 Fabric shall be premeasured and manufactured off-site.

.4 Install square, plumb, true to line, adequately anchored, maintaining uniform clearances, accurate alignment levels and parallel with the window plane. Fabric shall not travel more than 3 mm in either direction within channels after installation.

.5 Adjust operable parts for correct function.

.6 Secure with non-corrosive fasteners, concealed in final assembly.

.7 Fabric shall hang flat, without buckling or distortion. The edge, when trimmed, shall hang straight without raveling. An unguided roller shade cloth shall roll true and straight, without shifting sideways more than + 3 mm in either direction due to warp distortion, or weave design.

.8 Black out shades shall be installed to eliminate passage of light from exterior.

.9 Electrical wiring, hook-up, switches, motorized shades: in accordance with Division 26 requirements.

.10 Adjust to provide for operation without binding.

.11 Refinish damaged or defective work so that no variation in surface appearance is discernable.

3.2 Demonstration

.1 Prior to acceptance of system, arrange for demonstration of equipment with authorized representatives of the Owner, to be performed by representative of shade manufacturer to assure proper function, operation and explanation.

.2 Conduct comprehensive demonstration for Owner's staff on operation and care of interior window treatments.

3.3 Cleaning

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

End of Section