THE TOWN OF GRAND VALLEY

CHANGE ROOM ADDITION
Grand Valley and District Community Centre

90 Main Street North, Grand Valley, Ontario

"ISSUED FOR TENDER"

Tender No.

BBA Project No. 21171.1 **DATE** January 2025

BARRY BRYAN ASSOCIATES
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DIVISION 32 – EXTERIOR IMPROVEMENTS

End of Section

LIST OF DRAWINGS

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
A000	List of Drawings & Location Map Cover Sheet, Drawing, List, Location Map	0	-	Dec. 6 2024
Civil				
CV-2	Esc, Grading & Servicing Plan	0	-	Dec. 6 2024
Architectural				
A101	Overall Site Plan	0	-	Dec. 6 2024
A102	Demolition Site Plan	0	-	Dec. 6 2024
A103	Site Details	0	-	Dec. 6 2024
A201	Overall Floor Plan / Life Safety Plan	0	-	Dec. 6 2024
A201	Demolition: Floor plan and Part Ceiling Plan	0	-	Dec. 6 2024
A202	Demolition: Photos	0	-	Dec. 6 2024
A204	Enlarged Floor Plan	0	-	Dec. 6 2024
A205	Enlarged RCP Floor Plan	0	-	Dec. 6 2024
A206	Overall Roof Plan: Demo / Reno	0	-	Dec. 6 2024
A301	Enlarged Part Elevations, Wall Sections	0	-	Dec. 6 2024
A401	Building Sections	0	-	Dec. 6 2024
A402	Wall Sections	0	-	Dec. 6 2024
A403	Wall Sections	0	-	Dec. 6 2024
A601	Plan Details	0	-	Dec. 6 2024
A701	Interior Elevations	0	-	Dec. 6 2024
A701	Change Room Details and W/R Accessories	0	-	Dec. 6 2024
A701	Room & Door Schedule	0	-	Dec. 6 2024
Structural				
S101	General Notes	0	-	Dec. 6 2024
S102	Typical Details	0	-	Dec. 6 2024

Dwg. No.	Title	Issue No.	Rev. No.	Issue Date
S201	Enlarged Foundation Plan	0	-	Dec. 6 2024
S204	Enlarged Roof Framing Plan, Schedule	0	-	Dec. 6 2024
S501	Sections	0	-	Dec. 6 2024
Mechanical				
M101	Legend & Schedules	0	-	Dec. 6 2024
M102	Schedules	0	-	Dec. 6 2024
M201	Existing Ground Floor Part Plans - Demolition	0	-	Dec. 6 2024
M301	Ground Floor Plan - Plumbing & Drainage Renovation	0	-	Dec. 6 2024
M401	Ground Floor Plan - Fire Protection	0	-	Dec. 6 2024
M501	Ground Floor Plan - HVAC Renovation	0	-	Dec. 6 2024
M601	Mechanical Room Plan - Plumbing, Drainage & HVAC	0	-	Dec. 6 2024
M701	Roof Plan	0	-	Dec. 6 2024
M801	Details	0	-	Dec. 6 2024
Electrical				
E101	Details, Key Plan & Legend	0	-	Dec. 6 2024
E102	Details & Schedules	0	-	Dec. 6 2024
E201	Ground Floor Demolition	0	-	Dec. 6 2024
E301	Ground Floor Renovation - Lighting	0	-	Dec. 6 2024
E302	Ground Floor Renovation - Power & Systems	0	-	Dec. 6 2024
E303	Roof Power & Systems Renovation	0	-	Dec. 6 2024
E401	Distribution Riser Diagram	0	-	Dec. 6 2024
E501	Fire Alarm Riser	0	-	Dec. 6 2024

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Work covered by contract documents
.2 Owner
.3 Location of the site
.4 Site access
.5 Work sequence
.6 Contractor use of premises
.7 References and codes
.8 Protection of work
.9 Engineer design
.10 Hazardous material discovery
.11 Special conditions
.12 Site security
.13 "By Others"
.14 Protection of Drawings

1.2 Work Covered by Contract Documents

.1 Work of this Contract comprises the construction of the **GRAND VALLEY AND DISTRICT COMMUNITY CENTRE RINK SLAB REPLACEMENT, 90 Main Street North, Grand Valley, Ontario,** for the Town of Grand Valley, and as indicated on the drawings and specifications.

1.3 Owner

.1 The Town of Grand Valley

1.4 Location of Site

.1 The Work of this Contract is located at 90 Main Street North, Grand Valley, Ontario, L9W 5S7.

1.5 Site Access

.1 Access to the site and work areas to be arranged by the Owner.

.2 The facility will remain operational and open to the public for the duration of this Work. Coordinate any require shutdowns or service interruptions with the Town. Do not initiate shutdowns or service interruptions without written approval. Refer to Section 01 35 13.53 – Special Project Procedures for Occupied Buildings. The construction zone must be separated from the occupied rink space with a full height hoarding wall to prevent dust spread and migration into the occupied spaces.

.3 Exits must be maintained in the occupied spaces at all times as indicated on the drawings for life safety integrity.

.4 Provide all necessary protection, including access routes for the public, to existing facilities at all times.

.5 Maintain clear exiting and fire routes at all times. Provide flagmen where required.

1.6 Work Sequence

.1 Construct Work continuously in accordance with local facility and by-law restrictions.

.2 It is the Town's preference for all work to be conducted during normal hours of operation, whenever possible. Allow for extended hours as required to maintain the project schedule, or when work cannot proceed due to previously scheduled programs and events.

.3 The Town's Noise By-Law governs hours of operation for construction equipment.

.4 The work shall be completed and ready for occupancy on November 28th, 2025.

.5 The Township must be in a position to make and utilize the ice rink by October 1st, 2025.

1.7 Contractors Use of Premises

.1 Works areas are indicated on the drawings.

.2 Contractor has unrestricted use of defined work areas until Substantial Performance. For access to areas of the existing building beyond the work area limits, refer to Section 01 35 13.53 – Special Project Procedures for Occupied Buildings.

1.8 References and Codes

.1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CSA C22.1-15, and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.9 Protection of Work

.1 In carrying out the Work from their inception and until the final acceptance of the same, the Contractor must be careful not to cause any injury or damage to any adjacent property or any other structures, works or things on or near the line, or in the vicinity of the Works or elsewhere and must make good the same at the Contractor's own expense, in the manner directed by, and to the satisfaction of the Town of Madawaska Valley**.**

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.

1.11 Special Conditions

.1 The following general and special conditions apply:
.1 Facility shutdown shall be completed after hours (12.00 a.m. to 5.00 a.m.).
.2 Excessive demolition work shall be completed after hours to avoid disruption of operations.
.3 All existing surfaces and finishes are to be repaired wherever damaged during the course of the Work.

.4 Wherever existing floor and wall finishes are to be removed, include full removal down to the existing concrete substrate of all tile, base, mortars, grouts, waterproofing membranes and adhesives in accordance with TTMAC recommended procedures. Patch and repair existing substrate to the quality required by the new finish material manufacturer for the installation of their products.

.5 All openings in existing fire rated assemblies or fire separations which are created by the removal of existing services, plumbing, conduit, ductwork, fittings fixtures or accessories are to be firestopped to maintain the integrity of the existing construction.

.6 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.12 Hazardous Material Discovery

.1 Refer to Section 01 41 00 – Regulatory Requirements.

1.13 Special Conditions

.1 The following general and special conditions apply:

.1 All existing surfaces and finishes are to be repaired and refinished wherever damaged during the course of the Work.

.2 Wherever existing floor finishes are to be removed, include full removal down to the existing concrete substrate of all flooring finishes, waterproofing membranes and adhesives in accordance with manufacturer's recommended procedures, ASTM F710-11 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring", and TTMAC standards where applicable. Patch, repair and prepare existing substrate to the quality required by the new finish material manufacturer for the installation of their products.

.3 New vertical lift gate shall remove and replace the existing. The lift gate shall be mounted to the new concrete header trench wall and have custom post base plates to mount to the header trench / rink slab wall. Coordinate anchor spacing with the bracing to the adjacent back walls as necessary. Coordinate replacement work accordingly.

1.14 Site Security

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

1.15 "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.

1.16 Protection of Drawings

.1 Copyright of electronic document belongs to the Consultant. Electronic documents may not be forwarded to others, transmitted, downloaded or reproduced in any format, whether print or electronic, without the express, written permission of the copyright owner.

.2 Drawings, specifications and other contract related documents which are posted on Contractor controlled websites for access by sub-trades and suppliers, shall be posted only on password protected and secure websites approved by the Consultant to limit access to those with an

expressed interest in the Project.

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

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Consultants

.1 PRIME CONSULTANT:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Attention: Mr. Doug McLaughlin, P. Eng.

PART 2 PRODUCTS

3.1 Not Used

.1 Not used

PART 3 EXECUTION

3.2 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Cash Allowances

1.2 References

.1 Canadian Construction Documents Committee CCDC2-2020, 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 Supplementary Instruction.

.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 Related Sections

.1 Section 01 31 00 Project Management and Coordination
.2 Section 01 33 00 Submittal Procedures

1.3 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.
.1 An RFI shall not constitute notice of claim for a delay.

1.4 Submittal Procedures

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
.1 Number RFI's consecutively in one sequence in order submitted, in numbering system as established by the Contractor.

.2 Submit one distinct subject per RFI form. Do not combine unrelated items on one form.

.3 RFI form:
.1 Submit a draft "Request for Information" form to be approved by the Owner and Consultant.
.2 Submit RFI's to the Consultant on approved "Request for Information" form. The Consultant shall not respond to an RFI except as submitted on this form.
.3 Where RFI form does not have sufficient space to provide complete thereon, attach additional sheets as required.
.4 Submit with RFI form all necessary supporting documentation.

.4 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.

.5 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.

.6 Only the Contractor shall submit RFI's to the Consultant.

.7 RFI's submitted by Subcontractors or Suppliers directly to the Consultant will not be accepted.

1.5 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.

1.6 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.

1.7 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 Related requirements
.2 Appointment and Payment
.3 Contractor's Responsibilities

1.2 Related Requirements

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

1.3 Appointment and Payment

.1 The Owner will appoint an independent inspection and testing agency to provide Quality Assurance (QA) testing.

.2 Contactor will pay the independent inspection/testing agency from the Cash Allowance, including costs for equipment, facilities, and labour to, except follows:
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
.3 Mill tests and certificates of compliance.
.4 Tests specified to be carried out by Contractor under the supervision of Consultant.
.5 Additional tests specified in the following paragraph.

.3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Consultant or Consultant to verify acceptability of corrected work.

1.4 Contractor's Responsibilities

.1 The contractor shall be responsible for his own Quality Control and shall appoint and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Control (QC) testing where necessary to satisfy the contractor's quality control plan. Such inspection and testing services will not be paid out of the Cash Allowance.

.2 Where independent inspection and testing has been appointed by the Consultant or Owner for Quality Assurance, the contractor shall provide labour, equipment and facilities to assist in the independent inspection and testing agency and their representatives by:
.1 Providing access to Work to be inspected and tested.
.2 Facilitating inspections and tests.
.3 Making good Work disturbed by inspection and testing.

.3 Notify Owner and Consultant sufficiently in advance of testing & inspection operations (24hrs minimum).

.4 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.5 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed.

.6 The costs for contractor's rink slab surveys specified in Sections 03 30 00 and 07 21 13 are to be carried by the Contractor and are not included in the 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 Preconstruction Conference
.2 Project Meetings
.3 On Site Documents
.4 Schedules
.5 Requests for Information (RFI's)
.6 Closeout Procedures
.7 Cost Breakdown

1.2 Preconstruction Conference

.1 The Consultant will call for and administer 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 if applicable.
.13 Contractor's Schedule of Submittals

.4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven (7) days to submit comments or additions to minutes. Minutes will constitute final documentation of results of Preconstruction Conference.

1.3 Project Meetings

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

.2 Project meetings will be held minimum bi-weekly.

1.4 On-Site Documents

.1 Maintain copies of the following documents on site at all times
.1 Contract drawings.
.2 Permit Drawings
.3 Specifications.
.4 Addenda.

.5 Reviewed Submittals
.6 Approved Samples
.7 Colour Schedules
.8 Requests for Information (RFI's)
.9 Change orders.
.10 Supplemental Instructions
.11 Other modifications to Contract.
.12 Inspection and Test Reports, including designated substance reports
.13 Copy of approved Work schedule.
.14 Manufacturers' installation and application instructions.
.15 Safety data sheets for all products to be used or stored on site
.16 Company's site-specific safety plan
.17 Company's site-specific fire safety plan
.18 Site Meeting Minutes
.19 All as-built record documents related to the building site and work including drawings provided by the City.
.20 Other documents as specified.

1.5 Schedules

.1 Submit a construction progress schedule to Consultant within 10 working days of the Contract award and at least 10 working days prior to the submission of the first progress claim. The construction progress schedule must show anticipated progress stages and final completion of the work within the time periods required by the Contract documents.

.2 During progress of Work revise and resubmit as directed by Consultant.

.3 The current project schedule shall be tabled at each regular site meeting.

1.6 Requests for Information (RFI's)

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

1.7 Closeout Procedures

.1 Notify Consultant when Work is considered ready for Substantial Performance.

.2 Accompany Consultant on preliminary inspection to determine items listed for completion or correction.

.3 Comply with Consultant's instructions for correction of items of Work listed in executed certificate of Substantial Performance.

.4 Notify Consultant of instructions for completion of items of Work determined in Consultant's final inspection.

1.8 Cost Breakdown

.1 Submit a detailed cost breakdown to Consultant at least ten (10) 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 Required
.3 Format
.4 Submission
.5 Critical Path Scheduling
.6 Submittals Schedule

1.2 Related Sections

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 77 00 Closeout Procedures

1.3 Submittals

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

1.4 Schedules Required

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

1.5 Format

.1 Prepare schedule in form of a horizontal bar chart using Microsoft Project 2010 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.

1.6 Submission

.1 Submit initial format of schedules within 15 working days after award of Contract.

.2 Submit schedules in electronic format, by email as PDF files.

.3 Consultant will review schedule and return review copy within 10 days after receipt.

.4 Resubmit finalized schedule within 7 days after return of review copy.

.5 Submit revised progress schedule with each application for payment.

.6 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.

.7 Table current and up to date schedule at each regular site meeting.

1.7 Critical Patch 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 as follows.
- .1 Demolition.
- .2 Foundation Work.
- .3 Refrigeration system.
- .4 Rink slab construction.

.5 Dasherboards
.6 Special Subcontractor Work.
.7 Equipment Installations.
.8 Flooring replacement

.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.

1.8 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, 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 Related Sections

.1 Section 01 26 15 Requests for Information
.2 Section 01 31 00 Project Management and Coordination

1.3 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 Imperial units.

.4 Where items or information is not produced in Imperial 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.

1.4 Requests for Information (RFI's)

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

1.5 Shop Drawings and Product Data

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided 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 Allow ten (10) days for Consultant's review of each submission.

.6 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.

.7 Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

.8 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.

.9 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 Performance characteristics.
  - .5 Standards.
  - .6 Operating weight.
  - .7 Relationship to adjacent work.

.10 After Consultant's review, distribute copies.

.11 Submit 3 prints plus one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

.12 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.

.13 Delete information not applicable to project.

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

.15 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.

.16 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.

1.6 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.

1.7 Progress Photographs

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

1.8 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.

1.9 Mock-Ups

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

1.10 Certificates and Transcripts

.1 Submit Workers' Compensation Board status.

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 Special project procedures for occupied buildings.
.2 Contractor Use of Premises
.3 Owner's use of Existing Buildings
.4 Dust Control
.5 Protection
.6 Emergency and Fire Protection
.7 Temporary Exhaust
.8 Hoisting of Materials and Equipment.

1.2 Contractor Use of Premises

.1 Limit access of construction personnel to existing building only at locations approved by the Owner, and only when necessary to perform work within the existing building. Any other access by contractors is strictly prohibited. Refer to the location plan for approved staging area.

.2 Ensure that construction personnel perform work in existing building only as required under the Contract; and that they do not use it as access to work areas, except for work in existing building, or for other purposes.

.3 Use of washroom and services in existing building by construction personnel is strictly prohibited.

.4 Construction personnel shall use areas of the existing building for their purposes only as designated by the Owner and only while Work is in progress. Prohibit lounging. Keep assigned areas clean and return them to an "as was" condition at completion of construction.

.5 Smoking is strictly prohibited on the Owner's property.

.6 Do not take meal and coffee breaks in the existing building. Provide space in site trailer for workers' breaks.

.7 Keep traffic through existing occupied areas to an absolute minimum in executing the Work.

.8 Minimize noise, dust, and odours to ensure staff and students in areas adjacent to the construction area are disturbed as little as possible. Implement immediate corrective action to cease or limit disagreeable annoyances to staff and public upon notification by Owner.

.9 Make good damage to building, fixtures, and fittings caused during use by construction personnel by replacement with new work. Include cost of installation and making good of other work thereby affected in replacement.

.10 Assume total responsibility for security of construction areas within the existing building upon commencement of Work, particularly where construction areas are exposed to the exterior. Secure construction areas by methods compatible with the total security established for building.

.11 Construction personnel shall use areas of the existing buildings only in a manner as determined by the Work.

.12 Arrange with the Owner for appropriate times for doing cutting and coring operations.

1.3 Owner's Use of Existing Building

.1 The existing building will remain in use throughout the duration of construction of the new building. The Owner will maintain control over operation of building systems during construction. All building systems including alarms and sensors within the rink replacement area must be isolated and protected through the construction work.

.2 Maintain fire department access to existing building.

.3 Maintain existing exits and provide proper and safe means of egress from all parts of existing building to open spaces at all times to the approval of jurisdictional authorities. Identify, provide exit lights, and illuminate temporary means of egress.

.4 Execute work in existing building at times approved by Owner, so not to inconvenience their occupation or in any manner hinder their use of building.

.5 Give Owner minimum 14 working days of notice of intention to commence work in a room or area of existing building.

.6 Execute work as quietly as possible in and around existing building at all times Owner is occupying it. Schedule noisy operations with Owner to achieve least disturbance to ongoing activities and programming.

1.4 Dust Control

.1 Prior to any work being done or removal of ceiling tiles or opening of ceiling access hatches, erect a floor to ceiling dust tight partition which completely encloses the area of work;
  .1 Maintain barriers throughout the work and repair or replace as required or instructed.
  .2 Completely remove barrier when work is finished and remove any marks left by tape or studs.

.2 Post "Construction Zone" signage outside barrier and entrance to all work areas.

.3 Take precautions when working on existing ceilings, ducts and piping systems.

.4 Protect workers with the following minimum requirements:
  .1 Carefully remove acoustical ceiling panels keeping horizontal if possible, and vacuum and clean the panels immediately upon removal.
  .2 Clean air ducts, conduits and space above the ceiling with a HEPA filter equipped vacuum cleaner prior to start of any work.

.5 Throughout the work period, ensure that:
  .1 Plastic barrier flaps or doors to construction area remain closed.
  .2 Place adhesive floor strips or walk-off mats outside the door to the construction area.
  .3 Clean and vacuum construction and surrounding areas frequently with vacuum cleaners Equipped with HEPA filters.
  .4 Remove dust from body and clothing when traversing Owner occupied areas.
  .5 Carts, tools and equipment entering the construction area should remain there until the work is complete. Clean thoroughly prior to removal from the construction area.

1.5 Protection

.1 Protect staff and visitors from any danger arising from his work. Supply, erect, maintain and remove signs, barricades, barriers, etc. as required. Sharp tools and dangerous objects must not be left unattended.

.2 The job site shall remain clean and tidy at all times. Only those materials required each day are to be brought to the job Site.

.3 Remove all garbage and scrap from work site on a daily basis, or more often if required. Owners recycle containers and garbage bins shall not be used.

.4 Fire routes or personnel thoroughfares must not be obstructed. Fire doors must not be wedged open or latches disengaged.

.5 Safety clearances are required before any cutting, welding, core drilling, open flame work or dust work is done. A request in writing to the Owner must be made and approved a minimum of 72 hours before this work is anticipated.

.6 Provide dust tight partitions to prevent dust and dirt migrating from the work area. Remove when no longer required.

1.6 Emergency and Fire Protection

.1 Provide and maintain at all times, ready access to fire lighting equipment

.2 While work is proceeding in existing building, existing fire hoses and fire extinguishers shall be used as required. Recharge fire extinguishers if used and re-rack hoses.

.3 Provide temporary portable fire extinguishers throughout the work and at every work area.

.4 Prior to execution of any work which may possibly start a fire, provide proper and suitable precautions and fire extinguishers. Provide fire-watch during and for minimum 6 hours after all welding operations.

1.7 Hoisting of Materials and Equipment

.1 Movement of materials and equipment that requires hoisting above, or movement through, occupied grounds beyond hoarding lines shall not be performed without prior knowledge and approval from the Owner. Schedule such activity to coincide with Owner’s scheduling so as not to be performed when staff are on parking lots and areas of site within close proximity to areas of 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 Administrative
.2 Fires
.3 Disposal of Wastes
.4 Drainage
.5 Pollution Control
.6 Unanticipated Soil Contamination

1.2 Related Sections

.1 Section 01 41 00 Regulatory Requirements
.2 Section 01 51 00 Temporary Utilities
.3 Section 01 56 00 Temporary Barriers and Enclosures

1.3 References

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

1.4 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 The Work Site is subject to inspection by the Consultant, without prior notice.

.3 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.

.4 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.

.5 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.

.6 All hazardous materials are to be stored with secondary containment

1.5 Fires

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

1.6 Disposal of Wastes

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

1.7 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.

1.8 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 Requirements for quality of work.
.2 Requirements for material inspection and testing.
.3 Requirements for determination of defective materials and work.

1.2 Related Work

.1 Section 01 45 00 Quality Control

1.3 References

.1 CSA A23.1 Concrete Materials and Methods of Concrete Construction.
.2 CSA A23.2 Methods of Test for Concrete.
.3 CSA S304.1-04 (R2010) - Design of Masonry Structures
.4 CSA W47.1 Certification of Companies for Fusion Welding of Steel Structures.
.5 CSA W59 Welded Steel Construction (Metal Arc Welding).
.6 OPSS Ontario Provincial Standard Specifications.

1.4 Regulatory Requirements

.1 Products and services provided to complete the Work shall meet or exceed requirements of specified standards, municipal by-laws, building codes and referenced documents.

1.5 Independent Inspection and Testing

.1 Independent Inspection and Testing Consultants will be engaged on behalf of the Owner, for the purpose of inspecting and/or testing individual portions of the Work. The initial cost of such services will be included in the Contract Price, as allocated under Section 01 21 00, Allowances.

1.6 Responsibilities

.1 Inspection and Testing Consultants
  .1 Inspection and Testing Consultants shall;
    .1 Provide inspection and testing specified,
    .2 Inform the Contractor and Consultant immediately upon observance of materials, systems, or procedures not in compliance with the specifications, and
    .3 Submit complete reports to the Contractor and the Consultant in a timely manner.

.2 Contractor
  .1 Contractor shall:
    .1 Ensure the quality control requirements of the Contract are implemented.
    .2 Provide access to the Work for Inspection/Testing Consultants, and
    .3 Inform the Inspection/Testing Consultants in advance of day and time required for inspection and tests.

.3 Consultant
  .1 The Consultant will make final decisions on changes to the scope of work of inspection and testing that may affect the Contract Price.

.2 When informed of any material procedure or test result that does not meet or exceed the specifications, the Consultant will respond in an expedient manner to resolve the issue.

1.7 Access to Work

.1 Allow inspection & testing company's access to the Work, as well as off-site manufacturing and fabrication plants.

1.8 Work Subject to Inspection and Testing

.1 Refer to individual specification sections for requirements for inspection and testing.

.2 Provide additional inspection and testing beyond that listed in the specifications where directed by the Consultant.

1.9 Reports

.1 Submit inspection and test reports to the Consultant.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

.3 Submit one copy of inspection and test reports to the Building Official having jurisdiction, where required by that official.

.4 The cost of tests beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Consultant and may be authorized as recoverable.

1.10 Mock Ups

.1 Refer to Section 01 45 00 – Quality Control.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Inspection and Testing – General

.1 Furnish test results and mix designs as may be requested.

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

3.2 Inspection and Testing – Procedures

.1 Notify the appropriate agency and Consultant in advance of the requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store, cure and inspect test samples.

3.3 Quality of Work

.1 Quality of the Work shall be first class, executed by workers experienced and skilled in the respective duties for which they are employed. Immediately notify the Consultant if required work is such as to make it impractical to produce required results.

.2 Do not employ any unfit person or anyone unskilled in their required duties. The Consultant reserves the right to require the dismissal from the site, of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

3.4 Defective Materials and Work

.1 Where evidence exists that defective work has occurred, or that work has been carried out incorporating defective products, the Consultant may have independent tests, inspections, or surveys performed in order to determine if work is defective.

.2 Tests, inspections, or surveys carried out under these circumstances will be made at the Contractor's expense in the event of defective work, or at the Owner's expense where work is in conformance. Where tests incorporate a number of samples, payment will be assessed, by the Consultant, based on the ratio of conforming to non-conforming results. This does not include re-testing of soil compaction during placement, where evidence exists of non-conformance with the Contract documents, but rather only if re-testing is called for after completion of compaction.

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 Related Sections

.1 Section 01 70 03 Safety Requirements

1.3 References

.1 Perform Work in accordance with the Ontario Building Code Act, O. Reg. 332/12, the Ontario Building Code (OBC) including all Supplements and other codes of provincial or local regulation 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.

1.4 Owner's Regulations

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

1.5 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.

.3 Where a standard designates authorities such as the "Engineer", the "Owner" (when used in a sense other than that defined in the General Conditions) the "Purchaser" or some other such designation, these designations shall be taken to mean the Consultant.

.4 Wherever the words "acceptable", "approved", "satisfactory", "selected", "directed", “inspected”, “instructed”, “required”, "submit", or similar words or phrases are used in standards or elsewhere in the Contract Documents, it shall be understood that they mean, unless the context provides otherwise, "acceptable to the Consultant", "approved by the Consultant", "satisfactory to the Consultant", "selected by the Consultant", "directed by the Consultant", "inspected by the Consultant", "instructed by the Consultant", "required by the Consultant" and "submit to the Consultant".

1.6 Designated Substances

.1 Refer to the Designated Substance Report issued by the Town of Madawaska Valley.

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

.3 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.

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

1.7 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 Hazardous Materials will not be introduced for experimental or any other use prior to being evaluated for hazards.

.3 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.

.4 Provide SDS for all materials brought to the Place of Work.

.5 Many common construction materials such as asbestos pipe and various insulations are designated substances and shall not be used under any circumstances. Such materials are banned from the Owner’s facilities.

1.8 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.

1.9 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.

1.10 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

1.11 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.

1.12 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 Related Sections

.1 Section 01 21 13 Cash Allowances
.2 Section 01 29 83 Payment Procedures for Testing Laboratory Services

1.3 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.

1.4 Independent Inspection Agencies

.1 Independent Inspection/Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor and paid from the cash allowances specified in Section 01 21 13. Refer to Section 01 29 83.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as

advised by Consultant at no cost to Consultant. Pay costs for retesting and re-inspection.

1.5 Access to Work

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.6 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

1.7 Rejected Work

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

.3 If in opinion of Consultant it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, 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.

1.8 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.

1.9 Contractors Responsibilities

.1 Contractor is 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.

1.10 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Consultant and may be authorized as recoverable.

1.11 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.

1.12 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 Installation and Removal
.2 Dewatering
.3 Water Supply
.4 Temporary Heating and Ventilation
.5 Temporary Power and Light
.6 Temporary Communication Facilities

1.2 Related Sections

.1 Section 01 35 13.53 Special Project Procedures for Occupied Buildings
.2 Section 01 52 00 Construction Facilities.
.3 Section 01 56 00 Temporary Barriers and Enclosures

1.3 Installation and Removal

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

.2 Remove from site all such work after use.

1.4 Dewatering

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

1.5 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.

1.6 Temporary Heating and Ventilation

.1 Refer to Section 01 35 13.53- Special Project Procedures for Occupied Buildings for temporary exhaust of occupied spaces.

.2 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.3 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.

.4 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.

.5 Maintain temperatures of minimum 10° C in areas where construction is in progress.

.6 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.

.7 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.

.8 On completion of Work for which permanent heating system is used, replace filters.

.9 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.

.10 Pay costs for maintaining temporary heat, when using permanent heating system. Owner will pay utility charges when temporary heat source is existing building equipment.

.11 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.

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

1.7 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.

1.8 Temporary Communication Facilities

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Construction aids.
.2 Site storage.
.3 Parking
.4 Offices
.5 Equipment and Material Storage.
.6 Sanitary facilities.
.7 Signage.
.8 Hoarding

1.2 References

.1 Canadian Standards Association (CSA International)
.1 CAN/CSA Z321-96 (R2006), Signs and Symbols for the Workplace

1.3 Installation and Removal

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

.2 Remove from site all such work after use.

1.4 Scaffolding

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

1.5 Hoisting

.1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.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 Make good damage resulting from Contractors' use of roads and parking areas.

1.8 Offices

.1 General Contractor and Subcontractors may utilize the existing ice resurfacing room as designated by the Town for the site office. Alternatively, a construction trailer must be supplied.

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 Owner. Subcontractor and supplier corporate signage is not permitted.

.2 Signs and notices for safety and instruction shall be in English. Graphic symbols shall conform to CAN/CSA Z321-96 (R2006).

.3 Post "Construction Zone" signage outside barrier and entrance to all work areas.

.4 Install signage to direct site traffic and deliveries to the Construction work areas.

.5 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project.

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 Related Sections

.1 Section 01 35 13.53 Special Project Procedures for Occupied Buildings
.2 Section 01 52 00 Construction Facilities.

1.3 Installation and Removal

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

.2 Remove from site all such work after use.

1.4 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.

1.5 Hoarding

.1 Erect temporary enclosures to separate work areas from occupied areas using dust tight hoarding. This will be required on both the ground second floor of the rink areas along with through corridors where the flooring replacement is designated. Provide gates as necessary to maintain access through spaces.

1.6 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.

1.7 Weather Enclosures

.1 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

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. Refer to Section 01 35 13.53 - Special Project Procedures for Occupied Buildings

.2 Provide dust tight screens at all access points between the construction work areas and existing building areas scheduled to remain in operation and wherever directed by Owner or Consultant.

.3 Maintain and relocate protection until such work is complete.

1.9 Access to Site

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

1.10 Public Traffic Flow

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

1.11 Fire Routes

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

1.12 Protection for Off Site and Public Property

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

.2 Be responsible for damage incurred

1.13 Protection of Building Finishes

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

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Consultant locations and installation schedule 3 days prior to installation.

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Product quality, availability, storage, handling, protection, and transportation.
.2 Manufacturer's instructions.
.3 Quality of Work, coordination and fastenings.
.4 Existing Utilities

1.2 Quality

.1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Consultant based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 Availability

.1 Review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Consultant of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Consultant at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Consultant reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling and Protection

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

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

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

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Consultant.

.9 Touch up damaged factory finished surfaces to Consultant's satisfaction. Use touch up materials to match original. Do not paint over name plates.

1.5 Transportation

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

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Contractor shall be responsible for the unloading, handling and storage of such products.

1.6 Manufacturer’s Instructions

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

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

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

1.7 Quality of Work

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed.

.2 Immediately notify Consultant if required Work is such as to make it impractical to produce required results.

.3 Do not employ anyone unskilled in their required duties. Consultant reserves right to require dismissal from site, workers deemed incompetent or careless.

.4 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Consultant, whose decision is final.

1.8 Coordination

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

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

1.9 Concealment

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

.2 Before installation, inform Consultant if there is interference. Install as directed by Consultant.

1.10 Remedial Work

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

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

1.11 Location of Fixtures

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

.2 Inform Consultant of conflicting installation. Install as directed.

1.12 Fastenings

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.13 Fastenings – Equipment

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

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

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

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

1.14 Protection of Work in Progress

.1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by Consultant, at no increase in Contract Price or Contract Time.

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

1.15 Existing Utilities

.1 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.

1.16 Hazardous Materials

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

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 References

.1 Federal regulations, latest edition including all amendments up to project date:
  .1 Fire Commissioners of Canada, FC 301, Standard for Construction Operations.
  .2 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
.2 Provincial regulations, latest edition including all amendments up to project date:
  .1 Ontario Building Code.
  .2 Occupational Health and Safety Act.
.3 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2013 Edition

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 WHIMIS 2015.
    .2 Fall arrest and protection.
    .3 Suspended Access Equipment.
    .4 Erection of Scaffolding.
    .5 License for powder actuated devices.
  .5 Material Safety Data Sheets (MSDS) of controlled products to be used.
  .6 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 The Contractor will be the “Constructor” as defined by the Occupational Health and Safety Act, will file a Notice of Project with the Ontario Ministry of Labour prior to commencement of the work and will pay all associated fees.

.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 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.

.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, and 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 personal protective equipment (PPE) 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 or injury to any person on the site, adjacent work areas and adjacent property.

.9 Provide safeguard and protection against damage to adjacent structures, properties and services.

1.7 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(s) is required on a project, workers and supervisors, selected, as members of the committee must attend.

1.8 Workplace Hazardous Materials Information System (WHMIS)

.1 Contractor to be familiar with WHIMIS regulations and be responsible for compliance.

.2 Contractor is responsible for all other requirements of regulations as applicable to Employers.

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

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

1.9 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 and NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, 2013 Edition.

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

1.10 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.

.2 For the purpose of this contract immediately investigate and provide a report to the Consultant on incidents and accidents that involve:
- .1 A resulting injury that may or may not require medical aid but involves lost time at work by the injured person(s).
- .2 Exposure to toxic chemicals or substances.
- .3 Property damage.
- .4 Interruption to adjacent and/or integral infrastructure operations with potential loss implications.

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

1.2 Qualifications of Surveyor

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

1.3 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.

1.4 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 Establish foundation and floor elevations.

.4 Survey rink slab elevations including sand base, top of insulation and top of rink slab as specified.

1.5 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 Cap or otherwise seal service lines at cut off points as directed by Consultant.

.3 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.

.4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.5 Install temporary drain plugs to prevent construction debris from blocking pipes downstream of the work.

1.6 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.

1.7 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.

1.8 Subsurface Conditions

.1 Promptly notify Consultant in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.

.2 After prompt investigation, should Consultant determine that conditions do differ materially, instructions will be issued for changes in work.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Submittals

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

.2 Submit written request and obtain Consultant's approval in advance of cutting or alteration which affects:
.1 Structural integrity of any element of Project.
.2 Integrity of weather exposed or moisture resistant elements.
.3 Efficiency, maintenance, or safety of any operational element.
.4 Visual qualities of sight exposed elements

1.3 Materials

.1 Required for original installation.

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

.3 Requests for change in materials shall include documentation indicating conformance to project requirements and intent.

1.4 Definitions

.1 Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

.2 Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.5 Preparation

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

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

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

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

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

1.6 Execution

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

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

.5 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.

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

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

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

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

.10 Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 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.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

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 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.

.1 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.

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

.3 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.

.4 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.

.5 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.

.6 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.

.3 Floors: Where floor finishes that are removed extend one finished area into another, patch and repair floor and wall base surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and replace with new materials, if necessary, to achieve uniform color and appearance.

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

End of Section

PART 1 GENERAL

1.1 Section Includes

.1 Progressive Cleaning
.2 Final Cleaning

1.2 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Owner. Do not burn waste materials on site.

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

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

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

.6 Provide and use clearly marked separate bins for recycling.

.7 Remove debris daily. The work site must be left clean and tidy upon completion, to the satisfaction of the Consultant.

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

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

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

.11 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 as 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 Remove stains, spots, marks and dirt from walls, floors and ceilings.

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

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

.7 Inspect finishes, fitments and equipment and ensure specified workmanship.

.8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.9 Remove dirt and other disfiguration from exterior surfaces.

.10 Clean and sweep roofs. Clear all drains.

.11 Sweep and wash clean paved areas affected by work.

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

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

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 Related Sections

.1 Section 01 33 00 Submittal Procedures
.2 Section 01 35 43 Environmental Procedures
.3 Section 01 74 11 Cleaning

1.3 References

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

1.4 Submittals

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

.2 Submit 2 copies of completed Waste Management Plan (WMP) including Waste Reduction Workplan (WRW) and Materials Source Separation Program description prior to project start-up.

1.5 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.

1.6 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 inevitable 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. On new construction projects this means careful recycling of job site waste.

1.7 Documents

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

1.8 Waste Management Plan

.1 Waste Management Plan: Subsequent to the tender opening upon request, provide to the City for evaluation a Waste Management Plan that can include but is not limited to:
.1 Procedures for educating workers and sub-contractors in order to ensure adherence to the Waste Management Plan;
.2 Methods for reducing waste such as ordering material only as required, using up excess material on site where possible, or prefabricating sections off site;
.3 Methods and techniques for collecting, separating, and recycling waste materials and packaging, including a list of materials to be recycled and percentage expected to be recycled or sent to landfills;
.4 Provisions for dealing with hazardous waste, including procedures for handling, clean-up and disposal;
.5 A list of carriers and disposal destinations for each material to be disposed of or recycled. The list should be provided initially or at least before the final payment is made. This will ensure that all materials are being recycled and waste is legally disposed of;
.6 Alternative options for recovering higher percentages of materials and related costs; and
.7 The cost associated with the recovery of the material and the anticipated revenues from the sale of such material.

.2 Post WMP or summary where workers at site are able to review its content.

1.9 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

1.10 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.

1.11 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.

1.12 Disposal of Wastes

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

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

.3 Provide and use clearly marked separate bins for recycling.

.4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.

.5 Remove waste material and debris from site 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.

1.13 Scheduling

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

1.14 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 Related Work

.1 Section 01 78 00 Closeout Submittals

1.3 References

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

1.4 Inspection and Declaration

.1 Contractor's Inspection: The Contractor and all Sub-contractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Owner and Consultant.
  .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  .2 Request Consultant's review.

.2 Consultant's Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
  .1 Work has been completed and inspected for compliance with Contract Documents.
  .2 Defects have been corrected and deficiencies have been completed.
  .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, TSSA and other regulatory agencies have been submitted.
  .5 Operation of systems have been demonstrated to Owner's personnel.
  .6 Work is complete and ready for Final Review by the Consultant.

.4 Final Inspection: when items noted above are completed, request final review of Work by Consultant, and Contractor. If Work is deemed incomplete by the Consultant, complete outstanding items and request re-review.

.5 Declaration of Substantial Performance: when Consultant consider deficiencies and defects have been corrected and it appears requirements of Contract have been substantially performed, make application for certificate of Substantial Performance. Refer to CCDC 2, General Conditions Article GC 5.4 - Substantial Performance of Work and the Construction Lien Act for specifics to application.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance shall be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment: When Consultant considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. Refer to CCDC 2, General Conditions Article GC 5.7 for specifics to application.

.8 Payment of Holdback: After issuance of certificate of Substantial Performance of Work, submit an application for payment of holdback amount in accordance with CCDC 2, General Conditions Article 5.5

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

.

PART 1 GENERAL

1.1 Section Includes

.1 As built, samples, and specifications.
.2 Equipment and systems.
.3 Product data, materials and finishes, and related information.
.4 Operation and maintenance data.
.5 Spare parts, special tools and maintenance materials.
.6 Warranties and bonds.
.7 Final 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.

.8 Pay costs of transportation.

1.4 Format

.1 Organize data in the form as instructional manual.

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

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

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

.5 Arrange content by Section numbers and sequence of Table of Contents.

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

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

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

.9 Provide 1:1 scaled CAD files in .dwg format on CD.

1.5 Contents Each Volume

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

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

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

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

1.6 Occupant Manual

.1 Submit Occupant Manual to Consultant’s requirements.

.2 Occupant Manual to include:
  .1 General building information.
  .2 Building management.
  .3 Building operations.
  .4 Safety.
  .5 Security.
  .6 Environmental considerations.

.7 Communications.
.8 Contact List.
.9 Other/Miscellaneous.

1.7 As Builts and Samples

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

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

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

.5 Keep record documents and samples available for inspection by Consultant.

1.8 Recording Actual Site Conditions

.1 Record information on set of drawings, provided by Consultant.

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

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

.4 Submit following drawings:
.1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic “as-built” records on disk using latest version of AutoCad. Annotate “AS-BUILT RECORD” in each drawing title block.
.2 All changes shall be shown on a separate drawing layer named "as-built".

.3 At least 2 weeks prior to commencement of scheduled commissioning activities, submit one copy of the DRAFT "As-built" Project Record Documents for Consultants review and use during the commissioning activities. After the completion of the commissioning activities, the Consultant will return to the Contractor the DRAFT copy, with review comments, for revision. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after Substantial Performance, submit 2 copies of the FINAL "As-built" Project Record Documents and disk of "as-built" record drawings.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections

1.9 Final Survey

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

1.10 Equipment and Systems

.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with Engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.
.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control

.15 Additional requirements: as specified in individual specification sections.

1.11 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-Protection and Weather-Exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.12 Spare Parts

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Spare parts as identified in individual sections are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.13 Maintenance Materials

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Maintenance materials are to be delivered to the Owner prior to the Contractor's application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in

Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.14 Special Tools

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

.2 Provide items with tags identifying their associated function and equipment.

.3 Special tools are to be delivered to the Owner prior to the application for Substantial Performance.

.4 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.

1.15 Storage, Handling and Protection

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

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

.5 Remove and replace damaged products at own expense and to satisfaction of Consultant.

1.16 Warranties and Guarantees

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

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

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

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

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

.6 Co-execute submittals when required.

.7 Retain warranties and guarantees until time specified for submittal.

1.17 Independent Specialty Engineers Sign-Off

.1 Prior to Substantial Performance, provide copies of signed and stamped engineers review and sign-off letters stating that the work has been built in accordance with their drawings and designs. Conditional or vague letters of sign-off will not be accepted. All specialty design engineers for all sub-contractors and suppliers will be required to review the work in progress at appropriate

intervals to ensure compliance with their designs and drawings and shall provide final sign-off letters. Provide copies of all field reports issued by specialty engineers. Carry all costs associated with full compliance with this requirement.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Description

.1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two (2) weeks prior to date of Substantial Performance.

.2 Owner will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times.

1.3 Quality Control

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

1.4 Submittals

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Owner's approval.

.3 Submit reports within one (1) after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

1.5 Conditions for Demonstrations

.1 Equipment has been inspected and put into operation.

.2 Testing, adjusting, and balancing have been performed and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions

1.6 Preparation

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

.2 Verify that designated personnel are present

1.7 Demonstrations and Instructions

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times.

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 01 35 43 Environmental Procedures
.2 Section 01 56 00 Temporary Barriers and Enclosures
.3 Section 01 74 11 Cleaning
.4 Section 01 74 19 Construction Waste Management and Disposal
.5 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 F710-11 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
.3 Ontario Regulation 102/94, Waste Audits and Waste Reduction Work Plans.
.4 Ontario Regulation 103/94, Environmental Protection Act.
.5 Ontario Regulation 213/07 -The Fire Code.
.6 Ontario Regulation 232/98 - Landfilling Sites.
.7 Ontario Regulation 278/05 -Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
.8 Ontario Regulation 347- Environmental Protection Act, General — Waste Management.
.9 Ontario Regulation 332/12 - The Building Code.
.10 The Workplace Health and Safety Act, and Regulations for Construction Projects.
.11 The Contractors Health and Safety Policy.
.12 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 to Consultant and Owner 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.

.4 Submit a construction waste management plan including demolition and removal procedures under provisions of Section 01 74 19.

.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.
.3 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.

.8 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 Site 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 Refer to the Designated Substance Report issued by the Town of Grand Valley.
.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 be completed in accordance with O. Reg 278/05 and all other applicable legislation.

PART 2 PRODUCTS

2.1 Materials

.1 Conform to requirements of Division 1, in particular, articles on Design and Safety Requirements for Temporary Work. 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 which include the existing vertical lift gate and all accessory hardware. The lift gate shall be turned over to the owner after removal.

.2 Existing dasherboards shall be salvaged and turned over to the owner for re-use.

.3 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.

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

.5 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.

.6 Salvage materials and hand over to Owner, as indicated on the drawings and as noted below
.1 Existing vertical power lift gate.
.2 All existing dasherboards including glass.

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

.5 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 effects of soils, water, lateral pressures on retaining or foundations walls
  - .3 presence of tanks, wells, other piping systems
  - .4 presence of designated substances and hazardous materials.

.6 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 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 Communication cables
- .3 Fibre optic cables
- .4 Water lines.
- .5 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

3.3 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 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 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.

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

.8 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.

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

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

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

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

.13 At all times protect the structure from overloading.

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

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

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

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

3.4 Preparation

.1 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.

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

.3 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.

3.5 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).
  .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 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 Prevent movement, settlement or damage of adjacent structures, services, adjacent grades, and existing building to remain. Make good damage caused by demolition.

.5 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 Sawcut, 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 and salvage for reinstallation - existing safety netting above dasherboards is to remain.
.6 Complete sawcutting, removal and disposal of refrigerated rink slab and apron slabs and rink refrigeration piping in accordance with regulatory requirements.
.7 Remove all disconnected, abandoned utilities.
.8 Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

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 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.

.5 Where existing flooring is to be removed from floor slabs to remain, including vinyl composite and rubber flooring, carefully remove flooring, 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, TTMAC standards and ASTM F710-11.

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

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 20 00 Concrete Reinforcing
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D1751-04(2013)e1 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
  .2 ASTM D1752-04a(2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
.2 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 Canadian Standards Association (CSA)
  .1 CSA A23.1-14/A23.2-14 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
  .2 CAN/CSA S269.3-M92 (R2013) Concrete Formwork.
  .3 CSA O86-14 Engineering Design in Wood

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 requirements of 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-A23.1-09 and maintain on site

.2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CAN/CSA S269.3-M92 (R2008) and CAN/CSA O86.1-94, Engineering Design in Wood (Limit States Design) as applicable.

1.7 Shipping, Handling and Storage

.1 Refer to Section 01 16 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 11 – Cleaning.

PART 2 PRODUCTS

2.1 Materials

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

.2 Plywood: Douglas Fir, conforming to CSA O121-08. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 11/16” thickness.

.3 Lumber: Conforming to CSA O141-05 (R2009), with grade stamp clearly visible.

.4 Chamfers: Cut from ¾” x ¾” wood, smooth with no open defects.

.5 Form Ties: snap ties, with spreader washer and 1” break back.

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

.7 Nails, Spikes and Staples: Galvanized, conforming to CSA B111-1974 (R2003).

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

.9 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 Bed mud sills on sand, gravel or crushed stone placed on unfrozen, dry, solid and stable subgrade.

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

.8 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 6'-0" of their supports.
.2 Obtain Consultant's written approval before forming openings or sleeves larger than 8" 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.

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 which are 6" or more thick.
.3 Provide vertical construction joints in walls at not more than 60'-0" centre to centre.

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 31 23 10 Excavating, Trenching and Backfilling

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 A1064/A1064M-15 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  .3 ASTM A775/A775M-07b(2014) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
.2 American Concrete Institute (ACI)
  .1 ACI SP-66 (04) ACI Detailing Manual.
.3 Canadian Standards Association (CSA)
  .1 CSA A23.1-14/A23.2-14 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
  .2 CSA A23.3-14, Design of Concrete Structures.
  .3 CSA G30.18-09, 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, the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice and 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 concrete and wall reinforcement.
  .6 Show concrete cover to reinforcement.
  .7 Show location of construction joints.

.8 Prior to submission to Consultant, review all shop 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 shop drawing with the requirements of Work and Contract Documents.
.9 Contractor's review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.
.10 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.
.11 Consultant will review and return shop 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 shop drawings or of responsibility for meeting requirements of Contract Documents.
.12 Make any changes in shop 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.
.13 Do not commence fabrication of reinforcement before drawings have been reviewed and Consultant's comments incorporated on drawings issued to fabricating shop.
.14 In addition to the requirements of Section 01 33 00, submit one copy of reviewed shop drawings to the Inspection and Testing Company.

.3 Inspection Reports: Inspection and Testing Company shall submit and distribute inspection reports as follows:
.1 2 copies to Consultant.
.2 1 copy to 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:
.1 Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA Standard W186.

.3 Source Quality Control:
.1 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.

.7 Payment for specified Work performed by Inspection and Testing Company will be made from a Cash Allowance specified in the Instructions to Bidders.

1.6 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

.1 Refer to Section 01 74 10 – Cleaning.

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.

.2 Plain round bars: to CSA G40.20-04/G40.21-04 (R2009).

.3 Welded Wire Fabric: to ASTM A1064/A1064M-15 and in flat sheets, not rolls.

.4 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M-15.

.5 Chairs, Bolsters, Bar Supports and Spacers: to CSA A23.1-09.

.6 Mechanical splices: subject to approval of Consultant.

2.2 Fabrication

.1 Fabricate reinforcing steel only in permanent fabricating shop unless otherwise approved by Consultant.

.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 30" apart.
.3 Stagger alternate end bearing splices 30"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 effects 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 and welded wire fabric 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 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 and Cleaning

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

.2 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.

.3 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 10 – 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 30 00 Cast-in-Place Concrete
.4 Section 07 21 13 Building Insulation
.5 Section 07 26 00 Vapour Retarders
.6 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C150/C150M-15 Standard Specification for Portland Cement
  .2 ASTM C260/C260M-10a Standard Specification for Air Entraining Admixtures for Concrete
  .3 ASTM C309-11 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
  .4 ASTM C330/C330M-14 Standard Specification for Lightweight Aggregates for Structural Concrete
  .5 ASTM C494/C494M-15a Standard Specification for Chemical Admixtures for Concrete
  .6 ASTM C881/C881M-14 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  .7 ASTM C1017/C1017M-13e1 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
  .8 ASTM C1107/C1107M-14a Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
  .9 ASTM D412-06a(2013) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
  .10 ASTM D624-00(2012) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  .11 ASTM D1751-04(2013)e1 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
  .12 ASTM D1752-04a(2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
  .13 ASTM D2240-05(2010) Standard Test Method for Rubber Property - Durometer Hardness
  .14 ASTM E1486-14 Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria
.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 Canadian Standards Association (CSA International)
  .1 CSA A3000-13 Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014)
  .2 CSA A23.1-14 -14 Concrete Materials and Methods of Concrete Construction
  .3 CSA A23.2-14 Test Methods and Standard Practices for Concrete.
  .4 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.
.4 Ontario Provincial Standard Specifications (OPSS)

.1 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; when optimum bulk density of aggregates is specified, provide supporting evidence of compliance with requirements.
.2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.

.4 Inspection Reports:
.1 Inspection and Testing Company shall prepare and distribute written reports of inspections and tests as follows:
.1 2 copies to Consultant;
.2 1 copy to Contractor.
.2 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.

.5 Joint Location Drawings: Submit drawings showing proposed locations of control joints in slab-on-grade, where not shown on Drawings.

1.5 Quality Assurance

.1 Concrete supplier to have a valid “Certificate of Ready Mixed Concrete Production Facilities” as issued by the Ready Mixed Concrete Association of Ontario.

.2 Source Quality Control:
.1 Both source quality control, and field quality control specified in Article 1.04 B., 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 A283-06 (R2011), 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 A23.2-14 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.

.3 Field Quality Control:
.1 Inspection and Testing Company, when appointed as specified for Source Quality Control in Article 1.04 A, shall perform sampling, inspection and testing of concrete work at site.
.2 Perform sampling, inspection and testing in accordance with CSA A23.2-14, and to include:
.1 Making of standard slump tests.
.2 Obtaining of three standard specimens for strength tests from each 100 m³ 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.
.3 Inspection for Tolerances:
.1 Confirm that concrete work meets specified tolerance requirements.
.2 Use the elevation survey records of elevations of soffit form surfaces and 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.

.4 Single source floor assembly: The following work shall be carried out by a single competent source, to be responsible to provide the complete concrete floor assembly as specified herein including the supply and installation of concrete materials and all workmanship. The following specialty work shall be performed using the single source approach:
.1
.2 Bonded concrete toppings/sealers.

.5 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years of experience finishing Class “B’, “C” and “D” floors.

.6 Sample of Finish Flooring:
.1 Finish an area of floor slab where directed by Consultant to provide sample of finish and colour 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 and CAN/CSA A23.1-14, Article 22, Table 19.

.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 unlevelled 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 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 time and date of each pour
.2 high and low ambient air temperatures during each pour
.3 date of removal of forms in each area
.4 founding elevations of all footings
.5 variations of foundation Work from that indicated on Drawings
.2 Make record drawings available for Consultant's inspection at all times.

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 Standard A23.1-14, 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 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 when it is raining. 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 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.10 Waste Management and Disposal

.1 Refer to Section 01 74 10 – Cleaning.

PART 2 PRODUCTS

2.1 Materials

.1 To meet specified requirements of referenced Standards.

.2 Cement:
- .1 Portland Cement: to ASTM C150/C150M-15
- .2 Cementitious Hydraulic Slag: to ACI 232.1R-12

.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 5" and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 11 Group II of CSA Standard A23.1-14, 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, as conducted by Ministry of Transport of Ontario.
- .4 For toppings 2" thick and less: 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 Liquid Surface Densifier: The liquid surface densifier shall be the Ashford Formula or approved equivalent.

.7 Sealant:
- .1 Hot-Poured Asphalt:
  - .1 For use with bituminous type joint filler: rubberized asphalt compound to OPSS 1212:
    - .1 Hi-Spec Hot Poured Joint Sealant, by W.R. Meadows of Canada Ltd.
    - .2 Sealz No. 6165 Hot Poured Joint Sealant, by Hydrotech Membrane Corporation.
- .2 Cold Poured Liquid Neoprene: For use with non-bituminous joint filler:
  - .1 Gardox, by W.R. Meadows of Canada Limited.

.3 Elastomeric Sealant:
.1 For use with non-bituminous type joint filler.
.1 Two component polysulphides, or two component polyepoxide urethane, in colour selected by Consultant, to CGSB Specification CAN/CGSB-19.24.
.1 For horizontal joints: THC 900, by Tremco Ltd. or Eucolastic Pourable by Euclid Chemical Canada Inc.

2.2 Concrete Mixes

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

.2 Design concrete mix in conformance with CSA Standard A23.1-14, Clause 4.1.2, Table 5 (Alternative 1) and Clause 4.1.1, Tables 1, 2 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.

.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/m³ adjusted proportionally for maximum air content listed in CSA A23.1-14 , Clause 4.1.1, Table 13.

2.3 Admixtures

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

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

2.4 Premixed Grout

.1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107/C1107M-11, Compressive strength at 28 days: 48 MPa.

.2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107/C1107M-1. Compressive strength at 28 days: 59 MPa.

.3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107/C1107M-11. 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 A23.1-14, Clauses 7.7.1 and 7.7.2 and as additionally specified herein.

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

3.3 Placement of Concrete

.1 Place concrete in accordance with requirements CAN/CSA-A23.1-14.

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

.8 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

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

.10 Obtain Geotechnical Consultant’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 Standard A23.1-14, Clause 7.5, and as specified herein.

.2 Refer to the drawings for floor finishes.

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

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

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

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

3.5 Curing and Sealing

.1 Cure concrete in accordance with CSA Standard A23.1-14, Clause 7.4 and as specified herein.

.2 Curing Compound Method:
- .1 Use curing and sealing compound specified in paragraph 2.1.8 except:
  - .1 On surfaces to which architectural finishes will be adhered, the adhesives for which are incompatible with the curing compound.
- .2 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.
- .3 Apply curing and sealing compound in accordance with manufacturer's instructions, increasing application rate as necessary to cover surface completely.

.3 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 architectural finishes to be applied later. Apply the compound in strict accordance with the manufacturer's instructions.

3.6 Joint Sealant

.1 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. Sealant shall be light grey colour.

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

.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.

.5 Make good any variations beyond specified tolerances of elevation and finish to the approval of the Consultant. High spots are to be ground level and low spots cannot be filled.

3.7 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.

3.8 Cleaning

.1 Proceed in accordance with Section 01 74 10 – Cleaning.

.2 Leave the premises in a condition acceptable to the Consultant before completion of the work.

.3 Thoroughly clean the slab prior to ice making by the Owner.

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

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C779 / C779M - 12 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
  .2 ASTM C805/C805M-13a Standard Test Method for Rebound Number of Hardened Concrete
  .3 ASTM C1028 - 06 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
  .4 ASTM D3359 – 17 Standard Test Methods for Measuring Adhesion by Tape Test.
.2 CSA Group (CSA)
  .1 CSA A23.1-14/CSA A23.2-14 Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete.

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.

.3 Certificates: Manufacturer’s certification that the installer is acceptable.

.4 Submit WHMIS SDS - Material Safety Data Sheets.

.5 Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.5 Quality Assurance

.1 Installer Qualifications: Acceptable to the manufacturer.

1.6 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.

1.7 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.

1.8 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

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

1.9 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.

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

PART 2 PRODUCTS

2.1 Liquid Densifier/Sealer

.1 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.

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

.3 Manufacturer: Curecrete Distribution, Inc. 1203 Spring Creek Place, Springville, UT 84663-0551; Telephone: (800) 998-5664, (801) 489-5663; Fax: (801) 489-3307; Email: info@ashfordformula.com; Website: www.ashfordformula.com

.4 Basis of Design Product: Ashford Formula by Curecrete Distribution Inc.
.1 Acceptable Alternates subject to approval of the Consultant:

.1 Liqui- Hard by W.R. Meadows
.2 Sikafloor 3S by Sika Canada.
.3 Euco Diamond Hard by The Euclid Chemical Co

.5 Cure-Seal-Hardener: water-based, chemically reactive penetrating sealer and hardener that densifies concrete to seal against water molecules, but allows air and water vapor to pass, so that concrete can achieve full compressive strength for minimized surface crazing and elimination of dusting.
.1 Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
.2 Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.
.3 Hardening: As follows when tested in accordance with ASTM C39:
.1 After 7 Days: An increase of at least 40% over untreated samples.
.2 After 28 Days: An increase of at least 38% over untreated samples.
.4 Coefficient of Friction: 0.86 dry, 0.69 wet when tested in accordance with ASTM C1028.
.5 Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
.6 Light Exposure Degradation: No evidence of adverse effects on treated samples when tested in accordance with ASTM G23.
.7 Test Method for Measuring Wet SCOF of Common Hard-Surface Floors in accordance with ANSI B101.1.
.8 Test Method for Measuring Wet DCOF of Common Hard-Surface Floors in accordance with ANSI B101.3.
.9 Certified as High Traction by the National Floor Safety Institute (NFSI), Phase 2 testing.
.10 Certified Compliant according to California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

.1 Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 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.

3.3 Preparation

.1 Clean surfaces thoroughly prior to installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

.3 Do not use frozen material. Thaw and agitate prior to use.

.4 If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

3.4 Application

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

.2 New Concrete: Apply cure-seal hardener to new concrete as soon as the concrete is firm enough to work on after troweling; with colored concrete, wait a minimum of 30 days before application.
.1 Spray on at rate of 5 m2/L.
.2 Keep surface wet with cure-seal-hardener for a minimum soak-in period of 30 minutes without allowing it to dry or become slippery. If slipperiness occurs before the 30 minute time period has elapsed, apply additional cure-seal-hardener, as needed, to keep the entire surface in a non-slippery state for the first 15 minutes; for the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state. In hot weather conditions, follow manufacturer's special application procedures.
.3 When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
.4 Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-seal-hardener residue.
.5 Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
.6 Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.

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

3.5 Protection

.1 Do not allow traffic on floors for 3 hours after application.

.2 Do not allow parking of vehicles on concrete slab.

.3 Do not allow pipe cutting using pipe cutting machinery on concrete slab.

.4 Do not allow temporary placement and storage of steel members on concrete slabs.

.5 Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.

3.6 Cleaning

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

.2 Clean sealant from adjacent surfaces.

3.7 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 20 00 Concrete Reinforcing
.3 Section 03 30 00 Cast-in-Place Concrete
.4 Section 04 05 19 Masonry Anchorage and Reinforcing
.5 Section 04 22 00 Concrete Unit Masonry
.6 Section 05 12 23 Structural Steel
.7 Section 05 50 00 Metal Fabrications
.8 Section 06 10 00 Rough Carpentry
.9 Section 07 21 13 Building Insulation
.10 Section 07 84 00 Firestopping
.11 Section 07 92 00 Joint Sealants
.12 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A1064/A1064M-22 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
  .2 ASTM C881/C881M-20a Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  .3 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
  .4 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness
  .5 ASTM F3125/F3125M-22 Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
.2 Canadian General Standards Board
  .1 CAN/CGSB-1.40 Primer, Structural Steel, Oil Alkyd Type.
  .2 CAN/CGSB-1.181 Ready Mixed Organic Zinc-Rich Coating.
  .3 CAN/CGSB-51.20 Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.3 CSA Group (CSA)
  .1 CSA-A23.1:19/CSA-A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
  .2 CSA A23.3:19 Design of Concrete Structures for Buildings.
  .3 CSA A23.4-16 (R2021)Precast Concrete - Materials and Construction.
  .4 CSA-A251-00 (R2005) Qualification Code for Manufacturers of Architectural and Structural Precast Concrete.
  .5 CAN/CSA-G30.18 -09 (R2004) Billet-Steel Bars for Concrete Reinforcement.
  .6 CSA G40.20-13 General Requirements for Rolled or Welded Structural Quality Steel/
  .7 CSA G40.21-13 Structural Quality Steel,
  .8 CAN/CSA-G164 –M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
  .9 CSA G279-1975 Steel for Prestressed Concrete Tendons.
  .10 CSA W47.1-09 (R2014) Certification of Companies for Fusion Welding for Steel Structures.

.11 CSA W48.1-M1991 (R1998) Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
.12 CSA W59 -13 Welded Steel Construction (Metal Arc Welding).
.13 CSA W186-M1990 (R2016) Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.4 Submittals

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

.2 Submit concrete mix designs for concrete.

.3 Submit shop and erection drawings in accordance with CAN3-A23.3 and CAN 3-A23.4-M.
.1 Include the following items on shop drawings:
.1 Design calculations for items designed by manufacturer.
.2 Details of prestressed and non-prestressed members, reinforcement and their connections.
.3 Camber.
.4 Finishing schedules.
.5 Methods of handling and erection.
.6 Openings, sleeves, inserts and related reinforcement.
.2 Each drawing submitted shall bear stamp and signature of qualified professional engineer registered or licensed in the Province of Ontario.

.4 Submit for Consultant's review, three copies of design calculations for reinforcing, hoisting and connection and anchorage devices.

.5 Clearly indicate product locations, fabrication details, unit identification marks, reinforcement, connection details, dimensions, erection support points, anchors and relationship to adjacent materials in sufficient detail to cover manufacture, handling and erection.

.6 Do not proceed with fabrication until shop drawings and design calculations have been reviewed by Consultant.

.7 Submit to the Consultant and to the Ontario Ministry of Labour, sequential erection drawings indicating necessary falsework, construction bracing details and methods for hoisting of precast slabs. Drawings will be prepared by and shall bear the stamp of a Professional Engineer licensed to practice in Ontario.

1.5 Design Requirements

.1 Design of precast concrete members and connections shall conform to CSA A23.3, CSA A23.4 and Precast Concrete Institute Design Handbook and shall be completed under the direct supervision of a registered Professional Engineer, licensed to practice in Ontario, fully experienced in design of precast concrete structural units.

.2 Design precast elements to carry handling stresses.

.3 Design precast elements to carry loads indicated, in accordance with the National Building Code and all other applicable references.

.4 Design all members and connections to safely support their own weight and all forces and loads to which they may be subjected.

.5 Design connections to provide for building movement. Provide adjustable connections to accommodate misalignment of structure.

.6 Design roof deck deck for a maximum deflection of 1/360th of the span under superimposed load.

1.6 Source Quality Control

.1 Upon request, provide Consultant with certified copies of quality control tests and inspection related to project as specified in CSA A23.4 and CSA G279.

.2 Inspection of prestressed concrete tendons is required in accordance with CSA G279.

.3 Upon request, provide Consultant with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis

1.7 Quality Assurance

.1 Fabricate and install precast concrete deck in accordance with requirements of CSA A23.4.

.2 Maximum allowable manufacturing and erection tolerances, including final camber of slabs, are not to exceed those given in CSA A23.4.

.3 Do welding in accordance with CSA W59 for welding to steel structures and CSA W186 for welding reinforcement.

1.8 Qualifications

.1 Precast concrete elements to be fabricated and erected by a manufacturing plant certified by Canadian Standards Association on appropriate categories according to CSA A251.

.2 Precast concrete manufacturer to be certified in accordance with CSA certification procedures for precast concrete plants prior to submitting tender.

.3 The precast concrete manufacturer shall be a member in good standing with the Canadian Precast/Prestressed Concrete Institute (CPCI) and have a proven record and satisfactory experience in the design; manufacture and erection of precast concrete facing units of the type specified. The company shall have adequate financing, equipment, plant and skilled personnel to detail, fabricate and erect the work of this Section as required by the Specification and Drawings. The size of the plant shall be adequate to maintain the required delivery schedule.

.4 Welding companies shall be certified to CSA-W47.1.

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 Handle all precast members in a position consistent with their shape and design. Do all lifting and supporting only from support points indicated on shop and erection drawings.

.4 Embedded lifting or handling devices are to be capable of supporting members in all positions anticipated during manufacture, storage, transportation and erection. Maintain capacity of lifting devices sufficient to resist forces of minimum 2.5 times weight of member.

.5 Deliver members to site completely finished. Clearly mark members as indicated on shop drawings, with date of production and final position on structure.

.6 Block and laterally brace members during transport and while stored on site. Provide lateral bracing sufficient to prevent bowing and warping. Blocking and bracing to be clean, non-staining and not prevent uniform curing of exposed surfaces.

.7 Provide edges of members with adequate protection to prevent staining, chipping or spalling of concrete.

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 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 Defects include but are not limited to, spalling, corrosion of embedded steel, and cracking, except for normal hairline shrinkage cracks.

PART 2 PRODUCTS

2.1 Concrete Materials

.1 Cement, aggregates, water, admixtures: to CSA A23.1 and CSA A23.4.

.2 Grout: One part type 10 Portland cement, 2½ parts sand, sufficient water for placement and hydration.

.3 Chemical Admixtures: to CSA A266.2.

.4 Air Entrainment Admixtures: to CSA A266.1

2.2 Reinforcement

.1 Reinforcing steel shall be new deformed bars conforming to CSA G30.18.

.2 Welded Steel Wire Fabric: Deformed type to ASTM A1064, galvanized finish.

.3 Prestressing steel tendons and bars: to CSA S6 and CSA G279, uncoated 7 wire cable

2.3 Hardware

.1 Hardware and Miscellaneous Materials: to CAN/CSA A23.1.

.2 Connections, Supporting Devices and Embedded Steel: to CSA G40.21, Type 300W all galvanized to CSA-G164, 610 g/m2 minimum zinc coating after fabrication.

.3 Bolts, Nuts and Washers: Conforming to ASTM F3215.

.4 Anchors, Inserts and Couplings: Patented, load-tested galvanized steel, to CSA A23.1.

.5 Welding Materials: to CSA W48.1

.6 Welding Electrodes: to CSA W48.1 and certified by Canadian Welding Bureau.

2.4 Prime Paint

.1 Steel Primer: to CAN/CGSB-1.40.

.2 Zinc Rich Primer: to CAN/CGSB-1.181.

2.5 Bearing Pads

.1 3.0 mm masonite, smooth one side.

2.6 Concrete Mixes

.1 Use concrete mix designed to produce 41 MPa (6000 psi) compressive strength at 28 days with a maximum water/cement ratio to CSA A23.1, Table 7 for Class D exposure.

.2 Air entrainment of concrete mix: to CSA A266.4.

.3 Admixtures: to CSA A266.4, CSA A266.5.

.4 Do not use calcium chloride or products containing calcium chloride.

PART 3 EXECUTION

3.1 Fabrication

.1 Maintain plant records and quality control program during the production of precast structural concrete, as required by CSA-A251, Appendix D. Make records available to Consultant upon request.

.2 Use forms and beds which are rigid, adequate to withstand pre-stressing forces and constructed of materials that will result in finished products conforming to requirements stated herein and on drawings.

.3 Establish concrete mix design by tests on trial batches to achieve required strengths. Maintain water content as constant as possible during manufacture.

.4 Place and compact cement in accordance with the requirements of CSA A23.1.

.5 Moist cure precast units in accordance with CSA A23.1.

.6 Provide concrete protection of reinforcement in accordance with CSA A23.4.

.7 Fabricate all required connecting devices, plates, angles, inserts, bolts and accessories.

.8 Perform shop welding of connecting and supporting devices in accordance with requirements of CSA W59.

.9 Ensure anchors, inserts, plates, angles and other cast-in items are accurately located. Maintain in position while concrete is placed and consolidated.

.10 Shop prime anchors and inserts after fabrication and touch-up primers on anchors after welding. Do not apply primer to embedded portion of anchor or inserts.

3.2 Finish

.1 Finish deck slabs to conform to requirements of CSA A23.4.

.2 The underside of precast units shall be finished as per CSA A23.4 Standard Finish.

3.3 Erection

.1 Provide temporary bracing for all stresses and induced loads during erection. Maintain temporary bracing in place until final support is provided.

.2 Provide all hoisting equipment and operate in accordance with all applicable safety regulations.

.3 Discontinue work and advise Consultant when members require adjustment beyond design criteria. Perform required modifications at no cost to Owner.

.4 Erect members without damage to shape or finish. Replace or repair damaged members to approval of Consultant, at no cost to the Owner.

.5 Erect all units level, plumb, square and true within allowable tolerances.

.6 Perform welding of connecting and supporting devices in accordance with requirements of CSA W59.

.7 Prime paint field welds and touch up scratched and damaged galvanized surfaces.

.8 Fill all joints and grout keys between hollow core slabs with 1:3 mixture of cement and sand, trowel smooth.

.9 Remove all grout from underside of hollow core slabs and walls and floors immediately after grouting.

3.4 Cleaning

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

.2 Upon completion of the work of this Section, all surplus material and debris shall be removed from the site.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 04 22 00 Concrete Unit Masonry

1.3 References

.1 Canadian Standards Association (CSA)
  .1 CSA-A371, Masonry Construction for Buildings.
  .2 CSA-S304.1, Masonry Design for Buildings (Limit States Design)
  .3 CSA G30.3, Cold-Drawn Steel Wire for Concrete Reinforcement.
  .4 CSA G30.12, Billet-Steel Bars for Concrete Reinforcement.
  .5 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.
  .6 CSA-A23.1, Concrete Materials and Methods of Concrete Construction
.2 American Concrete Institute (ACI)
  .1 Detailing Manual
.3 Reinforcing Steel Institute of Canada (RSIC)
  .1 Reinforcing Steel Manual of Standard Practice,

1.4 Submittals

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

.2 Submit the following samples:
  .1 Two (2) of each type of masonry reinforcing and connector specified.

.3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.

.4 Submit two copies of MSDS - Material Safety Data Sheets. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.

.5 Shop Drawings:
  .1 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement and connectors.
  .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 cover to reinforcement
  .7 Show location of construction joints.

.8 Prior to submission to Consultant, review all shop 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 shop drawing with the requirements of Work and Contract Documents. Contractor's review of each shop drawing with the requirements of Work and Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date, and signature of a responsible person.

.9 At time of submission, notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.10 Consultant will review and return shop 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 shop drawings or of responsibility for meeting requirements of Contract Documents.

.11 Make any changes in shop drawings which Consultant may require consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of any revisions other than those requested by Consultant.

.12 Do not commence fabrication of reinforcement before drawings have been reviewed and Consultant's comments incorporated on drawings issued to fabricating shop.

1.5 Design Criteria

.1 Non-conventional Masonry Connectors
- .1 Deflection: maximum 2.0 mm, including free play when acted upon by 0.45 kN lateral load, in all possible positions of adjustment.
- .2 Positive restraint at position of maximum adjustment.

.2 Multi-component Ties - Free Play: Maximum 1.2 mm, when assembled in any possible configuration.

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 All metal components: hot dipped zinc galvanized to CSA-S304 unless otherwise indicated.

.2 Bar Reinforcement: To CSA-A371 and CSA G30.18, grade 400R, deformed billet steel bars.

.3 Column Ties: Fero CAT Tie (Column Adjustable Tie), spot weld to columns at 400 mm c/c.

.4 Connectors: to CSA-A370 and CSA-S304.

.1 Finish: Steel components, hot dip galvanized to CAN/CSA A370-04.For steel stud/masonry veneer application; length to suit combined total wall thickness; with polyethylene insulation support where required: Side Mounting Rap Ties by Fero Corporation
.2 Side Mounting Rap Ties:
.1 Flat-Plate: Length to suit steel stud width and thickness of gypsum sheathing, membrane and insulation.
.2 V-Tie: Length to provide placement of legs at centerline of solid unit veneer.
.3 Insulation support.

.5 Wire Reinforcement: To CSA-A371 and CSA G30.3.
.1 Interior walls: hot dipped galvanized to CSA-S304
.1 4.76 mm wire diameter hot dipped galvanized to CSA-S304 for interior bearing walls.
.2 3.66 mm wire diameter bright wire finish, standard duty for interior non-bearing walls and partitions
.3 Truss Type: Blok-Trus BL-30 by Blok-Lok Ltd. for non-vertically reinforced walls
.4 Ladder Type: Blok-Trus BL-10 by Blok-Lok Ltd. for vertically reinforced walls

.6 Equivalent products as manufactured by the following manufacturer's may be used subject to submission and acceptance by the Consultant of technical data:
.1 Dayton Superior Dur-O-Wall
.2 Hohmann and Barnard Inc.

2.2 Fabrication

.1 Fabricate reinforcing in accordance with CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.

.2 Obtain Consultant's approval for locations of reinforcement splices other than shown on placing drawings.

.3 Upon approval of Consultant, weld reinforcement in accordance with CSA W186.

.4 Ship reinforcement clearly identified in accordance with drawings.

PART 3 EXECUTION

3.1 Installation

.1 Install masonry anchors in accordance with CSA-A370, CSA-A371, CSA-A23.1 and CSA3-S304 unless indicated otherwise.

3.2 Reinforcement

.1 Unless otherwise noted, all masonry walls shall be reinforced with joint reinforcement.

.2 Reinforcement shall be installed in the first and second bed joints, 200 mm apart immediately above lintels and below sill at openings, and in bed joints at 400 mm vertical intervals elsewhere.

Reinforcement in the second bed joint above or below openings shall extend two feet beyond the jambs. All other reinforcement shall be continuous except that it shall not pass through vertical masonry control joints. Side rods shall be lapped at least 150 mm at splices.

.3 Use prefabricated corner and tee sections for continuous reinforcement at corners and intersecting walls.

.4 Vertical reinforcement shall have a minimum clearance of 13 mm from the masonry and not less than one bar diameter between bars.

.5 All block cores containing vertical reinforcing and/or anchor bolts shall be solidly filled with non-shrink grout.

.6 Place reinforcement and ties in grout spaces prior to grouting.

.7 Cleanouts: Provide cleanouts in the bottom course of masonry for each grout pour when the grout pour height exceeds 1.5 m.

.8 Construct cleanouts so that the space to be grouted can be cleaned and inspected. In solid grouted masonry, space cleanouts horizontally a maximum of 800 mm on center.

.9 Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimension shall be 76 mm.

.10 After cleaning, close cleanouts with closures braced to resist grout pressure.

3.3 Bonding and Tying

.1 Install masonry connectors in accordance with CSA-A370, CSA-A371, CSA-A23.1 and CSA3-S304 unless indicated otherwise.

.2 Bond walls of two or more wythes using seismic connectors and ladder type reinforcement in accordance with NBC CSA-S304, CSA-A371 and as indicated.

.3 Tie masonry veneer to backing in accordance with NBC, CSA-S304, CSA-A371 and as indicated herein.

3.4 Reinforced Lintels and Bond Beams

.1 Reinforce masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA-S304.

.3 Place reinforcing as indicated on drawings in masonry lintels and beams. Provide adequate ties and chairs for all embedded reinforcing steel.

3.5 Metal Anchors

.1 Do metal anchors as indicated.

3.6 Lateral Support and Anchorage

.1 Do lateral support and anchorage of masonry in accordance with CSA S304.1-04 (R2010) and as indicated.

.2 Temporary lateral support for the interior bearing wall must be maintained until the steel deck diaphragm installation is complete.

3.7 Control Joints

.1 Terminate reinforcement 25 mm short of each side of control joints unless otherwise indicated.

.2 Control joints shall be steeped to avoid cutting lintel beams. Under no circumstance shall the control joints be placed and compromised the bearing for the lintel.

3.8 Field Bending

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Consultant.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

.3 Replace bars and connectors which develop cracks or splits.

3.9 Field Touch Up

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

3.10 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 05 19 Masonry Anchorage and Reinforcing
.2 Section 04 27 00 Multiple Wythe 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

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C216-22 Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale)
.2 CSA Group (CSA)
  .1 CSA A82-14 (R2018) Fired Masonry Brick Made from Clay or Shale.
  .2 CSA A165 Series-14 (R2019) CSA Standards on Concrete Masonry Units
  .3 CSA A179-14 (R2019) Mortar and Grout for Unit Masonry
  .4 CSA A371-14 (R2019) Masonry Construction for Buildings.
  .5 CSA A3000-18 Cementitious Materials Compendium
  .6 CSA S304-14 (R2019) Design of Masonry Structures
.3 Brick Industry Association (BIA)
  .1 Technical Note No. 20-2006 Cleaning Brick Work.

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 brick masonry and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Samples: submit duplicate samples of brick in colour and texture specified.

1.5 Quality Assurance

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CSA A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

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

.3 Mock-ups:
  .1 Construct mock-ups in accordance with Section 01 45 00.
  .2 Construct mock-up panel of exterior brick construction 1200 x 1800 mm.

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 Storage and Handling Requirements:
  .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  .2 Store and protect brick masonry from nicks, scratches, and blemishes.
  .3 Replace defective or damaged materials with new

1.7 Project Conditions

.1 Ambient Conditions: assemble and erect components only when temperature is above 4 ° C.

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 Concrete brick: to CSA A165 Series.
  .1 Grade: I.
  .2 Size: 90 mm x 190 mm x 390 mm
  Colour and Texture: A minimum of six colors and standard textures should be provided to achieve a mixed appearance. A mock-up must be prepared according to the specifications for client and consultant review.
  .3 Colour Options: Brampton Brick Finesse/Profile series - 80% Suave and 20% Quartz. Consultant and client to review and approve samples.

.2 Reinforcement:
  .1 Reinforcement in accordance with Section 04 05 19.
.3 Connectors:
  .1 Connectors in accordance with Section 04 05 19.

.4 Mortar Mixes
  .1 Conforming to CSA A179
  .2 Use same brand of material and source of aggregate for entire project.
  .3 Aggregate: CSA A179 coarse sharp clean sand, free from salt, alkaline or other organic substances, specifically graded for masonry use.
  .4 Cement: To CSA A3000, masonry cement. Type S. Blended mixes of Portland cement to CSA A3000 and double hydrated lime to ASTM C207.
  .5 Water shall be clean, potable and free of deleterious amounts of acid, alkalies, or organic materials.
  .6 Hydrated Lime: Type 'S' to ASTM C207.
  .7 Type 'S' mortar shall be used for all masonry work.
  .8 Proprietary Mortar Mixes: St. Lawrence Cement Company, Blue Circle Cement, Daubois Inc., Lafarge Canada. Mortar mixes shall conform to mix requirements specified.
  .9 Mortar colour for concrete block masonry work shall be grey.

.10 Mortar for facebrick units shall be coloured with ground coloured natural aggregates.
.11 Coloured mortar: colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample.
.12 Admixtures of any kind are not allowed except as specified for coloured mortar.

.5 Grout Mixes:
.1 Grout: to CSA A179, Table 3.
.2 Premixed, non-shrink non-metallic grout: Non Shrink Grout by C.P.D., V3 Grout by W.R. Meadows of Canada, NS Grout by Euclid

.6 Control Joint Filler: to ASTM D5249, Type 1, Round, flexible, continuous-length, nonabsorbent, non-gassing, non-staining, and non-shrinking. Extruded from a cross-linked polyethylene. Flexible foam, heat-Resistant Backer Rod. 9.5 mm thick by width of wall.

.7 Damp Course and Flashings
.1 Fully compatible with air barrier membrane specified in Section 07 27 13. Self-adhesive modified SBS bitumen membrane reinforced with proprietary glass screen, minimum thickness of 1.0 mm:
.1 Vedagard Non-slip by Bakor Inc.
.2 Perm-A-Barrier Wall Flashing by W.R. Grace & Co.
.3 Mel-Dek by W.R. Meadows
.4 Enverge Flashguard by Firestone.
.2 Lap Sealant: recommended by flashing manufacturer.
.3 Surface primers and conditioners as recommended by membrane manufacturer.

.8 Cavity Vents and Weepholes: purpose made PVC vents, with pest resisting design, size to suit masonry units. Cell-Vent with mortar net, or Mor-Control by Dur-O-Wal Inc. Colour to match mortar colour.

.9 Mortar diverters: shaped and sized to suit cavity spaces.
.1 Manufactured from recycled material.

.10 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.

.11 Packing Insulation: loose glass fibre insulation or mineral wool with minimum density of 17.6 kg/m³.

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

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 brick masonry installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Preparation

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

3.3 Installation

.1 Construction to conform to CSA A371.

.2 Bond: Match existing.

.3 Coursing height: Match existing.

.4 Jointing: concave.

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

.6 Reinforcement: Install reinforcing in accordance with Section 04 05 19.

.7 Connectors: Install connectors in accordance with Section 04 05 19.

.8 Mortar Placement: conform to CSA A371.

.9 Grout Placement: Grout masonry in accordance with CSA S304 and as indicated.

.10 Repair/Restoration: Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

.11 Tolerances: To CSA A371.

3.4 Moisture Control

.1 Place continuous dampcourse and flashing membrane at the bottom of all exterior walls, including at bottom of walls and over all openings. Extend flashing from exterior face of exterior wythe, turned up backing face minimum 150 mm and bonded to sheathing with adhesive, unless otherwise indicated. Lap all joints 150 mm and seal with adhesive.

.2 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

.3 Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

.4 Grout screens: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.5 Cleaning

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

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

.3 Clean unglazed clay masonry: 10 m^2 area of wall designated by Consultant as directed below and leave for one week. If no harmful effects appear and after mortar has set and cured, protect windows, sills, doors, trim and other work, and clean brick masonry as follows.
   .1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.
   .2 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.
   .3 Repeat cleaning process as often as necessary to remove mortar and other stains.
   .4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.

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 30 00 Cast-in-Place Concrete

1.3 References

.1 Ontario Building Code.
.2 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.
.3 ASTM International, (ASTM)
  .1 ASTM C90-15 Standard Specification for Loadbearing Concrete Masonry Units
  .2 ASTM C129-14a Standard Specification for Nonloadbearing Concrete Masonry Units
  .3 ASTM C150/C150M-15 Standard Specification for Portland Cement
  .4 ASTM C207-06 (2011) Standard Specification for Hydrated Lime for Masonry Purposes.
  .5 ASTM D2240-05(2010) Standard Test Method for Rubber Property—Durometer Hardness.
  .6 ASTM D5249-10 Standard Specification for Backer Material for Use with Cold and Hot Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints.
.4 Canadian Standards Association
  .1 CSA A23.1-09, Concrete Materials and Methods of Concrete Construction.
  .2 CAN/CSA A165 Series-04 (R2009), CSA Standards on Concrete Masonry Units.
  .3 CAN/CSA A179-04 (R2009), Mortar and Grout for Unit Masonry,
  .4 CAN3-A370-04 (2009) Connectors for Masonry.
  .5 CAN/CSA A371-04 (R2009), Masonry Construction for Buildings.
  .6 CSA S304.1-04 (R2010), Masonry Design for Buildings.

1.4 Submittals

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

.2 Data: Submit manufacturer's printed product literature, specifications and data sheets

.3 Submit the following samples:
  .1 Two (2) of each type of concrete masonry units specified.
  .2 Two (2) of each type of masonry accessory specified.
.4 Submit shop drawings for all masonry reinforcing. Include placing drawings, bar lists and details. Indicate clearly reinforcing bar sizes, spacing, bending details, lap details, dowels to adjacent construction location and quantities of reinforcement and connectors.

.5 Submit engineered temporary bracing design drawings for temporary support of masonry walls. Drawings shall be prepared by, and bear the seal of a Professional Engineer, licensed in the Province of Ontario.

.6 Test reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

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

.8 Inspection Reports: Inspection and Testing Company shall submit reports of inspections and tests.
  .1 Distribute inspection reports as follows:
    .1 2 copies to Consultant.
    .2 1 copy to Consulting Structural Engineer
    .3 1 copy to Contractor.

1.1 Quality Assurance

.1 The masonry sub-contractor shall have a minimum of five (5) years of continuous documented Canadian experience in work of the type and quality shown and specified. Proof of experience shall be submitted when requested by the Consultant and shall be subject to the approval of the Consultant.

.2 Mock Up: Construct a sample panel of masonry walls including brick units, no less than 1200 x 1200 mm, of units of each colour and size to be used in the project.

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

.4 Field Quality Control:
  .1 Inspection and testing will be carried out by Testing Laboratory designated by Owner.
  .2 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
  .3 Inspection and Testing Company shall perform sampling, inspection and testing of masonry work at site, in accordance with referenced standards, including but not limited to the following:
    .1 Masonry Placement Inspection
    .2 Reinforcing Steel Placement
    .3 Grout and Mortar Testing
    .4 CMU Testing
    .5 Brick Shear Testing
  .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 Provide access to Work for inspectors.

1.2 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 Materials shall be kept clean and dry.

.4 Deliver cement, lime and mortar ingredients with manufacturer's seal and labels intact.

.5 Cementitious material and aggregates shall be stored in accordance with the requirements of CAN A23.1-09.

.6 Exposed units which become stained or chipped, surface marked or scratched, and materials which are affected by inadequate protection shall be replaced, at no additional expense to the Consultant.

.7 Masonry units shall be delivered to site in protective film and shall be stored without contact with ground or ground water.

1.3 Cold Weather Requirements

.1 Provide heat enclosures and heat as required.

.2 Work to be undertaken shall be carried out according to CAN3-A371, Clause 5.15.2.

.3 Maintain temperature of mortar between 5^{O}C and 50^{O}C until batch is used.

1.4 Hot Weather Requirements

.1 Protect freshly laid masonry from drying too rapidly by means of waterproof, non-staining coverings.

1.5 Protection

.1 Keep masonry dry using secure waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven snow, rain and dirt, until masonry work is completed and protected by flashings or other permanent construction.

.2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

1.6 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Masonry Units: Concrete Block: Modular, conforming to CCMPA requirements and CAN/CSA A165.1.
  .1 H/20/A/M concrete masonry units to be used at all load bearing masonry walls.
  .2 H/15/A/M concrete, masonry units, at all other locations unless noted otherwise.
  .3 SS/15/A/M semi-solid concrete masonry units to be used at all 2 hour rated fire walls.
  .4 Refer to drawings for Fire Resistance Ratings. Type of concrete and block to conform to Table 5.0, Fire Resistance Rating of Concrete Block in Hours, of the Canadian Concrete Masonry Producers Association Handbook.
  .5 Special shapes: provide special shapes indicated or required including bullnose and corner blocks, base blocks, fillers, and the like as may be required. Provide purpose made shapes for lintels and bond beams.

.6 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.

.2 Masonry Reinforcement and Connectors:
.1 Bar Reinforcement, wire reinforcement, connectors and ties: as specified in Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Control Joint Filler: to ASTM D5249-10, Type 1, Round, flexible, continuous-length, nonabsorbent, nongassing, nonstaining, and nonshrinking. Extruded from a cross-linked polyethylene. Flexibile foam, heat-Resistant Backer Rod. 9.5 mm thick by width of wall.

.4 Pre-manufactured Masonry Control Joint: Pre-manufactured polyvinylchloride control joints may be used in lieu of the specified built-up type of joint.

.5 Mortar and Grout: Conforming to CAN/CSA A179-04 (R2009).
.1 Use same brand of material and source of aggregate for entire project.
.2 Aggregate: CAN/CSA A179-04 (R2009), fine grain aggregates.
.3 Cement: normal Portland to ASTM C150/C150M-12, Type 10.
.4 Water shall be clean, potable and free of deleterious amounts of acid, alkalies, or organic materials.
.5 Hydrated Lime: Type ‘S’ to ASTM C207-06 (2011).
.6 Type 'S' mortar shall be used for all concrete block masonry work.
.7 Proprietary Mortar Mixes: conform to mix requirements specified
.8 Mortar colour for concrete unit masonry work shall be grey.
.9 Admixtures of any kind are not allowed.

.6 Grout: to CAN/CSA A179-04 (R2009), Table 3:
.1 Premixed, non-shrink non-metallic grout.

.7 Other Materials: all other materials not specifically described but required for a complete and proper installation of masonry, shall be as selected by the Contractor subject to approval by the Consultant

2.2 Mixes

.1 Mixing: Prepare and mix mortar materials under strict supervision, and in small batches only for immediate use.

.2 Mix proprietary mortars in strict accordance with manufacturer's instructions to produce the specified mortar types in accordance with CAN/CSA A179-04 (R2009). Do not use re-tempered mortars.

.3 Take representative samples for testing consistency of strength and colour according to CAN/CSA A179-04 (R2009).

2.3 Damp Course and Flashings

.1 Peel and stick modified SBS bitumen membrane reinforced with proprietary glass screen, minimum thickness of 1.0 mm.

.2 Lap Sealant: recommended by flashing manufacturer.

2.4 Accessories

.1 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.

2.5 Fabrication

.1 Lintels in non-load-bearing walls shall be constructed with special bond or lintel block units unless shown otherwise on plans. Lintels shall bear 150 mm minimum and bearing shall be isolated with two layers of heavy asphalt coated paper.

.2 Reinforcing steel in lintels shall be 2 x 20 M bars minimum specified under Section 04 05 19 - Masonry Anchorage and Reinforcing, or as noted on drawings.

.3 Concrete fill for lintels shall be 25 MPa or as noted on the drawings. Concrete shall be as specified in Section 03 30 00.

PART 3 EXECUTION

3.1 Existing Conditions

.1 Examine work of other trades for defects or discrepancies and report same in writing to Consultant.

.2 Installation of any part of this work shall constitute acceptance of such surfaces as being satisfactory.

3.2 General

.1 Do masonry work in accordance with CAN/CSA A371-04 (R2009) except where specified otherwise.

.2 A competent masonry foreman shall supervise and direct the work and only skilled masons shall execute the work of this Section.

.3 Coordinate work of this Section with others such as, field welding of anchors to steel work, insulation application, and the like. Prepare all items for built-in as the work proceeds, either supplied and installed by other trades or installed under this Section.

3.3 Workmanship

.1 Build masonry plumb, level, and true to line, with vertical joints in alignment.

.2 Lay out coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

.3 Lay block with webs to align plumb over each other with thick ends of webs up. The top course of all partitions which do not pass through a ceiling or up to the underside of a roof deck shall have the open cells filled solid.

.4 Cut exposed block with power driven abrasive cutting disc or diamond cutting wheel for flush mounted electrical outlets, grilles, pipes, conduits, leaving 3 mm maximum clearance.

.5 Fill all vertical and bed joints, including plain end faces, through the entire wall thickness solidly with mortar.

.6 Do not break bond of exposed walls where partitions intersect and if bond would show through on exposed face of walls. Bond these partitions to walls they intersect with prefabricated intersection masonry reinforcement in each course.

.7 Bond intersecting block walls in alternate courses.

.8 Terminate non load bearing walls within 20 mm of structure above unless indicated otherwise.

.9 Where walls are pierced by structural members, ducts, pipes, fill voids with mortar to within 20 mm of such members.

.10 Buttering corners of units, throwing mortar droppings into joints, deep or excessive furrowing of bed joints, is not permitted. Do not shift or tap units after mortar has taken initial set. Where adjustment must be made after mortar has started to set, remove mortar and replace with fresh supply.

.11 Do not wet concrete masonry before or during laying in wall.

.12 Bed and vertical joints shall be evenly and solidly filled with mortar.

.13 Provide reinforced bond beams where indicated on structural drawings.

.14 Provide vertical reinforcement as indicated on structural drawings.

3.4 Exposed Masonry

.1 Do not use chipped, cracked or stained, and otherwise damaged units or unsatisfactory material in exposed and load bearing masonry walls.

.2 Lay all joints 10 mm thick (uniform). All joints shall be full of mortar except where specifically designated to be left open.

.3 All joints shall be slightly concave. Use sufficient force to press mortar tight against masonry units on both sides of joints. Remove excess material or burrs left after jointing by means of a trowel or rubbing with burlap bag.

.4 Provide bullnose block at all exposed masonry corners.

3.5 Tolerances

.1 Tolerances in notes to Clause 5.3 of CAN/CSA A371-04 (R2009) apply.

3.6 Reinforcement

.1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.7 Connectors

.1 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.8 Concrete Masonry Lintels

.1 Install reinforced concrete block lintels over openings in masonry walls where steel lintels are not indicated.

.2 End bearing: not less than 200 mm.

.3 Refer to Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.9 Loose Steel Lintels

.1 Install loose steel lintels. Centre over opening width.

.2 Lintels supplied under Section 05 50 00 – Metal Fabrications.

3.10 Control Joints

.1 Provide continuous joints as indicted and at spacing not to exceed 6000 mm c/c unless noted otherwise on drawings.

.2 Break vertical mortar bond with extruded neoprene gasket or building paper.

.3 Prime control joint to prevent drying out of caulking material.

3.11 Support of Loads

.1 Use 25 MPa concrete unless specified otherwise on the Drawings, where concrete fill is used in lieu of solid units.

.2 Use grout to CAN/CSA A179-04 (R2009) where grout is used in lieu of solid units.

.3 Install building paper below voids to be filled with grout. Keep paper 25 mm back from face of units.

3.12 Lateral Support and Anchorage

.1 Do lateral support and anchorage of masonry in accordance with CSA S304.1-04 (R2010) and as indicated.

3.13 Grouting

.1 Grout masonry in accordance with CSA S304.1-04 (R2010) and as indicated.

3.14 Temporary Wall Bracing

.1 Design and provide all required temporary engineered wall bracing.

.2 Brace masonry walls to resist wind pressure and other lateral loads during construction period.

.3 Provide temporary bracing of masonry work during and after erection until mortar has cured and permanent lateral support is in place

3.15 Built-ins

.1 Build in items required to be built into masonry and provided by other Sections, including bearing plates, door frames, anchor bolts, sleeves and inserts. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill voids between masonry and metal frames with masonry mortar or insulation, as indicated on drawings or as required to provide a neat finished appearance.

.4 Set wall plates on masonry in non-shrink grout in accordance with manufacturer's instructions.

.5 Do all cutting, fitting, drilling, patching and making good for other trades in masonry work.

3.16 Protection

.1 Protect masonry units from damage resulting from subsequent construction operations.

.2 Use protection materials and methods which will not stain or damage masonry units.

.3 Remove protection materials upon Substantial Performance, or when risk of damage is no longer present.

3.17 Cleaning

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

.2 Allow mortar droppings on unglazed concrete masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

.3 Remove mortar from concrete floor slabs and leave entire area vacuum clean.

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 04 27 00 Multiple Wythe Unit Masonry
.4 Section 05 50 00 Metal Fabrications
.5 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International, (ASTM)
  .1 ASTM A108-18 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
  .2 ASTM A123/A123M-17 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  .3 ASTM A153/A153M-16a Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  .4 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
  .5 ASTM A653/A653M-20 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .6 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
  .7 ASTM F3125/F3125M-22 Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength
.2 CSA Group (CSA)
  .1 CSA G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel.
  .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CSA S16-14 Design of Steel Structures.
  .4 CSA S136-07 North American Specification for the Design of Cold Formed Steel Structural Members, Includes Update No. 1 (2009), Update No. 2 (2010).

.5 CSA W47.1-09 (R2014) Certification of Companies for Fusion Welding of Steel Structures.
.6 CSA W48-18 Filler Metals and Allied Materials for Metal Arc Welding.
.7 CSA-W55.3-08 (R2013) Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
.8 CSA W59-13 Welded Steel Construction (Metal Arc Welding).
.9 CSA W178.1-18 Certification of Welding Inspection Organizations.
.10 CSA W178.2-18 Certification of Welding Inspectors.

.3 American Welding Society (AWS)
.1 AWS A2.4:2020 Standard Symbols for Welding, Brazing, and Nondestructive Examination

.4 Structural Steel Painting Council
.1 SSPC-SP 6-91 Commercial Blast Cleaning.

.5 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
.1 CISC/CPMA 1-73a Quick-Drying, One-Coat Paint for Use on Structural Steel.

.6 American Institute of Steel Construction (AISC)
.1 Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architectural Exposed Structural Steel, latest edition.

.7 The National Building Code of Canada.

1.4 Submittals

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

.2 Submit shop and erection drawings. Submit typical details of connections and any special connections for review before preparation of shop drawings. Assume responsibility for the accuracy of Work. Review of submitted shop drawings is to ensure only that the Contract Documents are being correctly interpreted.

.3 Professional Engineer responsible for connection design shall sign and seal each shop drawing.

.4 Show on shop drawings the size, spacing, and the location of structural steel members; connections; attachments; reinforcing; anchorage and required inserts; and all necessary plans, elevations and details.

.5 Show splice locations and details.

.6 Welded connections shall be designated by welding symbols in compliance with AWS A2.4:2020 and indicate clearly net weld lengths.

.7 Submit design calculations if requested by the Consultant.

.8 Submit diagrams showing methods of erection.

.9 Field Work Drawings shall be submitted as shop drawings.

.10 Notify Consultant in writing of any deviations in shop drawings from the requirements of the Contract Documents.

.11 Submit a schedule of fabrication to the Consultant and the Testing Agency, prior to commencement of fabrication.

1.5 Qualifications

.1 Undertake welding and/or welding inspection by welders fully approved to one or more of the reference codes and standards where applicable.

1.6 Quality Assurance

.1 Connections:
- .1 Connections designed by Engineer: Submission of shop drawings for connection which have been detailed on Drawings shall represent acceptance by Contractor that connection can be executed successfully.
- .2 Design of other connections which cannot be selected from standard designs tabulated in CISC Handbook of Steel Construction shall be by a Professional Engineer, licensed in the Province of Ontario, experienced in structural steel connection design.
- .3 Consultant will review connection arrangement to verify general conformance with overall design concept of structure.
- .4 Connection design engineer shall be insured for professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.
- .5 Provide connections adequate to resist reaction of beam, when beam is loaded to maximum flexural capacity under uniformly distributed load, unless reaction or connection detail is shown on Drawings.
  - .1 Provide flexible beam connections for unrestrained members in accordance with CSA S16.1, unless shown otherwise on Drawings.
  - .2 Select connections, wherever possible, from standard designs tabulated in current edition of CISC Handbook of Steel Construction, except that length of beam web angles shall not be less than half the depth of beam, and single angles shall not be used.
  - .3 Provide direct connections to flanges of spandrel beams (exterior perimeter beams) to restrain twisting.

.2 Design:
.1 Connections:
.1 Provide bolted or welded connections, unless shown otherwise on Drawings.
.2 Use high strength bolts to ASTM F3125 for all connections.
.3 Use slip resistant (friction-type) connections for bolted joints designed to resist reversible forces.
.4 Provide tension adjustment hardware at rod type bracing and at flat bar type bracing.
.5 Do not permit connections to encroach on clearance lines required for installation of Work of other Sections.

.3 Random Splicing: Obtain in writing from Consultant, prior to commencement of shop drawings, special requirements that will be imposed as a necessary condition of acceptance of members with randomly located butt welded splices.

.4 All edge perimeter angles and bent plates installed at roof framing level shall be joined by butt weld splices designed for full tension capacity of members being joined.

1.7 Tolerances

.1 In addition to tolerances specified in CSA S16, erect shelf angles and sash angles attached to steel frame within a tolerance of 3 mm plus or minus, with abutting ends of members at the same level.

1.8 Inspection and Testing

.1 Refer to Section 01 45 00 – Quality Control.

.2 Inspection and testing of materials and shop fabrication of Work of this Section, and field quality control, will be performed by an independent Inspection and Testing Company. Refer to Section 01 45 00 - Quality Control.

.3 The Inspection and Testing Company shall meet qualification requirements of CSA W178.1 and shall be certified by the Canadian Welding Bureau in Category 1 Buildings.

.4 Welding Inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2, to minimum level 2 certification.

.5 Provide free access for inspectors to all places work is being performed, whether

on site or off.

.6 Mill inspection shall ensure that materials conform to specified requirements. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests.

.7 Shop inspection shall ensure that structural steel is fabricated in accordance with the shop drawings, and the specified fabrication and welding procedures.

.8 The cost of inspection and testing of splices introduced by the fabricator and not required on the Contract Documents will be paid by the Contractor.

.9 Inspection and Testing Company when appointed shall carry out shop inspection to verify:
- .1 Structural materials and paint conform to Specifications. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests of structural materials.
- .2 Fabrication and welding conforms to Specifications and dimensioned shop drawings.
- .3 Shop cleaning and preparation and prime painting to conform to specified requirements.
- .4 Surfaces inaccessible for cleaning and painting after assembly are treated before assembly.
- .5 For surfaces painted with zinc rich paint or zinc primer, specified surface preparation is followed and specified paint thickness is applied.

.10 Non-destructive Testing of Welded Connections: Carry out non-destructive testing of welded connections chosen at random as follows:
- .1 Check and record steel member sizes for 20% of columns, beams and girders.
- .2 Check 5% of all welds by magnetic particle inspection.
- .3 Check 25% of moment connections and all connections subject to direct tension involving use of full penetration groove welds by ultrasonic testing.
- .4 Check 10% (minimum 2 per connection) in accordance with Section 23 of CSA S16 of pretensioned connections including main building bracing connections.

.11 More frequent testing and inspection shall be completed if random tests described above are not satisfactory. These costs are to be paid by the Contractor.

1.9 Shipping, Handling and Storage

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

.2 Deliver products that are only supplied under work of this Section to those who are responsible for their installation, to the work site as directed and to meet construction schedule.

.3 Handle and store structural steel in such a manner that no damage, including corrosion, is caused to the stored or erected work, or to other property.

.4 Store structural steel off of ground on timber supports.

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 Rolled shapes, hollow structural sections, plates and rods: new steel, in compliance with CSA and/or ASTM Standards indicated on Structural Drawings.

.2 Welding Electrodes: to meet the requirements set forth in the applicable standard of the CSA W48 Series on welding electrodes. (Any process which produces deposited weld metal meeting the requirements of the applicable W48 Series Standard for any grade of arc welding electrodes shall be accepted as equivalent to the use of such electrodes.)

.3 High Strength Bolts: to meet specified requirements of ASTM F3125

.4 Machine Bolts: to meet specified requirements of ASTM A307.

.5 Anchor Bolts: to meet specified requirements of ASTM A307.

.6 Shop Coat Paint:

.1 Interior structural steel: To meet specified requirements of CISC/CPMA 1-73a and compatible with Master Painters Institute INT 5.1S or 5.1X Institutional low odour/low VOC semi-gloss finish. Colour to be grey.

.7 Galvanizing: hot dipped with zinc coating to CSA G164, ASTM A123 or ASTM A153.

Part 3 Execution

3.1 Fabrication

.1 Fabricate work of this Section in compliance with CSA S16, and as specified following.

.2 Connections:
- .1 Make bolted or welded connections.
- .2 Use high strength bolts unless otherwise noted on Drawings.
- .3 Use friction type high strength bolts for the connections of bracing members (diagonal kickers) resisting the effects of applied lateral loads. Provide tension adjustment at flat bar and rod type lateral bracing.
- .4 Do not permit connections to encroach on the clearance lines required for the installation of work of this Section.

.3 Beam Connections:
- .1 Provide beam connections adequate to resist the reactions produced by the framing or load conditions.
- .2 Provide beam to column connections that apply vertical reaction with negligible eccentricity at the connecting face of the column, such as single or double beam web connections, end plate connections or un-stiffened seats, unless otherwise shown on Drawings. Submit for review, in advance of the preparation of shop drawings, connections which do not meet these requirements.
- .3 Provide connections complying with the requirements of the CISC Handbook of Steel Construction, except that the length of beam web angles shall not be less than half the depth of the beam and single angles shall not be used.
- .4 Provide direct connections to flanges of spandrel beams to restrain twisting.

.4 Holes in Structural Members:
- .1 Punch holes 11 mm to 27 mm in diameter as required for attaching the work of other Sections to structural steel members. Locate holes so that no appreciable reduction of the strength of members is caused.
- .2 Provide holes for pipes and ducts, and reinforce openings as indicated on drawings. Cutting of holes in structural members in the field will not be permitted except with written approval of the Consultant.
- .3 Provide effective drainage holes to prevent the accumulation of water in tubular members.

.5 Member Separators: Provide separators at approximate spacing of 1200 mm o.c. for double beams and channels as follows:
- .1 For beams and channels 225 mm or less in depth: one or two rows of pipe separators.
- .2 For beams and channels over 225 mm in depth: channel separators, unless otherwise detailed on Drawings.

.6 Built up Compression Members General Requirements: Comply with the requirements of CSA-S16, for all built up compression members.

.7 Column Bearing Plates: Mill column bearing plates under column bearing unless plate is sufficiently flat to give adequate contact bearing between column and plate.

.8 Structural Steel Painting: All prime painting shall be shop applied and the responsibility of the steel fabricator. Refer to specific priming requirements specified in Section 09 91 23 - Interior Painting.
   .1 Paint in accordance with manufacturer's published directions. Paint steel in the shop under cover. Keep painted members under cover until the paint has dried.
   .2 Clean and prepare surfaces, as appropriate for paint specified, in accordance with Commercial Blast Cleaning is only required where zinc rich paint is to be appluied. All other steel to be or clean steel in compliance with SSPC SP6 where zinc rich paint is shop applied.
   .3 Where paint is applied adjacent to welded joints, remove it to bare metal for a distance of at least 50 mm beyond sides of joints.
   .4 Do not paint surfaces and edges to be field welded, contact surfaces of friction type connections assembled by high strength bolts, surfaces encased in or in contact with concrete.

.9 Galvanizing: Galvanize members as indicated and in accordance with reference standards, after shop welding is complete.
   .1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CSA G164 or ASTM A123.
   .2 Bolts, nuts, washers, iron, and steel hardware components shall be galvanized in accordance with CSA G164 or ASTM A153.
   .3 Coating Requirements:
      .1 Weight: the weight of the galvanized coating shall conform with Table 1 of CSA G164 or paragraph 6.1 of ASTM A123 and Table 1 of ASTM A153 (as appropriate).
      .2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article.
   .4 The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
   .5 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.2 Examination

.1 Verify, before delivery of structural steel, that work of other Sections on which work of this Section is dependent is correctly installed and located.

3.3 Preparation

.1 Supply anchor bolts, base and bearing plates and other members to be built in under work of other Sections as the work progresses. Cooperate with installers of this work and provide instructions for setting items to be built in.

3.4 Erection

.1 Comply with CSA S16 and work site safety plans in erection of work of this Section.

.2 Make adequate provision for horizontal and vertical erection loads and for sufficient temporary bracing to keep structural frame plumb and in true alignment until the completion of erection, and the installation of masonry, concrete work, and floor and roof decks which provide the necessary permanent bracing.

.3 Provide temporary steel members as may be required for erection purposes and remove them when no longer required.

.4 Installation of Bearing and Column Base Plates: Install bearing plates and standard wall anchors for beams bearing on masonry or concrete.
.1 Set loose beam bearing plates and column base plates, at proper elevation, true and level, with steel shims, ready for grouting as specified under work of other Sections.
.2 Set loose bearing plates and/or levelling plates to be cast into concrete.

3.5 Coating Touch-Up

.1 Clean welds with wire brushes and wash down with clean water to ensure no residue from electrodes is present.

.2 After erection, give one coat of prime coat or zinc rich paint as applicable and specified for shop coat to field bolts, field connections, burnt areas, and abrasions or damage to shop coats.

.3 Touch up all areas with a specified paint film thickness.

.4 Give areas of bare metal on galvanized members two coats of zinc-rich paint. Repair coating on architecturally exposed galvanized metals in accordance with reference standards and as directed by the Consultant. Replace any materials where damage cannot be repaired to the satisfaction of the Consultant.

3.6 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:
- .1 Inspection of erection and fit-up, including placing, plumbing, levelling and temporary bracing and conformance with specified tolerances.
- .2 Inspection of bolted connections, including verification that ASTM A307, ASTM F3125 snug tight only bolts, and ASTM F3125 pre-tensioned bolts have been installed and used appropriately, and that threads are excluded from shear plane where required.
- .3 Inspection of welded joints, including slag removal.
- .4 General inspection of field cutting and alterations; report immediately to Consultant, any alterations or cutting not shown on reviewed shop drawings.
- .5 General inspection of shop coating touch-up.
- .6 Inspection of zinc primer and zinc-rich paint, including surface preparation and coating thickness.

3.7 Defective Work

.1 Variations in excess of specified tolerances, 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 performed by this Section.

.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.

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 30 00 Cast-in-Place Concrete
.2 Section 09 21 23 Painting
.3 Section 13 18 00 Dasherboards

1.3 References

.1 The Ontario Building Code.
  .1 MMAH Supplementary Standard SB-8, September 14, 2012. Design, Construction and Installation of Anchorage Systems for Fixed Access Ladders.
.2 ASTM International, (ASTM)
  .1 ASTM A53/A53M-12 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
  .2 ASTM A123/A123M-12 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
  .3 ASTM A153/A153M-09 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
  .4 ASTM A307-10 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  .5 ASTM A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  .6 ASTM A385/A385M-11 Standard Practice for Providing High Quality Zinc Coatings (Hot Dip).
  .7 ASTM A570, Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
  .8 ASTM A1008/A1008M-12 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
  .9 ASTM A1011/A1011M-12a Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
  .10 ASTM D6386-10 Standard Practice for Preparation of Zinc (Hot Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
.3 Canadian Standards Association (CSA International)
  .1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel

.2 CSA-S16-09, Design of Steel Structures
.3 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.4 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
.5 CSA W48-06 (R2011), Filler Metals and Allied Materials for Metal Arc Welding
.6 CSA W59-13 Welded Steel Construction (Metal-Arc Welding)

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.40-97, Anticorrosive Structural Steel Alkyd Primer
.2 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint
.3 CAN/CGSB 1.181-99, Ready Mixed, Organic Zinc Rich Coating.

.5 Steel Structures Painting Council, Systems and Specifications Manual.
.1 CISC/CPMA 1-73a, A Quick drying One-coat Paint for Use on Structural Steel.
.2 CISC/CPMA 2-75, A Quick drying Primer for Use on Structural Steel.

1.4 Submittals

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

.2 Shop Drawings:
.1 Submit Shop and Erection Drawings for review.
.2 Verify site dimensions before proceeding with shop fabrication and to suit field conditions and field openings.
.3 Show and describe in detail all the work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as all other pertinent data and information, including type, size and description of all fasteners and anchors.

1.5 Qualifications

.1 Work of this Section shall be executed by a firm thoroughly conversant with laws, bylaws and regulations which govern and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturers specializing in this work, and having a minimum ten (10) years proven experience in the fabrication of high quality metal fabrications. Use workmen skilled in work of this Section.

.2 Welding shall be performed by trades persons certified by The Canadian Welding Bureau under CSA Standard W47.1.

1.6 Design Requirements

.1 Design ladder construction and connections to OBC vertical and horizontal live load requirements

.2 Design service access ladders to Ministry of Labour requirements.

.3 All access ladders shall be designed to the minimum requirements noted on the drawings and MMAH Supplementary Standard SB-8, whichever is more stringent. This shall include through-bolting anchors at masonry walls.

1.7 Examination

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

1.8 Shipping, Handling and Storage

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

.2 Label, tag or otherwise mark work supplied for installation by other Sections to indicate its function, location and shop drawing description.

.3 Protect work from damage and deliver to a location at the site in order to meet the scheduling requirements.

1.9 Waste Management and Disposal

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

Part 2 Products

2.1 Materials

.1 Architectural and Miscellaneous Mild Steel: CSA G40.20-04/G40.21-04 (R2009), Grade 300W.

.2 Machine Bolts and Nuts: ASTM Standard A307-10 low carbon steel externally and internally threaded standard fasteners. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed

fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.

.3 Sheet Steel: (Commercial Quality) ASTM A1008/A1008M-12, stretcher leveled or temper rolled.

.4 Welding Materials: CSA W59.

.5 Welding Electrodes: CSA W48 Series.

.6 Sulphur: Commercial Grade for setting of steel posts.
.7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

.8 Isolation Coating: alkali resistant bituminous paint to CAN/CGSB 1.108-M89.

.9 Adhesive Anchors: HILTI or Rawl Epoxy Adhesive Anchors sized to suit loading conditions, suitable for substrate. Adhesive to be low VOC type (maximum 250 g/l) to SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

2.2 Finishes

.1 Galvanizing: hot dipped with zinc coating to CAN/CSA G164 or ASTM A153/A153M.

.2 Galvanized coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strips. Galvanized after all welding and grinding complete. No welding or grinding of galvanized products allowed.

.3 Zinc Rich Primer: zinc rich, organic, ready mix to CAN/CGSB 1.181. Low VOC type.

Part 3 Execution

3.1 General

.1 Fabricate to reviewed shop drawings and in general to details, sizes and materials indicated on drawings and specified herein.

.2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.3 Fabricate work complete with all components required for anchoring; bolting or welding to structural frame; standing free or resting in frames or sockets; in a safe and sure manner.

.4 Where possible fit and shop assemble various sections of the work and deliver to site in largest practicable sections. Where shop fabricating is not possible make trial assembly in shop.

.5 Ensure exposed welds are continuous for length of each joint.

.6 Grind and fill all welds after inspection and acceptance.

.7 Fill all open joints, depressions, seams with metallic paste filler or by continuous brazing or welding and grind smooth to true sharp arises and profiles.

.8 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings.

.9 Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.

.10 Supply all fastenings, anchors, accessories required for fabrication and erection of work of this Section. Such items occurring on or in an exterior wall or rink apron slab shall be hot dip galvanized. Make thread dimensions such that nuts and bolts will fit without re-threading or chasing threads.

.11 Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise shown or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

.12 Welding shall be done by the shielded metal arc method in accordance with the requirements CSA W59. Welding operators shall be currently certified under CSA W47.1 for the work they are performing.

.13 Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two (2) or more layers, each layer shall be cleaned before the next layer is deposited. Care shall be taken to minimize stresses due to heat expansion, contraction and distortion by using proper sequence in welding and by approved methods.

.14 Appearance, quality of welds made, methods of correcting defective work shall be in accordance with CSA W59.

3.2 Galvanizing

.1 Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G164-M92 (R2003) or A123/A123M-12.

.2 Galvanizing of architecturally exposed steel shall be completed by a company recognized in the application of High Quality galvanized finishes and in accordance with ASTM A385.

.3 Prepare metals to be galvanized in accordance with requirements of ASTM D6386.

.4 Coating Requirements:
.1 Weight: the weight of the galvanized coating shall conform to Table 1 of CAN/CSA G164, or paragraph 6.1 of A123/A123M-12 and Table 1 of ASTM A153/A153M (as appropriate).
.2 Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the stated end use of the coated article. The integrity of the coating shall be determined by visual inspection and coating thickness measurements.
.3 Adhesion: the galvanized coating shall be sufficiently adherent to withstand normal handling.

3.3 Steel Weld Plates and Angles

.1 Provide steel weld plates and angles not specified in other Sections, for items supported from concrete or masonry construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete or masonry.

3.4 Ladders

.1 Conform to Ministry of Labour and Ontario Building Code requirements where applicable.

.2 Unless otherwise detailed, construct ladders as follows:
.1 Stringers shall be minimum 19 x 38 mm steel bar extending from 150 mm above floor or roof, to minimum 1220 mm above top rung.
.2 Rungs shall be 19 mm solid steel bars, 400 mm long, spaced at 300 mm o.c. vertically and welded to stringers.
.3 Attach stringers to walls with 10 mm x 38 mm steel bar yokes, U-shaped, spaced at maximum 1220 mm o.c. vertically. Locate centre line of rungs not less than 150 mm from face of walls.
.4 Provide safety cages to Ministry of Labour standard details where indicated.
.5 Where indicated, provide horizontal and vertical returns or stringers.
.6 Exterior ladders shall be galvanized. Rungs all have knurled rungs or non-slip finish.

3.5 Fasteners and Anchors

.1 Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.

.2 Securely anchor components in place. Unless otherwise indicated, anchor components as follows:
- .1 To concrete and solid masonry with expansion or epoxy adhesive type anchors.
- .2 To hollow construction with toggle bolts.
- .3 To thin metal with screws or bolts.
- .4 To thick metal with bolts or by welding.
- .5 Fill space between railing members and sleeves with non-shrink grout.

.3 Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.

.4 Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.

.5 Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.

.6 Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self-drilling and tapping screws or bolts.

3.6 Installation

.1 Provide all bracing and shoring required to support the work of this Section during installation.

.2 Work shall be fabricated and erected square, plumb and true, straight, level and accurately fitted to size detailed on reviewed Shop Drawings. All joints shall be welded unless otherwise indicated. Exposed welds shall be ground smooth and/or flush. Exposed work shall be finished smooth and even, close joints and neat connections. Exposed welds continuous for full length of joints.

.3 Where anchors or fastenings, sleeves, have to be built in by other trades, supply all necessary templates, instructions and supervision to ensure satisfactory installation.

.4 Do all drilling, cutting and fitting necessary to attach this work to adjoining work and make it complete.

.5 Provide all components required for anchoring. Make anchoring in concealed manner where possible. Exposed anchors shall be approved by the Consultant, shall be neat, and of the same material, colour, texture and finish of base metal on which they occur. Exposed fastenings shall be evenly spaced.

.6 Grind all field welds smooth.

.7 Touch up shop coat of prime paint where damaged by field erection.

.8 Touch up galvanized finishes with zinc rich paint.

3.7 Schedule

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

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 04 22 00 Concrete Unit Masonry
.4 Section 04 27 00 Multiple Wythe Unit Masonry
.5 Section 05 50 00 Metal Fabrications
.6 Section 06 20 00 Finish Carpentry
.7 Section 07 21 13 Building Insulation
.8 Section 07 26 00 Vapour Retarders
.9 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: 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 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 Wood Preservative to CSA O80 SERIES.

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

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

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

.13 Fibreglass Insulation: to CSA A101, loose batt type, minimum density of 24 kg/m3.

.14 Connectors: Simpson Strong Tie galvanized steel connectors, brackets, gussets and the like as required, and as designed by the Truss Engineer.

.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.

3.2 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 05 50 00 Metal Fabrications
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 92 00 Joint Sealants
.4 Section 08 11 00 Metal Doors and Frames
.5 Section 08 71 10 Door Hardware
.6 Section 09 21 16 Gypsum Board
.7 Section 09 91 23 Interior Painting
.8 Section 10 28 10 Toilet and Bath Accessories

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E1333-14 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
  .2 ASTM F1667-18a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
.2 American National Standards Institute (ANSI)
  .1 ANSI A208.1-2009 Particleboard.
  .2 ANSI A208.2-2016 Medium Density Fibreboard (MDF) for Interior Applications.
  .3 ANSI/HPVA HP-1-2016 Standard for Hardwood and Decorative Plywood.
  .4 ANSI/NEMA LD 3-2005 High Pressure Decorative Laminates
.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
  .1 Architectural Woodwork Quality Standards Illustrated.
.4 Canadian Plywood Association (CanPly)
  .1 The Plywood Handbook 2005.
.5 CSA Group (CSA)
  .1 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples.
  .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
  .3 CSA O112 SERIES-M1977 (R2006) Standards for Wood Adhesives
  .4 CSA O121-17 Douglas Fir Plywood.
  .5 CSA O141-05 (R2014) Softwood Lumber
  .6 CSA O151-17 Canadian Softwood Plywood
  .7 CSA O153-13 (R2017) Poplar Plywood.
  .8 CSA Z760-94 (R2001) Life Cycle Assessment

.6 Forest Stewardship Council (FSC)
  .1 FSC-STD-01-001-V4-0 FSC Principle and Criteria for Forest Stewardship.
  .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
  .3 FSC Accredited Certified Bodies.
.7 National Hardwood Lumber Association (NHLA)
  .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
.8 National Lumber Grades Authority (NLGA)
  .1 Standard Grading Rules for Canadian Lumber 2005.
.9 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
  .1 SCAQMD Rule 1168-03 Adhesives and Sealants Applications

1.4 Submittals

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

.2 Submit shop drawings.
  .1 Indicate details of construction, profiles, jointing, fastening and other related details.
  .2 Indicate materials, thicknesses, finishes and hardware.

.3 Submit duplicate 300 mm long samples of each type of solid wood or 300 x 300 mm square type of plywood to receive stain or natural finish.

.4 Submit samples of plastic laminate materials.

1.5 Quality Assurance

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

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

.3 Wood materials certified by Forestry Stewardship Council.

1.6 Shipping, Handling and Storage

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

.2 Protect materials against dampness during and after delivery.
.3 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.7 Waste Management and Disposal

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

Part 2 Products

2.1 Lumber Materials

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

.2 Hardwood Lumber: To NHLA requirements, moisture content of 6% maximum, maple species, AWMA Custom Grade.
  .1 Bench Slats: Select Grade Maple.

2.2 Panel Materials

.1 Douglas Fir Plywood (DFP): to CSA O121, standard construction.
  .1 Forestry Stewardship Council (FSC) certified.
  .2 Urea-formaldehyde free.

.2 Canadian Softwood Plywood (CSP): to CSA O151, standard construction.
  .1 Forestry Stewardship Council (FSC) certified.
  .2 Urea-formaldehyde free.

.3 Hardwood Veneered Plywood: To CSA O115, of thickness indicated, Type II Select Grade Maple, where transparent finish is required and Solid Grade where paint finish is required. Good two sides for work with two sides exposed to view; good one side for work with one side exposed to view. Use particle board core with Type I bond.

.4 Particleboard: to ANSI A208.1.
  .1 Forestry Stewardship Council (FSC) certified.
  .2 Urea-formaldehyde free.

.5 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m³.
  .1 Forestry Stewardship Council (FSC) certified.
  .2 Urea-formaldehyde free.

2.3 Plastic Laminate

.1 Plastic laminate facing sheet: ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates (HPDL) PF-S and GP-S;
  .1 Backing sheet: BK Grade by manufacturer of facing sheet.
  .2 Core: CSA O151
  .3 Laminating adhesive: CSA O112.
  .4 Core sealer: clear water resistant synthetic resin sealer.
  .5 Colours, pattern, gloss and texture will be selected by Consultant from full range of products by one of the following:
    .1 Formica,
    .2 Arborite,
    .3 Pionite,
    .4 Nevamar
    .5 Wilsonart.
  .6 Up to three colours and patterns will be selected by the Consultant.

2.4 Accessories

.1 Rough Hardware: Bolts, lag screws, anchors, nails and expansion shields required to secure this portion of work. Rough hardware hot dip galvanized conforming to latest edition of CSA G164. All fasteners used in damp or wet areas to be suitable for use in corrosive environment. Use hot dipped galvanized or other material approved by the Consultant.

.2 Nails and staples: to ASTM F1667 galvanized.

.3 Wood screws: to CSA B35.4 plain type and size to suit application.

.4 Stainless Steel hardware: Type 316 Stainless steel for exposed or wet locations, tamper proof.

.5 Splines: wood or metal to suit application.

.6 Adhesive: recommended by manufacturer, waterproof type, maximum VOC limit 30 g/L SCAQMD Rule 1168 - Adhesives and Sealants Applications.

Part 3 Execution

3.1 Construction

.1 Fastening:

.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

.2 Interior and exterior frames: Set frames with plumb sides, level heads and sills, and secure.

3.2 Fabrication

.1 General:
.1 Field measure all dimensions.
.2 Fabricate all finish carpentry items to AWMAC premium grade, and in accordance with the reviewed shop drawings.
.3 Set nails and screws, apply stained plain wood filler to indentations, sand smooth and leave ready to receive finish.
.4 Provide 10 mm thick solid matching wood strip on plywood and particle board edges 13 mm or thicker, exposed in final assembly.
.5 Ease edges of solid lumber components to 1.6 mm radius.

.2 Plastic Laminate Components
.1 Fabricate plastic laminate window stools as detailed. Stools shall be minimum 19 mm thick plastic laminate plywood, with edge banding on all exposed faces. Fabricate in one piece, without joins, wherever as possible. Where necessary, joins shall be centred on window mullions and tightly butted together with concealed splines.
.2 Fabricate vanities and change room shelving units as detailed.
.3 Unless otherwise specified herein, comply with requirements of ANSI/NEMA LD 3 Annex 'A'.
.4 Assembly: Bond plastic laminate to core with adhesive, under pressure.
.5 Core: unless otherwise indicated: 19 mm thick.
.6 Balanced construction: plastic laminate covered components shall be of balanced construction, with plastic laminate on both faces of core. Seal core edges not covered with plastic laminate.
.7 Use largest practicable plastic laminate sheet size.
.8 Provide joints symmetrically; provide joints as corners and at changes in superficial areas; provide concealed draw bolt anchors and joints. All butt joints shall have a blind spine.
.9 Openings and cutouts:

.1 Radius internal corners at least 3 mm and chamfer edges.
.2 Where core edge is to remain exposed, cover with plastic laminate edging.
.3 Where core edge is to be concealed, seal with sealer.

3.3 Installation

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

.2 All fastenings shall be concealed.

.3 Provide heavy duty grounds as necessary for secure installation of finish carpentry work.

.4 All wood surfaces shall be sanded smooth, ready to receive finish.

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

.6 Form joints to conceal shrinkage.

.7 Set and secure materials and components in place, rigid plumb and square.

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

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

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

.11 Apply mildew resistant sealant to perimeter of all vanity tops and window stools as specified in Section 07 92 00.

3.4 Benches

.1 Coordinate benches in dressing rooms and change cubicles with Section 05 50 00.

.2 Install solid maple bench seats as detailed with countersunk stainless steel carriage bolts.

3.5 Door Installation

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

3.6 Finish Hardware Installation

.1 Finish hardware will be supplied for installation under this Section.

.2 Prepare doors and frames in accordance with manufacturer's instructions and templates. Install finish hardware complete in all respects, hang doors and make adjustments necessary.

.3 Doors shall swing freely. Where thresholds are to be used, door bottom shall be finished to suit thresholds as required.

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

3.7 Miscellaneous

.1 Install Toilet and Bath Accessories as specified in Section 10 28 10, including accessories supplied by Owner.

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 05 50 00 Metal Fabrications
.2 Section 06 10 00 Rough Carpentry
.3 Section 06 20 00 Finish Carpentry
.4 Section 06 61 16 Solid Surfacing
.5 Section 07 92 00 Joint Sealants

1.3 References

.1 ANSI A208.1, Mat-Formed Wood Particleboard
.2 CAN/CGSB-11.3-M, Hardboard
.3 CSA O115-M, Hardwood and Decorative Plywood
.4 CSA O121-M, Douglas Fir Plywood
.5 CSA O151-M, Canadian Softwood Plywood
.6 CSA O153-M, Poplar Plywood

1.4 Submittals

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

.2 Submit detailed shop drawings for cabinetwork showing proposed assembly, connections, anchorage, materials, dimensions, thickness, and finishes.

.3 Submit duplicate, 300 mm long samples of each type of solid wood and 300 x 300 mm samples of each type of plywood used in exposed work and scheduled to receive stained or natural finish, complete with specified finish, prior to fabrication of cabinetwork.

.4 Submit sample of each type of cabinet hardware component used.

1.5 Quality Assurance

.1 Unless otherwise specified, carry out finish carpentry work in accordance with the requirements of "Millwork Standards" (latest issue) of Architectural Woodwork Manufacturers' Association of Canada (AWMAC), Custom Grade

1.6 Definition

.1 "Exposed" when referred to in this Section, shall mean all parts which can be viewed and shall include interiors of cabinets, backs of doors, shelving and gables.

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 against damage, including damage by excessive changes in moisture content, during delivery and storage. Maintain minimum storage temperature of 16° C, and relative humidity of 25% to 55%.

.4 Cover plastic laminate faces at shop with heavy Kraft paper.

.5 Do not deliver finish carpentry components to site before all wet trades are completed, the building is closed in and humidity conditions on site are acceptable. Do not deliver during rain or damp weather

.6 Store materials on site in such a way as to prevent deterioration or loss or impairment of essential properties. Prevent excessive moisture gain of materials.

1.8 Protection

.1 Provide coverings as necessary to protect finish carpentry components from damage of any kind during storage and after installation.

1.9 Waste Management and Disposal

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

1.10 Warranty

.1 At no cost Owner, remedy any defects in work of this Section due to delamination and warping of plastic laminated finish carpentry components for a period of two

(2) years from date of Substantial Performance. Provide Owner with a written warranty to this effect.

Part 2 Products

2.1 Materials

.1 Solid Wood:
- .1 Unless otherwise indicated, provide AWMAC Custom Grade.
- .2 All wood materials shall be new, straight and clean, free of sap, knots, pitch, and other defects, except as permitted by applicable grading rules.
- .3 All wood shall be kiln dried to a maximum moisture content of 7%.
- .4 Softwood: to CSA O141, dressed all sides used in concealed locations.

.2 Veneers: As required by AWMAC's STANDARDS (NAAWS) for its use and Grade specified. Flat sliced maple veneers from architectural grade flitches to provide uniform grain pattern and colour throughout, free of dark streaks and blemishes. Sharp variation of grain patterns and colour between adjacent jointed pieces is not acceptable.

.3 Plywood:
- .1 Veneer core plywood: hardwood with a non-telegraphing grain manufactured with exterior glue. To ANSI/HPVA HP-1-09, minimum five (5) plies.
- .2 Soft Plywood: to CSA O151-M Standard Grade, solid two sides. Use in concealed locations only, except as indicated.
- .3 To ANSI/HPVA HP-1-09, Grade A face, book matched, flat cut wood veneer face and No. 3 edge.

.4 Edgeband
- .1 For wood veneer casework: Veneer of same species and cut as exposed surfaces.
- .2 For Plastic Laminate Casework: [PVC] [High Pressure Decorative Laminate (HPDL)].

.5 Hardboard: To CGSB 11-GP-3M, Type 2, 6 mm thick or as indicated.

.6 Solid Surfacing Countertops: as specified in Section 06 61 16 and where indicated on drawings.

.7 Stainless Steel Countertops:
- .1 To ASTM A167 and ASTM A440, type 304 with AiSI No. 4 finish, 16 gauge.
- .2 Laminated to 2 layers of 13 mm marine grade plywood core.

.8 Plastic laminate facing sheet: ANSI/NEMA LD 3 High-Pressure Decorative Laminates (HPDL) PF-S and GP-S;
  .1 Backing sheet: BK Grade by manufacturer of facing sheet.
  .2 Core: CAN3-0188.1M, Grade R.
  .3 Laminating adhesive: CAN3-O112 Series M.
  .4 Core sealer: clear water resistant synthetic resin sealer.
  .5 Colours, pattern, gloss and texture will be selected by Consultant from full range of products by one of the following:
    .1 Formica,
    .2 Arborite,
    .3 Pionite,
    .4 Nevamar
    .5 Wilsonart.
  .6 Up to three (3) colours and patterns will be selected by the Consultant.

.9 Fasteners and Adhesive:
  .1 Nails and staples: CSA B111, galvanized, spiral head nails.
  .2 Screws: To CSA B35.4 zinc, cadmium or chrome plated steel.
  .3 Splines: wood or metal, to suit application.
  .4 Adhesive: To CSA 0112-M, type as appropriate for the intended application waterproof. Complying with ANSI/WDMA I.S-1 series. Contact bond not acceptable.
  .5 Avoid the use of adhesives, preservatives, synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content.

.10 Cabinet Hardware: Products listed are a standard of acceptance. Products by other manufacturers, of equal quality and similar appearance may also be accepted subject to review and approval by Consultant.
  .1 Shelf Standards: Knape & Vogt KV80, Anochrome finish.
  .2 Brackets: Knape & Vogt KV180, Anochrome finish.
  .3 Hinges: Blum concealed hinges, 125° clip and 125° opening with self-closing spring. Full or half overlay. Nickel plated steel.
  .4 Cabinet Pulls: Richelieu D-Pull No: 30134-170, 96 mm c.c. brushed stainless steel.
  .5 Cabinet Locks: CCL 0737 pin tumbler MK & KA by room.
  .6 Catches: Type optional with manufacturer.
  .7 Provide other hardware and hardware accessories as detailed or required.
  .8 All exposed hardware to have Platinum (Mica) finish by Teknion or equivalent unless noted otherwise.

2.1 Fabrication

.1 Exposed joints and edges:
  .1 Uniformly space exposed joints unless otherwise indicated.
  .2 No edge grain shall be visible; mitre external corners, house internal fasteners. Glue mitred corners.
  .3 All exposed edges of plywood and particle board shall have solid wood edging, pressure glued. AWMAC No. 3 edge.
  .4 Ease edges of solid lumber components to 1.6 mm radius.

.2 Mechanical Fasteners:
  .1 Inconspicuously locate mechanical fasteners. Wherever possible, conceal fastenings.
  .2 Countersink nail heads.
  .3 Where exposed to view, countersink screw and bolt heads and fill holes with matching wood plugs.
  .4 Cutting and fitting: make cut-outs in work of this Section as required to accommodate work of other Sections.
  .5 Make provisions in cabinetwork to accept built-in appliances, provided by others.

.3 Plastic Laminate Components:
  .1 Unless otherwise specified herein, comply with requirements of CAN3-A172-M Appendix 'A'.
  .2 Assembly: Bond plastic laminate to core with adhesive, under pressure.
  .3 Core: unless otherwise indicated: 19 mm thick.
  .4 Balanced construction: plastic laminate covered components shall be of balanced construction, with plastic laminate on both faces of core. Seal core edges not covered with plastic laminate.
  .5 Use largest practicable plastic laminate sheet size.
  .6 Provide joints symmetrically; provide joints as corners and at changes in superficial areas; provide concealed draw bolt anchors and joints. All butt joints shall have a blind spine.

.4 Openings and cut-outs:
  .1 Radius internal corners at least 3 mm and chamfer edges.
  .2 Where core edge is to remain exposed, cover with plastic laminate edging.
  .3 Where core edge is to be concealed, seal with sealer.

2.2 Cabinetwork

.1 Except where otherwise detailed, use flush overlaid construction. Tenon, dado, dowel, or rabbet interior construction with all parts well glued. Shoulder mitre all exposed corners. Open ends or skeleton frames against walls are not permitted.

.2 Construct cabinetwork components of plastic laminate faced particle board or maple veneer plywood as indicated and in accordance with AWMAC Custom grade.

.3 Rout gables for pilaster strips where adjustable shelving is required.

.4 Construct shelving as indicated with edge moulding to match.

.5 Construct doors fronts of 19 mm plastic laminate faced plywood.

.6 Construct doors 19 mm thick with sides tongued into front and back housed into sides.

.7 Install cabinet hardware in accord with hardware manufacturer's directions. Unless otherwise indicated, provide each door with pull and with minimum two hinges. Provide locks where indicated.

.8 Apply moisture repellent sealer to concealed backs of cabinetwork.

.9 Countertops shall be solid surfacing as specified in Section 06 61 16. Coordinate installation and provide all necessary supports.

2.3 Finishes

.1 All exposed exterior and interior surfaces: plastic laminate as indicated. Colours selected by the Consultant.

.2 Wood Finish: 3 coats clear polyurethane finish on all sides as specified in Section 09 91 23. Factory finish wherever practical.

.3 Cabinet and case backs unexposed to view shall be back primed with one coat of moisture repellent sealer.

.4 Apply finishes in accordance with the AWMAC Manual and Section 09 91 23.

Part 3 Execution

3.1 Installation

.1 Verify adequacy of backing and support framing. Advise Contractor of areas and surfaces requiring further modifications for plumb, level, even or square fitting.

.2 Verify HVAC controls and systems are operating properly.

.3 Install work in accordance with AWMAC Installation Manual, Premium grade.

.4 Install cabinetwork components plumb, true and level and securely fasten in place.

.5 Accurately scribe and closely fit components to irregularities of adjacent surfaces.

.6 Accurately fit joints in true plane, locate joints overbearing or supporting surfaces.

.7 Provide mechanical fastening devices such as nails, screws and bolts required for fastening wood components. Provide concealed fastening of components.

.8 Where permitted, nail with small headed finishing nails. Countersink nail heads with nail setter.

.9 Install plastic laminate components using concealed fastening devices.

.10 Where components are fastened with screws or bolts, countersink screw and bolt heads and provide wood plugs matching surrounding wood.

.11 Where cabinetwork abuts other building elements, provide trim matching cabinetwork except where otherwise detailed.

.12 Where access is required to valves and other mechanical and electrical components, located behind cabinetwork, provide removable plywood access panels of size required and secure with four brass screws.

.13 Coordinate installation of solid surfacing countertops with Section 06 61 16.

.14 Apply mildew resistant silicone sealant to perimeter of all countertops as specified in Section 07 92 00.

3.2 Adjustment

.1 Upon completion of installation, inspect work of this Section and touch-up, where required, minor or damaged surface finish to restore it to original condition.

.2 Touch up exposed job made nail and screw holes, raw finishes resulting from job fitting, scratches and mars.

.3 Check operation of all moveable parts and, if necessary, adjust to ensure proper and smooth function.

.4 Replace damaged components which, in the opinion of the Consultant, cannot be satisfactorily repaired.

3.3 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 50 00 Metal Fabrications
.2 Section 07 92 00 Joint Sealants
.3 Section 06 20 00 Finish Carpentry

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM International (ASTM)
  .2 ASTM E84-21a Standard Test Method for Surface Burning Characteristics of Building Materials
.2 CSA Group (CSA)
  .1 CSA O151-17 Canadian Softwood Plywood
.3 Architectural Woodwork Institute (AWI)
  .1 AWI/AWMAC/WI's Architectural Woodwork Standards
.4 International Surface Fabricators Association (ISFA)
  .1 ISFA 2-01 (2013) Classification and Standards for Solid Surfacing Material
.5 American National Standards Institute (ANS)
  .1 ANSI ICPA-SS-1 (2001) Performance Standard for Solid Surface Materials

1.4 Submittals

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

.2 Product Data: Include detailed specification of construction and fabrication, manufacturer's installation instructions, and manufacturer's detailed recommendations for handling, storage, installation, protection, and maintenance.

.3 Shop Drawings: Installation details including location and layout of each type of fabrication and accessory.

.4 Samples: Duplicate samples of specified colours, 76 x 76 mm.

.5 Provide maintenance data for solid surface material countertops for incorporation

into Operation and Maintenance Manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Source Limitations: Obtain materials and products from single source.

.2 Fabricator Qualifications: Certified solid surface fabricator/installer.

.3 Installer Qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, including specific requirements indicated.
.1 Acceptable to or licensed by manufacturer.

1.6 Field Conditions

.1 Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

.2 Coordinate locations of utilities that will penetrate countertops or backsplashes.

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 Handle in a manner to prevent breakage. Brace parts if necessary. Transport in the near vertical position with finished face toward finished face. Do not allow finished surfaces to rub during shipping and handling.

.4 Store in racks in near vertical position. Prevent warpage and breakage. Store Inside away from direct exposure to sunlight.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of five (5) 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 Furnish manufacturer's 10-year material warranty.

Part 2 Products

2.1 Acceptable Manufacturer

.1 Dupont Corian
.2 Formica
.3 Wilsonart

2.2 Solid Surface Material

.1 Composition Solid-Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1 and ISFA-2.

.2 Panel thickness: 12.7 mm.

.3 Panel weight: 21.5 kg/m2

.4 Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
.1 Flame-Spread Index: 25 or less.
.2 Smoke-Developed Index: 50 or less.
.3 Flammability: To NFPA 101, Class A.

.5 Pattern and Finish:
.1 Counters: Corian Everest
.2 Change Room Benches: Corian Silver Birch
.3 Under Hair/Hand Dryers: Corian Glazier White

.6 Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

.7 Plywood: Exterior softwood plywood complying with CSA O151, CSP, B1 face, C-C inner plies and back. Touch Sanded.

2.3 Accessory Materials

.1 Adhesive for Bonding to other products: as recommended by solid surface material manufacturer.

.2 Sealant for Countertops: Comply with applicable requirements in Section 07 92 00.

.3 Heat Reflecting Tape: Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

.4 Insulating Fabric: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.4 Fabrication

.1 Fabricate countertops and benches according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI Architectural Woodwork Standards.

.2 Grade: Premium.

.3 Configuration:
  .1 Front: Pencil round edge 3.0 mm radius.
  .2 Backsplash and side splash: Pencil round edge 3.0 mm radius.

.4 Countertops: 12.7-mm thick, solid surface material with front edge built up with same material laminated to exterior grade plywood.

.5 Backsplashes: 12.7-mm thick, solid surface material.

.6 Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

.7 Fabricate with loose backsplashes and end splashes for field assembly.

.8 Joints: Fabricate in sections for joining in field, with joints at locations indicated on reviewed shop drawings.
  .1 Joint Locations: Not within 76 mm of a cutout or cooktop, 25 mm from inside corner for conventional seams, and not where countertop sections less than 900 mm long would result, unless unavoidable.

.9 Cutouts and Holes:
  .1 Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
  .2 Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop.
  .3 Provide vertical edges, rounded to 10-mm radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom.

.4 Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
.5 Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.
.6 Change Room Benches:
.1 Fabricate as detailed.
.2 Laminate solid surfacing to 9 mm exterior grade plywood.

Part 3 Execution

3.1 Examination

.1 Examine substrates to receive solid surfacing. Identify conditions detrimental to proper or timely installation. Do not commence installation until conditions have been corrected.

.2 Verify that substrates supporting quartz surfaces are plumb, level, and flat to within 3.0 mm/3.0 metres.

3.2 Preparation

.1 Precondition solid surfacing in accordance with manufacturer's printed instructions.

3.3 Installation

.1 Install components plumb and level, in accordance with approved shop drawings, Project installation details, and manufacturer's printed instructions.

.2 Joints between adjacent pieces of surfacing shall be flush, tight fitting, level, and neat. Securely join adjacent pieces with manufacturer's adhesive. Fill joints level to polished surface.
.3 Install countertops level to a tolerance of 3 mm in 2.4 m, 6 mm maximum. Do not exceed 0.4-mm difference between planes of adjacent units.

.4 Fasten countertops by adhering with 100-percent silicone material in dab format (not bead format) to base units into underside of countertop at 457 to 610 mm o.c. Shim as needed to align subtops in a level plane.

.5 Align adjacent surfaces and, using adhesive in colour to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

.6 Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

.7 Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

.8 Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

.9 Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

.10 Apply mildew resistant silicone sealant to perimeter of all countertops as specified in Section 07 92 00.

3.4 Protection

.1 Protect surfaces from damage until date of Substantial Completion. Repair or replace damaged components that cannot be repaired to Consultant’s satisfaction.

.2 Fabricator/installer shall provide the manufacturer's care and maintenance kit, review maintenance procedures and the warranty with the head of maintenance upon completion of the Project.

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 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 13 13	Bituminous Sheet Waterproofing
.5	Section 07 21 29	Sprayed Insulation
.6	Section 07 26 00	Vapour Retarders
.7	Section 07 27 13	Modified Bituminous Sheet Air Barriers
.8	Section 07 46 13	Preformed Metal Siding
.9	Section 07 92 00	Joint Sealants
.10	Section 08 11 00	Metal Doors and Frames
.11	Section 08 50 00	Aluminum Doors, Windows and Screens
.12	Section 31 23 10	Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C423-23 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  .2 ASTM C518-21 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  .3 ASTM C578-22 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 C665-23 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
  .6 ASTM C1620-16(2023) Standard Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants
  .7 ASTM D1621-16(2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  .8 ASTM D1623-17(2023) Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
  .9 ASTM E1677-19 Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
  .10 ASTM E84-23d 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 Underwriters Laboratories (UL)

.1 UL 1715 - Fire Test of Interior Finish Material

.5 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.

.6 Uniform Building Code (UBC)

.1 UBC 26-3 Room Fire Test Standard for Interior of Foam Plastic Systems

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 Board Insulation

.1 Rigid insulation at perimeter of ground floor slab and below grade: extruded expanded polystyrene to ULC S701.1 TYPE 4. HFO blowing agents. Thickness as detailed, 400 x 2440 mm boards with butt edges. Material shall have the following characteristics when tested to the reference standards:
  .1 Compressive Strength: ASTM D1621: 210 kPa.
  .2 Water Absorption: ASTM D2842: maximum 0.7% by volume.
  .3 Water Absorption: ASTM C272: maximum 0.1% by volume.
  .4 Water Vapour Permeance, ASTM E96: 52 ng/Pa•s•m2
  .5 Thermal resistance RSI: ASTM C518: 0.88/25 mm
  .1 Basis of Design: Soprema XPS-30

.2 Drainage Board Insulation: Rigid drainage board insulation at perimeter of basement walls: extruded expanded polystyrene to ASTM C578 Type IV, ULC S701.1 Type 4 and CCMC Class A Type 2 drainage requirements. Shiplapped. Insulation shall have minimum compressive strength of 210 kPa, RSI value of not less than 0.87/25 mm, and a moisture absorption rate of not more than 0.9% by volume and grooved drainage channels. Thickness as detailed, 400 x 2440 mm boards with butt edges.
  .1 Styrofoam Perimate Insulation as manufactured by DuPont de Nemours Inc.
  .2 Premier Drainage Board by Fransyl.

2.2 Concrete Faced Insulated Perimeter Wall Panels

.1 Panel Performance:
  .1 Wall Panel System Fire Test:
    .1 Meets Uniform Building Code (UBC) 26-3 Room Fire Test Standard for Interior of Foam Plastic Systems. Criteria are to maintain coverage of foam substrate up to 2438 mm from interior corner, over the duration of the test.
    .2 Equivalent to current UL 1715 and UBC 97 revised.
  .2 Negative Wind Load And Gravity Shear Load Tests:
    .1 Clips spaced at 610 mm along each horizontal joint can safely carry the wall panel vertical weight and support the panel under negative wind pressures of up to 1.2 kPa with a safety factor of 2.

.2 Construction: Perimeter Foundation Insulation: Extruded polystyrene board to ASTM C578 (ULC 701.1) Type IV, rigid, closed cell, with integral high density skin, c/w integral 8 mm thick latex-modified concrete facing.
  .1 Board Size: 610 mm by 1219 mm by thickness indicated.
  .2 Edges: Tongue and groove sides, square edge ends.
  .3 Maximum Use Temperature: 74 °C.
  .4 Thermal Resistance ASTM C518: Long term aged R-value of 0.03 sm K/W per mm.
  .5 Foam Compressive Strength, ASTM D1621, minimum: 240 kPa.
  .6 Compressive Strength: to ASTM D1621, minimum 275.6 kPa
  .7 Water Absorption ASTM D2842: <0.1 (0.7% by volume maximum).
  .8 Water VapoUr Permeance (ASTM E96): 50 ng/Pas m.
  .9 Coefficient of Lineal Thermal Expansion (ASTM D696, mm/m x degree C: 6.3 x 10-.

.3 Material: WallGUARD Concrete Faced Insulated Perimeter Wall Panels as manufactured by FinPan.

.4 Accessories:
.1 Metal Cap Flashing: 0.61mm galvanized steel J-channel; 57mm wide, 102 mm long leg and 57mm short leg; prefinished in colour as selected.
.2 Clips and Fasteners: corrosion-resistant type, sized to suit application; as supplied by insulation manufacturer.

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

.6 Primer for concrete and masonry surfaces recommended by the adhesive manufacturer for the materials to be adhered.

2.3 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.

2.4 Sprayed Insulation

.1 Sprayed insulation for exterior wall assemblies is specified in Section 07 21 29.

2.5 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.

2.6 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 Drainage Board Insulation

.1 Verify that all masonry joints are struck flush and that other conditions are satisfactory for proper installation.

.2 Remove concrete fins and mortar projections that interfere with placement of insulation boards.

.3 Vertical Insulation:
  .1 Apply insulation boards to exterior face of exterior foundation walls except where otherwise indicated.

.2 Extend insulation at least 610 mm down from immediately under floor slabs-on-grade.
.3 Adhere insulation to wall by applying 50 mm diameter spots of adhesive to insulation boards 400 mm o.c. both ways.

.4 Cut insulation to fit snugly around pilasters, projections, curves and irregularities on the wall surface. Fill voids with insulation.

3.4 Concrete Faced Insulated Perimeter Wall Panel Installation

.1 Perimeter Insulation Substrate Examination
.1 Verify that the insulation boards and adjacent materials are compatible.
.2 Verify that the substrate is flat, sound, clean and remove any masonry irregularities or jagged surfaces on the foundation wall.

.2 Perimeter Insulation Installation:
.1 Layout concrete-faced insulation boards to maximize board sizes. Do not use boards less than 152 mm wide.
.2 Install concrete-faced insulation board system in orientation as indicated or to maximize full sheets. Complete with fastening clips and cap flashing in accordance with manufacturer's installation guidelines

3.5 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.

3.6 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.

3.7 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 03 30 00 Cast-in-Place Concrete
.2 Section 04 27 00 Multiple Wythe Unit Masonry
.3 Section 05 21 00 Structural Metal Stud Framing
.4 Section 06 10 00 Rough Carpentry
.5 Section 07 21 13 Building Insulation
.6 Section 07 42 55 Fibre Reinforced Cement Panels
.7 Section 07 46 13 Preformed Metal Siding
.8 Section 07 92 00 Joint Sealants
.9 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D1621-16 Standard Test Method for Compressive Properties of Rigid Cellular Plastics
  .2 ASTM D1622-20 Standard Test Method for Apparent Density of Rigid Cellular Plastics
  .3 ASTM D1623-17 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
  .4 ASTM D2842-19 Standard Test Method for Water Absorption of Rigid Cellular Plastics
  .5 ASTM D6226-21 Standard Test Method for Open Cell Content of Rigid Cellular Plastics
  .6 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
  .7 ASTM E283-19 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  .8 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
.2 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-18 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
  .2 ULC 705.1-15 Standard for Thermal Insulation - Spray Applied Rigid Polyurethane Foam, Medium Density - Material Third Edition.
  .3 ULC 705.2-05 Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application
  .4 ULC 770-15 Standard Test Method for Determination of Long-term Thermal Resistance of Closed-Cell Thermal Insulating Foams
.3 Canadian Urethane Foam Contractors Association (CUFCA)
  .1 Manual for Installers of Spray Polyurethane Foam Thermal Insulation,
  .2 Quality Assurance Program.
.4 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1168-03 Adhesives and Sealants Applications.

1.4 Submittals

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

.2 Installer Qualifications: Submit proof confirming the installing contractor is licensed by the manufacturer's quality and training program and certified to perform the installation of the product or system specified in accordance with ULC 705.2.

.3 Submit field quality control procedures to be utilized by the applicator to ensure proper preparation and installation of the materials specified

.4 Submit two 300 mm x 300 mm samples of finished product to Consultant.

.5 Provide the CCMC Evaluation Report and the manufacturer's documentation confirming material has been evaluated and conforms to the requirements of ULC 705.1.

.6 Manufacturer's installation instructions: indicate preparation, installation requirements and techniques, product storage and handling criteria, and limitations of the material.

.7 When the spray polyurethane foam is the material in an air barrier assembly, submit documentation to confirm that the material meets the requirements of the CCMC's Technical Guide for Air Barrier Materials.

1.5 Test Reports

.1 Submit test reports, verifying qualities of insulation that meet or exceed requirements of this specification.

1.6 Design Requirements

.1 Provide materials which maintain continuity of thermal insulation and air barrier at building enclosure in conjunction with thermal and air barrier materials specified elsewhere.

.2 Finished RSI value or thickness of spray applied insulation shall be as indicated on the drawings.

1.7 Qualifications

.1 Contractor performing work under this section must be certified by the manufacturer and licensed under the SPF Quality Assurance Program (QAP) used by CUFCA (Canadian Urethane Foam Contractors Association or Caliber QAP).

.2 Installers performing work under this Section must have at least 5 years of experience in the application of spray polyurethane foam insulations and must be licensed under the SPF Quality Assurance Program. Installers shall be trained by CUFCA/NECA (National Energy Conservation Association) and certified by PSDI in accordance with the training requirements outlined in ULC 705.2. Applicators shall have their photo-identification certification cards in their possession and available on the project site, for inspection upon request.

.3 Conduct on-site daily testing as required by the ULC 705.2 Installation Standard. The Licensed Installer shall complete the Daily Work Report as required by the ULC 705.2. Forward to the Consultant copies of the Daily Work Record upon request. Submit copies of the Daily Work Records or a monthly summary sheet to the CUFCA office, on a monthly basis, as required by the SPF Quality Assurance Program used by CUFCA.

1.8 Quality Assurance

.1 A pre-installation meeting shall be held prior to the commencement of spray operations to ensure isolation of the immediate spray area and non-interference with other trades.

.2 Coordinate with other Sections in the preparation of mockups for each exterior wall system indicated.
.1 Locate mockups as directed by the Consultant.
.2 Mockups shall be minimum 1 m^2.
.3 Modify mockups as necessary for Consultants approval. Mockups may remain in place as part of completed work after approval.
.4 Approved mockups shall represent standard for remainder of work.

1.9 Shipping, Handling and Storage

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

.2 Deliver materials in original containers and packaged with labels. Containers shall be marked as required by ULC 705.1. The “use before” date shall be included on the drum label.

.3 Material shall be stored in a safe manner as recommended by the manufacturer, as required by ULC 705.2. During cold weather, store raw materials in heated storage.

1.10 Environmental Requirements

.1 Apply spray polyurethane foam when chemical, atmospheric and cavity/surface temperatures are within the limitations required by the ULC 705.2 and as recommended by the manufacturer.

1.11 Protection

.1 Ensure continuous ventilation of the work area, through a fresh air intake and the extraction of foul air, during the course of the application process and for a period of 24 hours following application.

.2 Install temporary partitions in order to prevent any effect on the ambient air outside of the work area, from spray applied insulation material.

.3 Ensure all structures are well protected, in accordance with the manufacturer’s recommendations.

.4 Protect all adjacent surfaces and equipment against any damage that may be caused by dispersion and overspray of insulation material beyond the prescribed limits.

1.12 Sequencing and Scheduling

.1 Co-ordinate this work with the work of all Sections referencing this work.

.2 All foam insulation closures and substrates shall be completed and secure before the work of this Section commences.

1.13 Waste Management and Disposal

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

.2 Empty isocyanate containers to be decontaminated or removed from site on a daily basis.

1.14 Warranty

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

PART 2 PRODUCTS

2.1 Insulation/Air Barrier Material

.1 Sprayed polyurethane foam material, when tested, shall meet the requirements of ULC S705.1.
.1 Certified by EcoLogo.
.2 Listed by Greenguard as a low emitting material.
.3 Blowing Agent: Product to utilize Zero ODS (Ozone Depleting Substance) blowing agent.
.4 Thermal resistance LTTR (ULC 770):

THICKNESS	THERMAL RESISTANCE	
Millimetres	R Value	RSI
	(ft2.hr.°F/Btu)/in	(m2.°C/W)
50	12.2	2.14
63.5	15.8	2.78
75	18.9	3.33
100	25.8	4.55
102	26.2	4.62
127	33.0	5.82

.2 Spray polyurethane foam insulation to ULC 705.1 and meeting the following criteria:

PHYSICAL PROPERTIES	TEST PROCEDURE	UNITS	RESULT
Density (min.)	ASTM D1622	Kg/m^3	28.9
Compressive Strength (min.)	ASTM D1621	KPa	201
Tensile Strength (min.)	ASTM D1623	KPa	325
Water Absorption (96 hours) (max.)	ASTM D2842	% by volume	0.62
Water Vapour Permeance without skins. 50 mm Thickness (max)	ASTM E96	$ng/Pa{\cdot}s{\cdot}m^2$	50
Open Cell Content (max)	ASTM D6226	%	6.0
Air Leakage	ASTM E283 and E330	$l/s{\cdot}m^2$@75 Pa	0.0053
Flame Spread	ULC 102		<500

.3 Approved Product:
.1 Walltite v.3 by BASF The Chemical Company
.2 ICYNENE MD-C- 200-v2 by Icynene Inc.
.3 PFSI Polar Foam PF-7300-0 SOYA
.4 CertainTeed Certaspray
.5 Johns Manville Corbond III
.6 Carlisle Sealtite Pro One Zero.

.4 The sprayed polyurethane foam shall exceed the requirements of the CCMC Technical Guide for Air Barrier Systems, as outlined by the Institute for Research in Construction - National Research Council of Canada (0.05 L/m². Indoor Humidity greater than 55%).

.5 Primers: in accordance with manufacturer's recommendations if required for surface conditions.

2.2 Equipment

.1 The equipment used to spray the polyurethane foam material shall be in accordance with ULC 705.2 and the equipment manufacturer's recommendations for specific type of application.

.2 Equipment settings are to be recorded on the Daily Work Record as required by ULC 705.2.

.3 Each proportioner unit to supply only one spray gun.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that surfaces and conditions are suitable to accept work required in this Section.

.2 Ensure that all work by other trades that may penetrates through the thermal insulation is in place and complete.

.3 Report, in writing, defects in surfaces or conditions which may adversely affect the performance of products installed under this section to the Consultant; prior to commencement of work.

.4 Do not commence work until defects have been corrected.

3.2 Protection

.1 Mask and cover adjacent areas to protect from over spray.

.2 Apply primers for special condition as required by foam manufacturer.

.3 Ensure any required foam stop or back up material are in place to prevent over spray and achieve complete seal.

.4 Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes. Provide for make-up air.

.5 Clean work area prior to commencing spray operations.

.6 Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spay area.

.7 Mask and cover adjacent areas to protect from over spray.

3.3 Surface Preparation

.1 Surfaces to receive sprayed polyurethane foam insulation shall be frost free and not coated with release agents or other deleterious substances. Commencement of work shall be deemed as acceptance of existing work and conditions.

.2 Surfaces to receive sprayed polyurethane foam insulation shall be clean, dry and properly fastened to ensure adhesion of the polyurethane foam to the substrate.

.3 Ensure that surface preparation and any primers required conform to the manufacturer's instructions.

.4 Apply air barrier membrane material to all transitions to bridge all gaps and control joints in the exterior walls and ensure all perimeter air seals at window and door openings are in place, prior to application of spray applied insulation.

3.4 Application

.1 Spray-application of polyurethane foam shall be performed in accordance with ULC 705.2 and the manufacturer's instructions.

.2 Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer and ULC 705.2.

.3 Use primer where recommended by the manufacturer.

.4 Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than 15mm and not greater than 50mm.

.5 Do not install spray polyurethane foam within 75mm of heat emitting devices such as light fixtures.

.6 Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.

.7 Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.

.8 Install sealant at outside edges of transition membrane at vertical to horizontal membrane locations.

.9 Finished polyurethane foam shall be free of voids and embedded foreign materials and to minimum thicknesses shown or specified on drawings.

3.5 Tolerance

.1 Maximum variation from required thickness: +6 mm/-0 mm.

3.6 Test and Inspections

.1 Conduct daily visual inspection, adhesion/cohesion testing and density measurements as outlined by ULC 705.2.

.2 Installed assembly will be tested and inspected for conformance with specifications by an independent inspection and testing company paid from the Cash Allowances.

3.7 Protection

.1 The spray polyurethane foam shall be protected from ultraviolet as per manufacturer's requirements.

.2 The spray polyurethane foam shall be covered with an appropriate thermal barrier meeting local building codes when installed on the interior of the building.

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 30 00 Cast-in-Place Concrete
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 21 29 Sprayed Insulation
.5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.6 Section 07 92 00 Joint Sealants
.7 Section 09 21 16 Gypsum Board
.8 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E96/E96M-21 Standard Test Methods for Water Vapor Transmission of Materials
  .2 ASTM E154/E154M-08a(2019) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
  .3 ASTM E1643-18a Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
  .4 ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
  .5 ASTM F1249-20 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-51.34 Vapour Barrier, Polyethylene Sheet, for Use in Building Construction
.3 American Concrete Institute (ACI)
  .1 ACI 302.1R Guide for Concrete Floor and Slab Construction

1.4 Submittals

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

.2 Submit manufacturer's product data including certification that materials meet the requirements of the reference standards, and application instructions.

1.5 Project Conditions

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

1.6 Quality Assurance

.1 Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of the vapor retarder.

.2 Obtain vapour retarder materials from a single manufacturer regularly engaged in manufacturing the product.

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

1.7 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

.4 Store materials in a clean dry area in accordance with manufacturer's instructions. Stack membrane on smooth ground or wood platform to eliminate warping.

.5 Protect materials during handling and application to prevent damage or contamination.

.6 Ensure membrane is stamped with manufacturer’s name, product name, and membrane thickness at intervals of no more than 220 cm.

1.8 Waste Management and Disposal

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

Part 2 Products

2.1 Sheet Vapour Barrier

.1 Polyethylene film: to CAN/CGSB-51.34, 0.15 mm thick.

.2 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50 mm wide for all lap joints and perimeter seals.

.3 Mastic: as recommended by membrane manufacturer and compatible with substrate.

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

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

2.2 Sheet Vapour Barrier for Below Concrete Slabs on Grade

.1 Vapour retarder membrane below slabs on grade shall be manufactured from virgin polyolefin resins and shall meet or exceed all requirements of ASTM E1745, Class A.
  .1 Maximum Water Vapour Permeance (ASTM E154 Sections 7, 8, 11, 12, 13, by ASTM E96, Method B or ASTM F1249)
    .1 As received: 0.0063 perms.
    .2 After Wetting and Drying: 0.0052 perms.
    .3 Resistance to Plastic Flow and Temperature: 0.0057 perms.
    .4 Effect Low Temperature and Flexibility: 0.0052 perms
    .5 Resistance to Deterioration from Organisms and Substances in Contacting Soil: 0.0052 perms.
    .6 Puncture Resistance (ASTM D1709): >3,200 grams.
    .7 Tensile Strength ASTM E154, Section 9: 72 Lb. Force/Inch
  .2 Thickness of Retarder (plastic), ACI 302.1R-96, not less than 15 mils.
  .3 Acceptable product: Sealtight Perminator HP, as manufactured by W.R. Meadows or Stego Wrap Vapor Barrier by Stego Industries LLC.

.2 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm. Perminator Tape by W.R. Meadows or Stego Tape by Stego Industries LLC.

.3 Pipe Collars: Construct pipe collars from vapor barrier material and pressure sensitive tape per manufacturer’s instructions.

2.3 Slip Sheet Below Rink Slabs

.1 Polyethylene Film: to CAN/CGSB – 51.34, 0.15mm thick.

Part 3 Execution

3.1 Vapour Retarders in Walls

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

.2 Use sheets of largest practical size to minimize joints. Install horizontally on wall surfaces.

.3 Adhere membrane to metal studs with continuous ribbons of mastic.

.4 Tape all joints.

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

.6 Seal lap joints of sheet vapour barrier as follows:
- .1 Attach first sheet to substrate using sealant/adhesive.
- .2 Apply continuous bead of sealant over solid backing at joint.
- .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
- .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.7 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
- .1 Install moulded box vapour barrier.
- .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

.8 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

.9 Refer to building elements schedule on the drawings and details for locations of vapour retarders.

3.2 Vapour Retarders Below Slabs

.1 Install sheet vapour retarder below all concrete slabs on grade.

.2 Prepare surfaces in accordance with manufacturers recommendations.

.3 Level, tamp, or roll earth or granular material beneath the slab base.

.4 Install vapour retarder below floor slab immediately prior to concrete reinforcement placement and in accordance with ASTM E1643

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

.6 Lap vapour retarder over footings and seal to foundation walls.

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

.8 Seal all penetrations (including pipes and conduits) with manufacturer's pipe boot.

.9 No penetration of the vapour retarder is allowed except for reinforcing steel and permanent utilities.

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

.11 Restrict traffic over vapour retarder.

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

3.3 Inspection

.1 Arrange for inspection of vapour retarders immediately prior to covering, by local building department and Consultant.

.2 Make all required repairs identified during inspection.

3.4 Cleaning

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

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast in Place Concrete
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 21 29 Sprayed Insulation
.5 Section 07 62 00 Sheet Metal Flashing and Trim
.6 Section 07 92 00 Joint Sealants
.7 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-22 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 E1186-17 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.

1.10 Warranty

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

Part 2 Products

2.1 Materials

.1 Materials: as required to achieve specified performance criteria; meeting specified reference standards and functionally compatible with adjacent materials and components.

.2 Air barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 Membranes

.1 Self-adhered air barrier 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 Adhesive and Primers

.1 As recommended by manufacturer.

2.4 Mastics & Termination Sealants

.1 As recommended by manufacturer.

Part 3 Execution

3.1 Manufacturer’s Instructions

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

3.2 General

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

3.3 Examination

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

3.4 Preparation

.1 Prepare substrate surfaces in accordance with air barrier material manufacturer's instructions.

.2 All surfaces which are to receive flexible air barrier must be smooth, clean, dry, frost-free and in sound condition. All moisture, frost, grease, oils, loose mortar, dust, or other foreign materials which may impede the adhesion of the air barrier must be removed.

.3 New mortar must be cured 14 days and must be dry before air barrier membrane is applied.

.4 Concrete must be cured 28 days and dry before air barrier membrane is applied.

.5 Remove any and all sharp protrusions and repair any defects such as spalled or loose aggregate areas.

.6 Do not proceed with air barrier application until all substrate defects are repaired.

3.5 Installation

.1 Install air barrier materials at corners, openings, and transitions 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 05 12 23 Structural Steel
.2 Section 05 31 00 Steel Deck
.3 Section 05 41 00 Structural Metal Stud Framing
.4 Section 05 50 00 Metal Fabrications
.5 Section 06 10 00 Rough Carpentry
.6 Section 07 21 13 Building Insulation
.7 Section 07 21 29 Sprayed Insulation
.8 Section 07 26 00 Vapour Retarders
.9 Section 07 27 13 Modified Bituminous Sheet Air Barriers.
.10 Section 07 62 00 Sheet Metal Flashing and Trim
.11 Section 07 92 00 Joint Sealants

1.3 References

.1 The National Building Code of Canada.
.2 ASTM International (ASTM)
  .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .2 ASTM A792/A792M-23 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  .3 ASTM C553-13(2019) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
  .4 ASTM D1005-95(2020) Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers.
.3 CSA Group (CSA)
  .1 CSA S136-16 North American specification for the Design of Cold Formed Steel Structural Members
.4 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S702-09-AM1, Standard for Thermal Insulation, Mineral Fibre, for Buildings
.5 Canadian Sheet Steel Building Institute (CSSBI)
  .1 CSSBI 20M-2008 Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.
  .2 CSSBI B14-93 Steel Roofing and Siding Installation Guide.
  .3 CSSBI-B15-1993 Snow, Wind and Earthquake Load Design Criteria for Steel Building Systems
  .4 CSSBI B16-1994 Prefinished Sheet Steel for Building Construction.
.6 Canadian Institute of Steel Construction (CISC)
  .1 CISC Standard Code of Practice (2009).

1.4 Submittals

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

.2 Submit shop drawings including plans, elevations and details.
  .1 All dimensions must be verified in the field prior to submittal of shop drawings.

.2 Show profile, size, lap dimensions and details, connections, attachments, anchorage, caulking, and closure details.
.3 Indicate details of complete wall assembly including liner panel, insulation, sub-framing, exterior panel, flashing, trim and accessories.
.4 Shop drawings shall be stamped and signed by a registered Professional Engineer registered in the Province of Ontario.

.3 Submit full range of manufacturer's colours.

.4 Submit duplicate samples of each type of fastener proposed to be used.

.5 Submit engineering design calculations for all materials and assemblies when requested by the Consultant.

.6 Provide maintenance data for metal cladding for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00.

1.5 Design

.1 Design metal cladding and assemblies to sustain all applied loads as required by the National Building Code of Canada.

.2 Design metal cladding and fasteners for a positive wind load of 0.96 kPa and a negative wind load of 0.56 kPa and a maximum deflection of 1/180 of the span at maximum load.

.3 Spacing of sub-framing system shall be not greater than 1200 mm centres.

.4 Stress shall not exceed 144 MPA for Grade A steel.

.5 Design shall be performed by a professional Engineer licensed to practice in Ontario.

1.6 Pre-Installation Conference

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

1.7 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Materials

.1 Sheet Metal: To ASTM A635M-09b and CSA136-07, galvanized sheet steel, commercial quality with a minimum yield stress of 230 MPA, and a working stress of 144 MPA. Material shall have Z275 designation zinc coating unless noted otherwise.

.2 Metal Cladding: Exterior Corrugated Wall Panel:
- .1 2 2/3 x 7/8 Corrugated.
- .2 C.N.T. 0.76 mm.
- .3 Zinc Coating Designation Z275.

.3 Metal Cladding: Exterior Wall Panel:
- .1 Vicwest AD150-R. 300 mm x 38 mm deep.
- .2 C.N.T. 0.76 mm.
- .3 Zinc Coating Designation Z275.

.4 Z Bars and Sub-framing Systems:
- .1 Zinc coated steel minimum 1.22 mm base steel thickness.
- .2 Notched Z bar subgirts at liner panels.
- .3 Depth as indicated or required by engineering design.

.5 Sub-framing Thermal Spacer: 100 % Pultruded glass fibre and thermoset polyester resin insulation clip.
- .1 Thermal Spacer thickness for top, base and web: 4.8 mm nominal.
- .2 Thermal spacer depth: 127 mm nominal.
- .3 Depth tolerance: ± 0.127 mm
  - .1 Basis of Design: Cascadia Windows Inc., Cascadia Clip, www.cascadiaclip.com.
- .4 Ensure thermal spacer type is selected to accommodate orientation of vertical and horizontal sub-framing.

.6 Flashings and Trim:
- .1 Flat Sheet.
- .2 Minimum C.N.T. 0.48 mm
- .3 Zinc coating designation of Z275.
- .4 Colour to match cladding colour.

.7 Liner Panel:
- .1 Vicwest L800 Liner with prepainted finish.
- .2 C.N.T. 0.76 mm.
- .3 ZF75 Galvaneal finish

2.2 Finishes

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

.2 Cladding colours shall be selected by the Consultant from full range of manufacturer's standard colours. Up to two colours may be selected.

2.3 Accessories

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

.2 Closures: Unifoam PVC closures to profile of cladding.

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

2.4 Fabrication

.1 Fabricate all metal flashing, starter strips, closures, and trim as required for complete installation of wall cladding. Hem all exposed edges minimum 13 mm for appearance and stiffness. Mitre and seal corners with sealant.

.2 Fabricate flashings and trim to suit existing material profile and configuration.

PART 3 EXECUTION

3.1 Examination

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

.2 Check the accuracy and alignment of the building substrate. If not within tolerances set forth in the CISC Standard Code of Practice, the matter shall be brought to the attention of the Consultant before proceeding with erection of the metal cladding.

.3 Ensure that all air barrier membranes and air seals are in place and have been accepted by the Consultant.

.4 Notify Consultant of any conditions which would prevent proper installation.

.5 Do not proceed with cladding installation until work which will be concealed has been inspected and approved.

.6 Commencement of work implies acceptance of existing conditions.

3.2 Installation

.1 Erection shall be carried out by the manufacturer's trained erection crews or their approved erector, in accordance with the manufacturer's specifications.

.2 Install all flashings and seal to provide a weather-tight structure.
.3 Fasteners or method of attachment shall withstand all loads of wind or of suction as may be imposed on the metal cladding. Exposed fasteners shall have pre-coated or nylon coated heads to match colour of the metal wall cladding.

.4 Installation shall be in accordance with the reviewed shop drawings, the manufacturer's printed instructions and the referenced standards.

.5 Install sub-framing, girts, trim, flashings, insulation and metal cladding as indicated.

.6 Allow for application of sprayed insulation as specified in Section 07 21 29.

.7 Fasten sub-framing to backup with self-tapping screws or masonry anchors of sufficient length to penetrate a minimum of 19 mm into the structure. Locate sub framing at maximum 1200 mm centres but not more than required to support applied wind loads.

.8 Apply a continuous bead of caulking on faces of all supports and at top, bottom and ends of cladding to provide a complete seal.

.9 On lapped joints, caulk continuously between laps to provide a complete water seal.

.10 Bed all flashings, closures and corner pieces in sealant to provide a weather tight installation.

.11 Caulk all openings, joints and around perimeter to provide a weathertight installation.

.12 Complete all air seals between metal cladding and other systems or materials as detailed. Air barrier membranes are specified under Section 07 27 13.

.13 Provide expansion joints required by shop drawings complete with metal closures, flashings, trim and caulking, to provide a weather tight installation.

.14 Provide all matching trim, fasteners and accessories to make building weathertight.

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

3.3 Touch–Up

.1 Repair and touch up with colour matching high grade enamel minor surface damage, only where permitted by the Consultant and only where appearance after touch-up is acceptable to Consultant.

.2 Replace damaged panels and components that, in opinion of the Consultant, cannot be satisfactorily repaired.

3.4 Cleaning

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

.2 Clean all exposed panel surfaces in accordance with manufacturer's instructions.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 05 31 10 Steel Deck
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 26 00 Vapour Retarders
.5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.6 Section 07 62 00 Sheet Metal Flashing and Trim
.7 Section 07 71 00 Roof Specialties and Accessories
.8 Section 07 72 69 Roof Anchors and Safety Restraints
.9 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C1177/C1177M-17 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
  .2 ASTM C1289-23 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
  .3 ASTM C1396/C1396M-17 Standard Specification for Gypsum Board
  .4 ASTM D312/D312M-16a(2023) Standard Specification for Asphalt Used in Roofing
  .5 ASTM D5147/D5147M-18 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
  .6 ASTM D6162/D6162M-21 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
  .7 ASTM D6163/D6163M-21 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
  .8 ASTM E108-20a Standard Test Methods for Fire Tests of Roof Coverings
.2 CSA Group (CSA)
  .1 CSA A123.3-05 (R2015) Asphalt Saturated Organic Roofing Felt.
  .2 CSA A123.4-04 (R2018) Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
  .3 CSA A123.21:20 Standard Test Method for The Dynamic Wind Uplift Resistance of Membrane-Roofing Systems.
.3 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-18 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  .2 ULC 107-10 Methods of Fire Tests of Roof Coverings
  .3 ULC 704-11 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
.4 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-37.5, Cutback Asphalt Plastic Cement.
  .2 CGSB 37-GP-15M, Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.

.3 CGSB 37-GP-19M, Cement, Plastic, Cutback Tar.
.4 CAN/CGSB-37.29, Rubber-Asphalt Sealing Compound.
.5 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
.6 CAN/CGSB 51.33-M, Vapour Barrier, Sheet, Excluding Polyethylene, for Use in Building Construction.

.5 Canadian Roofing Contractors Association (CRCA) Metric Specification Manual.

1.4 Submittals

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

.2 Product Data: Provide manufacturer's specification data sheets for each product.

.3 Shop Drawings
.1 Submit shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
.2 Submit engineered shop drawing showing layout of mechanical fasteners to achieve specified uplift ratings.

.4 Certification
.1 Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
.2 Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
.3 Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

1.5 Quality Assurance

.1 The roofing and sheet metal Contractor shall be of recognized standing with a proven record of satisfactory installations, and shall be a member in good standing of the Canadian Roofing Contractors Association and shall be acceptable to the roofing product manufacturer.

.2 Roofing shall be executed under the full time supervision of a competent foreman and shall be carried out by applicators fully experienced in this type of work.

.3 Hold a pre-installation meeting prior to start of roofing works, with the Consultant, the Owner, the General Contractor, the independent inspection and testing agency inspector and the manufacturers roofing inspector. The purpose of this meeting is to review particular installation conditions. Prepare and distribute a report for this meeting.

.4 Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108 for external fire and meet local building codes.

.5 Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM I-90.

1.6 Manufacturer's Design Responsibility

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

.2 The roofing contractor must receive written authorization from the roofing inspector to proceed.

1.7 Manufacturer's Inspections

.1 Report progress and quality of the work as observed. Progress reports must be published and distributed to all project stakeholders weekly.

.2 Provide periodic (minimum of 2 days per week) roofing installation inspections: Inspections must include; photographic documentation of work in-progress and written statements of compliance with details/shop drawings.

.3 Report to the Owner and Consultant in writing any failure or refusal of the contractor to correct unacceptable practices called to the contractor's attention.

.4 Prior to commencement of roof membrane application, the manufacturer's roofing inspector shall review the installation of the insulation substrate including all tapered insulation to confirm that the finished roof system will have no flat or negatively sloped areas which will affect the performance of the roof or will adversely impact or void the roofing warranty.

.5 Confirm after project completion that the manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.8 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Provide and maintain adequate facilities or access to facilities to take receipt of and store roofing materials so that the materials are ready to be built in.

.4 Deliver and store materials undamaged in original unopened containers with manufacturer's label and seals intact. Materials not identified shall be removed off the site. Containers shall be stored upright and roofing membrane shall be stored on end to prevent flattening. All materials shall be protected from moisture at all times. No material shall be placed in direct contact with the earth.

.5 Store adhesives and emulsion-based waterproofing mastics at a minimum +5 °C. Store adhesives and solvent-based mastics at sufficiently high temperatures to ensure ease of application.

.6 All materials must be stored in a dry area and protected from water and direct sunlight. Damaged materials shall be replaced at roofing Contractor's expense.

.7 Storage of insulation and roofing materials, etc. on the roof is prohibited.

1.9 Protection

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

1.10 Environmental Requirements

.1 Apply roofing in periods only approved by the roofing inspector.

1.11 Waste Management and Disposal

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

1.12 Warranty

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

.2 Defects to include but not be restricted to leaking, failure to stay in place, undue expansion, lifting, deformation, loosening and splitting of seams, joint deformation, failure to adhere, deterioration, blisters, etc.

.3 Manufacturer's Extended Warranty: Provide manufacturers extended twenty-five (25) year warrantee to cover repair or replacement costs for Labour, Materials and Workmanship required to restore roof or system to watertight condition, after a leak has occurred, due to defective materials or system related failures. Warranty shall be Non Pro Rated and must be covered to the original installation cost for the full ten years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Manufacturer

.1 When a particular trade name or performance standard is specified it shall be indicative of a standard required.

.2 Compatibility between roofing system components is essential. All materials used on the roof shall be endorsed for compatibility by the applicator and the materials manufacturer.

2.2 Systems

.1 Provide insulated Modified SBS/SIS Bituminous roof systems as indicated complete with all materials and accessories required for a complete installation.

.2 All roof areas shall have a minimum slope of 2% to drains. Provide tapered insulation where indicated and where required to provide the necessary slope. Flat roof areas or negatively sloped areas which retain standing water are not permitted.

2.3 Materials

.1 Vapour Retardant: Kraft laminated paper, glass edge reinforced with asphalt filler, in compliance with CAN/CGSB-51.33-M, Type 2.
.1 Adhesive: non-flammable bituminous-based adhesive as recommended by manufacturer.

.2 Insulation: to ASTM C1289 and ULC 704 Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
.1 Thickness 2 layers. Base layer fastened as per manufacturer recommendations.
.2 LTTR-Value: Minimum two layers total: R-36
.3 Base layer 1220 x 2440 mm boards.
.4 Top layer 1220 x 1220 boards.
.5 Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1.

.3 Tapered Insulation: Tapered Insulation: compatible with roofing system and as recommended by roof insulation manufacturer, slope as indicated on the drawings but not less than 2%, starting thickness of 0 mm, factory tapered.

.4 Fasteners: Corrosion resistant screw and plate fastener as recommended by roof membrane manufacturer and tested with specified insulation. Base layer thermal board fastened.
.1 Factory Mutual Tested and Approved with 76 mm coated disc for I-90 rating, length required to penetrate metal deck 25 mm.

.5 Protection board: 13 mm thick high density fibreboard. Board size 1220 mm x 1220 mm.

.6 Asphalt: ASTM D312, Type III Steep Asphalt. Fully adhere all layers above fastened base layer thermal board.

.7 Fiber Cant and Tapered Edge Strips: torchable, performed rigid insulation units of sizes/shapes indicated. Matching insulation board or of perlite or organic fiberboard.

.8 SBS Modified Bitumen Base Sheet: 80 mil thickness modified bitumen membrane with fiberglass reinforcement sandwiched between SBS rubber in a high penetrating index asphalt mixture, minimum tensile strength 54 kN/m, minimum tear strength 1300 N, and low temperature flexibility -34C.

.9 SBS Modified Bitumen Granulated Cap Sheet and Cap Sheet Flashing: 145 mil minimum thickness modified bitumen membrane sheet consisting of two laminated layers of polyester and fiberglass scrim reinforcement sandwiched by SBS/SIS in a high penetration index asphalt mixture, minimum tensile strength 150 kN/m, minimum tear strength 7000 N, and minimum low temperature flexibility -40 ° C. Membrane performance requirements, CSA A123.15 Type C Grade 1, and ASTM D6162, Type III. Sanded bottom surface and white granulated top surface.

.10 Mastics: Asphalt mastic conforming ASTM D312/D312M-15.

.11 Bituminous Materials:
- .1 Asphalt Primer: Unfilled asphalt conforming to CGSB 37-GP-9Ma.
- .2 Cutback Asphalt Plastic Cement: Fibrated cut back type plastic asphalt compound.
- .3 Rubberized Asphalt Sealing Compound.
- .4 Bituminous Paint: To CGSB 1-GP-108M.

.12 Pitch Pockets: Lexsuco Spun Aluminum Mastic Pans.

.13 Pourable Sealer: 2 part polyurethane sealer intended for use by the manufacturer to seal pitch pans and other penetrations.

.14 Stack jacks (vent pipe flashings): Lexsuco or Thaler standard mill finish aluminum insulated vent stack covers applicable at all plumbing vent pipes. Rubber sleeves and sleeves supplied by other trades will not be acceptable.

.15 Roof Drains: As specified on mechanical drawings.

.16 Rain Collars and Clamps: Fabricated from same material as exhaust stacks, with continuously soldered seams and extending a minimum of 50 mm down face of sleeve. Allow 6 mm gap all around between rain collar and sleeve or pitch pockets. Clamps to be fabricated from same material as collar.

PART 3 EXECUTION

3.1 Manufacturer’s Instructions

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

3.2 Examination

.1 Verify actual site dimensions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to installation.

.2 Verify roof penetrations and drains are present in quantity required. Verify roof drains are securely clamped in place.

.3 Verify wood blocking is securely anchored to deck and nailers match thickness of roof insulation.

.4 Examine substrate for compliance of conditions that affect installation and performance of roof system.

3.3 Workmanship

.1 Workmanship shall be of the highest quality. Use only competent mechanics and execute work in accordance with drawings and specifications.

.2 Regard the manufacturer's printed recommendations and specifications as the minimum requirement for materials, methods and workmanship not otherwise specified.

.3 Maintain roofing equipment in good working order.

.4 Unsuitable or damaged materials shall immediately be removed from the site.

.5 Materials shall not be applied during inclement weather. Do not apply roofing over wet decks, or where frost or snow is present.

.6 Install roofing elements on clean, dry surfaces.

.7 Use torch types recommended by roof membrane manufacturer.

.8 Install temporary barrier around existing roofing to remain to prevent excess traffic.

3.4 Vapour Retarder

.1 Apply adhesive to steel deck and install vapour retarder membrane and seal all laps, edges and penetrations in accordance with the manufacturer's installation instructions.

.2 Apply in straight lines, free from wrinkles, tears or open laps. Minimum 150 mm end laps and 50 mm side laps tightly sealed with a continuous mopping of adhesive. At perimeters, vertical walls and curbs, etc. apply a 300 mm wide strip of vapour retardant and seal to air barrier membrane.

.3 No more vapour retardant shall be applied in any one working day than can be covered with insulation and properly "dried in".

.4 Vapour retardant shall not be installed to bridge across expansion joints or similar devices.

3.5 Insulation

.1 Keep insulation dry at all times. Insulation showing evidence of having been dampened since its manufacture or separation of laminations shall not be used. Lay insulation panels with all joints staggered. Insulation shall be laid with the longest side parallel to the flutes unless the manufacturer stipulates otherwise. Lay board in tight contact to prevent gaps and resulting loss of thermal insulation value. Cut boards to fit neatly around projections through roof.

.2 Attachment of Base Layer Mechanically fastened to steel deck.
  .1 Install insulation to vapour retarder loose laid or in ribbons of adhesive in accordance with manufacturer's instructions.
  .2 Install secondary layer to primary layer in full mopping of hot asphalt in accordance with manufacturer's instructions

.3 At roof drains and scupper drains, reduce the insulation thickness by 13 mm for a distance of 600 mm from the centre of the drain.

.4 Protect all exposed edges of insulation where roofing temporarily terminates at the end of a working day by forming a water cut off. Water cut off shall extend from the surface of the roof membrane minimum 200 mm onto the deck. Ensure water cut off is continuously secured to the deck and is removed prior to proceeding with work the following day.

.5 Install tapered insulation where indicated and in accordance with the reviewed shop drawings.

.6 Insulation shall not be installed to bridge across control joints.

3.6 Cant Strip

.1 Install cant strip at junction with vertical surfaces in accordance with manufacturer's instructions.

3.7 Protection Board

.1 Stagger coverboard joints with insulation joints.

.2 Apply adhesive to fully adhere with type III asphalt or insulation adhesive as recommended by the manufacturer, placed 13 mm wide and no more than 225 mm apart to top surface of insulation. Use a 34 kg roller to press the coverboard for full and continuous contact to insulation.

.3 Lay coverboard with joints offset minimum 300 mm from underlying layer.

.4 At drains ensure sump depth is kept to a minimum of 13 mm below finished roof surface.

3.8 Base Sheet

.1 Unroll base sheet onto dry substrate and allow to relax before re-rolling. Base sheet is to be applied to properly prepared substrate at a rate of no less than 11.3 kg of type III asphalt per 9 m^2. The roll is to push a puddle of asphalt ensuring that there is adequate "asphalt bleed-out" at all side and end laps.

.2 Base sheet shall have side laps of 90 mm and end laps of 150 mm.

.3 Ensure the membrane is properly adhered, without air pockets, wrinkles, fishmouths, or tears.

.4 Base sheet is to extend to the top of the cant at all vertical to horizontal transitions.

3.9 Base Sheet Stripping (Flashing)

.1 Primer coating must be dry before application of the base sheet stripping.

.2 Base sheet stripping to be laid in strips one meter wide to the vertical surfaces, extending on to the flat surface of the roof a minimum of 155 mm. Side laps to be 90 mm and staggered a minimum of 200 mm with the laps of the base sheet.

.3 Base sheet stripping to be fully adhered with type III hot asphalt. When allowed by the support, the base sheet top edge must be nailed on 300 mm centers.

3.10 Cap Sheet

.1 Once the base sheet and stripping have been applied and do not show any defects, then the cap sheet can be laid.

.2 Cap sheet membrane must be unrolled and allowed to relax. Start from the low point of the roof. Care must be taken to ensure alignment of the first roll (parallel with the edge of the roof).

.3 Cap sheet shall be fully adhered using type III asphalt on to the base sheet membrane at a rate of no less than 25 lbs. of asphalt per 100 square feet. The roll is to push a puddle of asphalt ensuring that there is adequate "asphalt bleed-out" at all side and end laps.

.4 Base sheet and cap sheet seams shall be offset a minimum of 300 mm.

.5 Cap sheet must have side laps of 90 mm and end laps 150 mm.

.6 After installation of the cap sheet, inspect all lap seams on the cap sheet for full adhesion and evidence of bleed out.

.7 Cap sheet is to extend to the top of the cant at all vertical to horizontal transitions.

3.11 Cap Sheet Stripping (Flashing)

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

.2 Lay out a straight line on the cap sheet surface, parallel to roof edge, 150 mm inside the roof from the base of the cant strip. Remove surface granules from field cap sheet where flashing is to be applied.

.3 Cap sheet stripping shall be adhered with type III hot asphalt directly on its base sheet, proceeding from bottom to top. Heat weld seams to soften the two membranes to ensure a uniform weld, use weight roller.

.4 Cap sheet stripping shall be applied to extend down the outside face of exterior edge, across top of parapet, down interior vertical surface and on to flat roof a distance of 230 mm, to the extent of area of embedded granules. Cut roll into required lengths and use width of roll down length of roof, maintaining specified 90 mm side laps. Install termination bar at all vertical transitions.

3.12 End Laps

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

3.13 Metal Flashing

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

3.14 Roof Drains

.1 Flash in drain flange with three plies of glass felt in Type II asphalt. Extend first ply a minimum of 300 mm beyond the edge of the flange and each succeeding ply 150 mm beyond underlying ply.

.2 Install clamping ring and aluminum strainer over raised bosses and install screws to tighten ring against membrane flashing until secure.

3.15 Mechanical and Electrical Equipment

.1 All electrical conduits and gas lines must be sufficiently supported as directed by the Consultant. Use treated wood blocking supported on concrete pavers resting on PVC pedestals.

.2 Install rain collars complete with clamping rings over all pitch pockets and stacks where vandal proof caps cannot be installed.

.3 Provide purpose made stack jack flashings at all plumbing vents.

.4 Seal flashing sleeves in accordance with manufacturer's directions and CRCA standard details.

3.16 Testing and Inspection

.1 Inspect completed membrane and flashings for punctures, tears and discontinuous seams. Apply additional layer of membrane over punctures and tears, extending minimum 50 mm beyond damaged area in all directions.

.2 Manufacturer full time representative to inspect work in progress a minimum of one out of every two days worked.

3.17 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 41 13.23 Insulated Metal Roof Panels
.4 Section 07 92 00 Joint Sealants

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

1.4 Submittals

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

.2 Submit duplicate 300 x 300 mm samples of each type of sheet metal material, colour and finish when requested by the Consultant.

1.5 Design and Performance Requirements

.1 Appearance: neatly and evenly lay out and install components. Exposed fastening devices not permitted.

.2 Effects of Wind: resist positive and negative wind pressures without detrimental effects.

.3 Water Control: prevent passage of water.

.4 Thermal Movement: accommodate expansion and contraction of component parts without buckling, failure of joints, undue stress on fasteners and other detrimental effects.

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

1.6 Quality Assurance

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

1.7 Shipping, Handling and Storage

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

.2 Materials shall be handled and stored on the job in such a manner that no damage shall be done to the material or the structures.

.3 Materials showing evidence of improper handling and storage shall be rejected and removed from the site at no additional expense to the Owner.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

Part 2 Products

2.1 General

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

2.2 Materials

.1 Sheet Metal: 0.48 mm thick galvanized sheet steel, commercial quality to ASTM A653 Grade 'A' with a minimum yield stress of 230 MPA, and a working stress of 144 MPA, to CSA S136. Material shall have Z275 designation zinc coating.

.2 Prefinished material shall be colour coated with manufacturer's standard finish system equivalent to Valspar WeatherXL coating system, utilizing silicone modified polyester resin, minimum dry film thickness of 1.0 ± 0.1 mils when tested to ASTM D1005. This Section shall supply all metal flashing for all roof and wall applications whether shown or not, and as necessary for the complete installation.
  .1 Colour for all sheet metal flashing and trim shall be as selected by the Consultant from full range of manufacturer's standard colours.
  .2 Up to three colours may be selected.

.3 Continuous hook on strips and metal bellows: 0.65 mm galvanized sheet steel, zinc coating designation ZF275.

.4 Isolation Coating: Alkali resistant exterior bituminous paint to CAN/CGSB 1.108-M.

.5 Plastic Cement: To CAN/CGSB 37.5.

.6 Nails, Bolts, Screws and Other Fastenings: same metal finish as sheet metal being used to CSA B111. The size of fastenings shall suit the applicable conditions.

.7 Underlay: No. 15 perforated asphalt felt to CSA A123.3-M or dry sheathing, breather type, to CAN/CGSB-51.32

.8 Cleats: Of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

Part 3 Execution

3.1 General

.1 Install sheet metal work in accordance with CRCA specifications and as detailed.

.2 Use concealed fastenings except where approved before installation.

3.2 Fabrication

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA specifications and as indicated.

.2 Form pieces in 2440 mm maximum lengths.

.3 Hem exposed edges on underside 13 mm. Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating (two coats) to metal surfaces to be in contact with concrete or mortar or dissimilar metals.

.6 Install underlay under sheet metal in accordance with CRCA "FL" series details. Lap joints 100 mm.

.7 All seams shall be of the "slip lock type" that permit adequate movement without resulting in deformation or loosening of metal flashings. Lapped joints or exposed raw edges will not be accepted. Exposed edges shall be "double back" at least 13 mm. At eaves and parapets, metal shall be hooked over continuous starter strips minimum 1 gauge thicker than the metal used for flashing. Secure starter strips at 300 mm on centre or closer as required.

.8 Where metal terminates under fascia boards, secure metal at 610 mm centres using specified fasteners. At curbs to openings or at sleepers, provide locked or standing seams at corners. Solder mitred corners, pop rivet or form standing seams.

.9 Secure metal flashings in reglets at 610 mm centres and further secure metal to vertical surfaces at locks as required.

.10 All flashings shall be installed in straight lines. Irregular or badly fitted work will not be accepted. Exposed fastenings will only be permitted where concealed fastening is not possible. Provide neoprene washers for exposed fasteners.

.11 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.

.12 Fabricate and install scuppers as detailed and in accordance with CRCA specifications and standards.

3.3 Caulking of Flashings

.1 Sealants shall be as specified in Section 07 92 00 - Joint Sealants.

.2 Caulk all joints in flashing.

.3 Dissimilar metals in contact, or metals in contact with adjacent surfaces shall be separated from one another to prevent corrosion, staining, or electrolysis by use of approved methods and materials.

.4 Do caulking between metal flashing and concrete.

.5 Caulking compound shall be applied in strict accordance with the manufacturer's application instructions. Use proper surface primers where necessary.

.6 Colour of caulking compound shall be the integral colour of the abutting material.

3.4 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 04 22 00 Concrete Unit Masonry
.2 Section 07 92 00 Joint Sealants
.3 Section 09 21 16 Gypsum Board

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM E119-18 Standard Test Methods for Fire Tests of Building Construction and Materials
  .2 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems.
  .3 ASTM E84-18 Standard Test Method for Surface Burning Characteristics of Building Materials
  .4 ASTM E1966-15 Standard Test Method for Fire-Resistive Joint Systems
  .5 ASTM E 2307-15be1 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
  .6 ASTM E136-16a Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750° C
.2 Underwriter's Laboratories of Canada (ULC)
  .1 CAN/ULC S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials
  .2 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
  .3 CAN/ULC S115-11, Standard Method of Fire Tests of Firestop Systems
.3 National Fire Protection Association (NFPA)
  .1 NFPA 252 Standard Methods of Fire Test and Door Assemblies
.4 South Coast Air Quality Management District (SCAQMD) California State
  .1 SCAQMD Rule 1168-03: Adhesives and Sealants.
.5 Ontario Building Code

1.4 Submittals

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

.2 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two (2) copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:
  .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
  .2 Construction details should accurately reflect actual job conditions.

.4 Samples:
.1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

.5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Test reports: in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.
.2 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties
.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.5 Definitions

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

1.6 Quality Assurance

.1 One installer shall install all firestopping on the project. Each trade shall not firestop their own service penetrations. Installer shall be certified by fire stopping manufacturer.

.2 Qualifications: Qualified Installer: specializing in fire stopping installations with 5 years documented experience approved and trained by manufacturer.

.3 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Consultant to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

.4 Site Meetings:
.1 As part of Manufacturer's Services described in 3.5- Field Quality Control, schedule site visits, to review Work, at stages listed.
.2 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
.3 Twice during progress of Work at 25% and 60% complete.
.4 Upon completion of Work, after cleaning is carried out.

.5 Single Source Responsibility: Obtain through-penetration fire-stop systems for each kind of penetration and construction condition indicated from a single manufacturer.

.5 Field-Constructed Mockup: Prior to installing fire-stopping, erect mockups for each different through-penetration fire-stop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final installations.
.1 Locate mockups on site in locations indicated or, if not indicated, as directed by Consultant.
.2 Notify Consultant one (1) week in advance of the dates and times when mockups will be erected.
.3 Obtain Consultant's acceptance of mockups before start of final unit of Work.
.4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
.5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

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

1.8 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.4 Storage and Protection:
.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

1.9 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 All fire stopping shall consist of ULC listed firestop system.

.2 All firestopping material shall be:
.1 From one manufacturer;
.2 Intumescent where an appropriate system exists.

.3 Fire stopping and smoke seal systems: ULC listed in accordance with CAN/ULC S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.

.4 Service penetration assemblies: ULC listed systems tested to CAN/ULC-S115.

.5 Service penetration fire stop components: ULC listed and certified by test laboratory to CAN/ULC-S115.

.6 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.7 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.8 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.9 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.10 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.11 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.12 Sealants for vertical joints: non-sagging.

.13 General: Provide fire-stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

.14 F-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with F ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

.15 T-Rated Through-Penetration Fire-stop Systems: Provide through-penetration fire-stop systems with T ratings, in addition to F ratings, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupy-able floor areas. T-rated assemblies are required where the following conditions exist:
.1 Where fire-stop systems protect penetrations located outside of wall cavities.
.2 Where fire-stop systems protect penetrations located outside fire-resistive shaft enclosures.
.3 Where fire-stop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
.4 Where fire-stop systems protect penetrating items larger than a 100 mm diameter nominal pipe or 10,000 mm² in overall cross-sectional area.

.16 Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

.17 For fire-stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

.1 For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration fire-stop systems.
.2 For floor penetrations with annular spaces exceeding 100 mm or more in width and exposed to possible loading and traffic, provide fire-stop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
.3 For penetrations involving insulated piping, provide through-penetration fire-stop systems not requiring removal of insulation.

.18 For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450.

.19 Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by fire-stopping manufacturer based on testing and field experience.

.20 Accessories: Provide components for each fire-stopping system that are needed to install fill materials and to comply with "System Performance Requirements". Use only components specified by the fire-stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance-rated systems. Accessories include but are not limited to the following items:
.1 Permanent forming/damming/backing materials including the following:
.1 Semi-refractory fibre (mineral wool) insulation.
.2 Ceramic fibre.
.3 Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
.4 Fire-rated formboard.
.5 Joint fillers for joint sealants.
.6 Temporary forming materials.
.7 Substrate primers.
.8 Collars.
.9 Steel sleeves.

.21 Applications: Provide fire-stopping systems composed of materials specified in this Section that comply with system performance and other requirements.

.22 Environmental Conditions: Do not install fire-stopping when ambient or substrate temperatures are outside limits permitted by fire-stopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

.23 Ventilation: Ventilate fire-stopping per fire-stopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

.24 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labeling and provision of Material Safety Data Sheets (MSDS).

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Preparation

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.

.2 Ensure that substrates and surfaces are clean, dry and frost free.

.3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour retarder

.5 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 Installation

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.

.2 Provide fire stopping for all disciplines.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.

.5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.6 Tool or trowel exposed surfaces to neat finish.

.7 Remove excess compound promptly as work progresses and upon completion.

3.4 Sequences of Operation

.1 Proceed only when submittals have been reviewed by Consultant.

.2 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.5 Field Quality Control

.1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

.2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.

.3 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Part 1.4 - Submittals.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in Part 1.6 - Quality Assurance.

3.6 Commissioning

.1 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site. Submit DRI's written reports within 3 days of review, verifying compliance of Work.

.2 Perform a thorough examination of the fire stopping system to determine if the assembly is installed as per its ULC listing.

.3 Allow for destructive testing of installed firestopping. Repair all tested assemblies.

.4 The examination shall take place prior to close-up to confirm assembly components and installation configuration.

.5 Any and all deviations from the ULC listed system shall be considered grounds for rejection and replacement.

3.7 Schedule

.1 Fire stop and smoke seal at:
.1 Penetrations through fire-resistance rated concrete, masonry, and gypsum board partitions and walls.
.2 Top of fire-resistance rated partitions.
.3 Intersection of fire-resistance rated partitions.
.4 Control and sway joints in fire-resistance rated partitions and walls.
.5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
.6 Around mechanical and electrical assemblies penetrating fire separations.
.7 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
.8 All electrical outlet boxes installed in fire rated gypsum board assemblies.
.9 All locations required by the Ontario Building Code.
.10 Any other locations indicated.

3.8 Cleaning

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

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

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 30 00 Cast-in-Place Concrete
.2 Section 07 21 13 Building Insulation

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C834-14 Standard Specification for Latex Sealants
  .2 ASTM C920-14a Standard Specification for Elastomeric Joint Sealants
  .3 ASTM C1184-14 Standard Specification for Structural Silicone Sealants
  .4 ASTM C1193-13 Standard Guide for Use of Joint Sealants
  .5 ASTM C1311-14 Standard Specification for Solvent Release Sealants
.2 Canadian General Standards Board (CGSB)
  .1 CGSB 19-GP-SM, Sealing compound, one component, acrylic base, solvent curing.
  .2 CGSB 19.13-M, Sealing compound, one component, elastomeric chemical curing.
  .3 CGSB 19-GP-14M Sealing compound, one component, butyl-polyisobutylene, polymer base, solvent curing.
  .4 CAN/CGSB-19.24-M90, Multi component, chemical curing sealing compound.
.3 South Coast Air Quality Management District (SCAQMD) California State
  .1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.4 Submittals

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

.2 Submit MSDS Data Sheets for review and acceptance by the Owner prior to delivery to the project site. Obtain written approval from the Owner and do not deliver any materials to the Owner's property, prior to receipt of such approval.

1.5 Quality Assurance

.1 Installation of caulking shall be performed only by workmen thoroughly skilled and specially trained in the techniques of caulking.

.2 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.

1.6 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Use all means necessary to protect caulking materials before, during and after installation and to protect the installed work and materials of all other trades.

.4 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

.5 Store all caulking materials and equipment under conditions recommended by its manufacturer.

.6 Do not use materials stored for a period exceeding the maximum recommended shelf-life of the material.

.7 Materials shall be delivered to the job in their original containers or wrapping with the manufacturer's seal and labels intact.

1.7 Environmental Considerations

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of material safety data sheets.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work by use of approved portable supply and exhaust fans.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of three (3) 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 Products of the following manufacturers are approved for use subject to meeting the specifications for the particular product listed below:
- .1 Canadian General Electric
- .2 Dow Corning
- .3 Nuco Inc.
- .4 Sika Canada Limited
- .5 Tremco Manufacturing Company (Canada) Ltd.
- .6 W.R. Grace and Company.
- .7 CR Laurence.

2.2 Materials

.1 Primers: Type recommended by sealant manufacturer. Low VOC type

.2 Joint Fillers:
- .1 General: Compatible with primers and sealants, outsized 30 to 50%.
- .2 Vertical Joints: Polyethylene, Urethane, Neoprene or Vinyl:
  - .1 Extruded closed cell foam, Shore A hardness 20, tensile strength 140 to 200 kPa.
  - .2 Sealtight-Etha Foam Backer Rod, W. R. Meadows Canada Ltd.
- .3 Horizontal Joints: Neoprene or Butyl Rubber (Horizontal Joints): Round solid rod, Shore A hardness 70.

.3 Sealants:
- .1 All sealants shall be Low VOC Type.
- .2 Colour of sealants to be selected by Consultant.
- .3 For Exterior Locations: To ASTM C920-14a, two component LP polysulphide base sealant Type 2 where subjected to foot traffic and Type 1 where not subjected to foot traffic (20-35 Shore A) Class B, bearing seal of approval of Thiokol Chemical Corporation:
  - .1 DOW Corning 790/795
  - .2 Tremco Dymeric 240FC
- .4 For Interior Locations:
  - .1 Moving joints:

.1 Low modulus, high performance, one-component, polyurethane-based, non-sag elastomeric sealant.
.1 Sikaflex 15LM

.2 Non-moving Joints
.1 To CAN3-11.13-M, one component polysulphide base sealant bearing seal of approval of Thiokol Chemical Corporation.
.1 Vulkem 116 – Tremco
.2 Mono 555

.3 Acrylic Latex: Siliconized acrylic latex to ASTM C834.
.1 Tremflex 834 - Tremco

.4 Mildew Resistant Sealant: Silicone to ASTM C920.

.4 Bond Breaker Tape: Polyethylene bond breaker tape which will not bond to sealant.

.5 Joint Cleaner: Xylol, methylethyleketon or non-corrosive type recommended by sealant manufacturer and compatible with joint forming materials.

Part 3 Execution

3.1 Inspection

.1 Inspect conditions and substrates upon which work of this Section is dependent. Report to Consultant in writing any defects that may jeopardize the performance of this work.

.2 Commencement of work implies acceptance of conditions.

3.2 Preparation

.1 Remove dust, paint, loose mortar and other foreign matter. Ensure joint surfaces are dry and free of frost.

.2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting.

.3 Remove oil, grease and other coatings from non-ferrous metals with joint cleaner.

.4 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.5 Prepare concrete, masonry glazed and vitreous surfaces to sealant manufacturer's instructions.

.6 Examine joint sizes and conditions to achieve correct depth ratio ½ of joint width with minimum width and depth of 6 mm, maximum width 25 mm.

.7 Install joint filler to achieve correct joint depth.

.8 Where necessary to prevent staining, mask adjacent surface prior to priming and caulking.

.9 Apply bond breaker tape where required to ensure performance of sealant.

.10 Prime sides of joints when required and as recommended by sealant manufacturer to ensure performance of sealant immediately prior to caulking.

3.3 Application

.1 Apply sealants in accordance with manufacturer's instructions, in continuous beads, to provide watertight joint. Apply sealant using gun with proper size nozzle. Use sufficient pressure to fill voids and joints solid. Superficial pointing with skin bead is not acceptable.

.2 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slight concave joint.

.3 Clean adjacent surfaces immediately and leave work neat and clean. Remove excess sealant and droppings using recommended cleaners as work progresses. Remove masking after tooling of joints.

.4 Apply sealant to joints between window or door frames to adjacent building components, around perimeter of every external opening, to control joints in masonry walls where shown.

.5 Caulk joints in surfaces to be painted before surfaces are painted. Where surfaces to be caulked are primed in shop before caulking, check to make sure prime paint and caulking are compatible. If they are incompatible, inform Consultant and change caulking to compatible type approved by Consultant.

3.4 Schedule

.1 Provide sealants at the following locations
  .1 Where required to protect interior from exterior air and water infiltration.
  .2 Joints between all dissimilar materials.
  .3 Construction and control joints.
  .4 Base of metal frames at resilient flooring.
  .5 Exterior thresholds (set in 2 full beads).
  .6 Caulk the entire perimeter of all mechanical and electrical material or piping extending through or occurring in masonry walls unless indicated to be firestopped.
  .7 Top of insulation between rink slab and apron slab.
  .8 Other locations where caulking or sealant is required to provide a neat clean junction

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 22 00 Concrete Unit Masonry
.2 Section 04 27 00 Multiple Wythe Unit Masonry
.3 Section 06 10 00 Rough Carpentry
.4 Section 07 92 00 Joint Sealants
.5 Section 08 71 10 Door Hardware
.6 Section 08 71 13 Automatic Door Operators
.7 Section 08 80 05 Glazing
.8 Section 09 21 16 Gypsum Board
.9 Section 09 91 13 Exterior Painting
.10 Section 09 91 23 Interior Painting

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 C177-19 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
  .3 ASTM C518-17 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  .4 ASTM C553-13 (2019) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
  .5 ASTM C591-20 Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
  .6 ASTM C1289-20 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
  .7 ASTM D6386-22 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
  .8 ASTM D7396-14(2020) Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting
  .9 ASTM E90-09 (2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  .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 E2074-00e1 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies (Withdrawn 2007)

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99 Ready-Mixed Organic Zinc-Rich Coating.
- .2 CGSB 41-GP-19M-84 Rigid Vinyl Extrusions for Windows and Doors.

.3 CSA Group (CSA)
- .1 CSA-G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-18 Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames, 2000
- .2 CSDMA Recommended Specifications for Commercial Steel Doors and Frames, 2006.
- .3 CSDMA Selection and Usage Guide for Commercial Steel Door and Frame Products, 2009.

.5 Underwriters Laboratories Canada (ULC)
- .1 ULC 104-2015 Standard Method for Fire Tests of Door Assemblies.
- .2 ULC 105- 2016 Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.
- .3 ULC 106-2015 Standard Method for Fire Tests of Window and Glass Block Assemblies
- .4 ULC 701-2011 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .5 ULC 702.1- 2014 Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .6 ULC 704-11 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

.6 Underwriters Laboratories (UL)
- .1 UL10B Fire Tests of Door Assemblies.
- .2 UL10C Standard for Positive Pressure Fire Tests of Door Assemblies.

.7 National Fire Protection Association (NFPA)
- .1 NFPA 80-2019 Standard for Fire Doors and Other Opening Protectives.
- .2 NFPA 252-2017 Fire Tests of Door Assemblies.

.8 American National Standards Institute (ANSI)
- .1 ANSI 250.4-2018 Test Procedure and Acceptance Criteria for — Physical Endurance for Steel Doors, Frames and Frame Anchors
- .2 ANSI 250.10-2011 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

1.4 Submittals

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

.2 Provide shop drawings
  .1 Indicate each type of door, frame, steel, construction and core.
  .2 Indicate fire ratings.
  .3 Indicate material thicknesses, mortises, reinforcements, anchorages, location of exposed fasteners, openings, arrangement of hardware, and finishes.
  .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

1.5 System Description

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

1.6 Defining Opening Sizes

.1 Width - Widths of openings shall be measured from inside to inside of frame jamb rabbets. (Referred to as "frame rabbet width" or "nominal door width")

.2 Height - Heights of openings shall be measured from the finished floor (exclusive of floor coverings) to the head rabbet of the frame. (Referred to as "frame rabbet height" or "nominal door height")

.3 Door Sizes - Doors shall be sized so as to fit the above openings and allow a 3 mm nominal clearance at jambs and head of frame. A clearance of 13 mm maximum shall be allowed between the bottom of the door and the finished floor (exclusive of floor coverings).

.4 Tolerances - Doors and frame product shall be manufactured and installed in accordance with the CSDMA's, "Recommended Dimensional Standards for Commercial Steel Doors and Frames".

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 Requirements of Regulatory Agencies

.1 Steel fire rated doors and frames: labeled and installed by an organization accredited by Standards Council of Canada in conformance with ULC 104 or NFPA 252 for ratings specified or indicated.

.2 Provide fire labeled frame products for those openings requiring fire protection

ratings, as scheduled. Test products in strict conformance with ULC 104, ASTM E2074 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.9 Testing and Performance

.1 Fire labeled products shall be provided for those openings requiring fire protection ratings as scheduled on the drawings. Products shall be tested in strict conformance with ULC 104 and listed by Underwriters Laboratory of Canada Ltd. or Warnock Hersey under an active Factory Inspection Program.

.2 Product quality shall meet the standards established by the Canadian Steel Door Manufacturer's Association.

.3 Door construction shall meet acceptance criteria of ANSI A250.10 and shall be certified as meeting Level A (1,000,000 cycles) and Twist Test Acceptance Criteria deflection not to exceed 6.4 mm/13.6 kg force, total deflection at 136.1 kg force not to exceed 64 mm and permanent deflection not to exceed 3.0 mm when tested in strict conformance with ANSI A250.4. Test shall be conducted by an independent nationally recognized accredited laboratory.

.4 Core materials for insulated doors shall attain a thermal resistance rating of RSI 2.17 when tested in accordance with ASTM C177 or ASTM C518.

1.10 Waste Management and Disposal

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

Part 2 Products

2.1 Materials

.1 Acceptable Materials
  .1 Steel doors and frame product manufactured in accordance with this Specification by CSDMA members, are eligible for use on this project.

.2 Steel: Commercial grade steel to ASTM A653, CS, Type B, Coating Designation ZF75 (A25) minimum. Minimum steel thicknesses shall be in accordance with Appendix 1 of the CSDMA, Recommended Specifications for Commercial Steel Door and Frame Products unless noted otherwise.

.3 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653, ZF75.

.4 Door Core Materials
.1 Interior Doors: Structural small cell, 24.5mm maximum kraft paper 'honeycomb'. Weight 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness. ULC approved.
.2 Exterior Doors: Polyisocyanurate: Rigid, modified polyisocyanurate, closed cell board. Density; 32 kg/m3 minimum, thermal values; RSI 2.17 minimum, in accordance with ASTM C591 (un-faced) or ASTM C1289 (faced).
.3 Temperature Rise Rated (TRR): Core composition to provide the fire-protection rating and limit the temperature rise on the unexposed side of door to 250°C at 30 or 60 minutes, as determined by governing building code requirements. Core to be tested as part of a complete door assembly, in accordance with ULC 104 and shall be listed by a nationally recognized testing agency having a factory inspection service.

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

2.2 Adhesives

.1 Adhesive: maximum VOC content 50 g/L to SCAQMD Rule 1168.

.2 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.3 Polyisocyanurate: heat resistant, epoxy resin based, low viscosity, contact cement.

.4 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, low VOC sealant/adhesive or U.L.C. approved equivalent.

2.3 Accessories

.1 Glazing Stops: Minimum 0.9 mm base thickness sheet steel with wipe zinc finish to ASTM A525. Fasteners to be #6 x 32 mm cadmium plated oval head scrulox self-drilling type screws. Tamper proof screws.

.2 Exterior top caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Frame Thermal Breaks: Rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19MA.

.4 Door silencers: single stud rubber/neoprene type.

.5 Fiberglass: to ULC 702, loose batt type, minimum density of 24 kg/m³.

.6 Metallic paste filler: to manufacturer's standard.

.7 Sealant: As specified in Section 07 92 00.

2.4 Fabrication - Frame Products

.1 General
- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior frame product shall be 1.60 mm welded type construction, thermally broken.
- .4 Interior frame product shall be 1.60 mm. Interior frames, transoms, sidelights and window assemblies shall be welded type construction.
- .5 Blank, reinforce, drill and tap frames for templated hardware and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Prepare frames to receive electrical conduit for door operators where indicated and required.
- .7 Protect mortised cutouts with steel guard boxes.
- .8 Provide anchorage appropriate to floor, wall and frame construction. Each wall anchor shall be located immediately above or below each hinge reinforcement on the hinge jamb and directly opposite on the strike jamb. For rebate opening heights up to and including 1520 mm provide two (2) anchors, and an additional anchor for each additional 760 mm of height or fraction thereof, except as indicated below. Frames in previously placed concrete, masonry or structural steel shall be provided with anchors located not more than 150 mm from the top and bottom of each jamb, and intermediate anchors at 660 mm on centre maximum. Fasteners for such anchors shall be provided by others.
- .9 Minimum reinforcing, anchor and other component thickness shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".
- .10 Each interior door opening shall be prepared for single stud rubber door silencers, three (3) for single door openings, two for double door openings, except on gasketed frame product.
- .11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.12 Fire-rated frame products shall be provided for those openings requiring fire protection as determined and scheduled by the Consultant. Frames, transom and sidelight assemblies shall be listed for conformance with ULC 104. Window assemblies shall be listed for conformance with ULC 106. All fire-rated frame products shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and label materials, and shall identify the manufacturer. Fire-rated frame products shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.2 Welded Type

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Where frame product is to be installed prior to the adjacent partition, a floor anchor shall be securely attached to the inside of each jamb profile. Each floor anchor shall be provided with two holes for securing to the floor. For conditions that do not permit the use of a floor anchor, an additional wall anchor, located within 150 mm of the base of the jamb, shall be substituted.

.6 Weld in two temporary jamb spreaders per door opening to maintain proper alignment during shipment and handling, which shall not be used for installation.

.7 Glazing stops shall be formed steel channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.

.8 When required due to site access, when advised by the contractor responsible for coordination or installation, as specified on the drawings or due to shipping limitations, frame product for large openings shall be fabricated in sections as designated on the approved submittal drawings, with splice joints for field assembly and welding by others.

.9 Prior to shipment, mark each frame product with an identification number as shown on the approved submittal drawings.

.10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.11 Manufacturer's nameplates on frames and screens are not permitted

2.5 Fabrication - Doors

.1 General

.1 Interior doors: insulated steel construction with honeycomb core laminated to minimum 1.19 mm nominal thickness steel face sheets under pressure.
.2 Exterior doors: insulated steel construction with polyisocyanurate core laminated to minimum 1.19 mm nominal thickness steel face sheets under pressure.
.3 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.
.4 Doors: swing type, flush.
.5 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.

.2 Longitudinal edges shall be mechanically inter-locked, adhesive assisted. Seams: visible grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.

.3 Doors shall be mortised, blanked, reinforced, drilled and tapped at the factory for templated hardware and electronic hardware, in accordance with the approved hardware schedule and templates provided by the hardware supplier.

.4 Holes 12.7 mm diameter and larger shall be factory prepared, except mounting and through-bolt holes, which are by others, on site, at time of hardware installation. Holes less than 12.7 mm diameter shall be factory prepared only when required for the function of the device (for knob, lever, cylinder, thumb or turn pieces) or when these holes over-lap function holes.

.5 Doors shall be reinforced where required, for surface mounted hardware, anchor hinges, thrust pivots, pivot reinforced hinges, or non-templated hardware.

.6 Provide top and bottom of doors with inverted, recessed, welded steel channels. Exterior doors shall be provided with rigid PVC top caps.

.7 Minimum reinforcing and component thickness shall be in accordance with Table 1 of the CSDMA, "Recommended Specifications for Commercial Steel Door and Frame Products".

.8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.9 Fire-rated doors shall be provided for those openings requiring fire protection and temperature rise ratings, as indicated. Such products shall be listed for conformance with ULC 104. All fire-rated doors shall bear the label of and be listed by a nationally recognized testing agency having a factory inspection service. Labeling shall be in accordance with NFPA 80, the listing authority's policies and

label materials, and shall identify the manufacturer. Fire-rated doors shall be constructed as listed for labeling in the Follow-Up Service Procedures/Factory Inspection Manuals issued by the listing agency to individual manufacturers.

.10 Prior to shipment, mark each door with an identification number as shown on the approved submittal drawings.

.11 Welded Stiffener Construction (Reinforced Doors)
- .1 Both face sheets for interior doors shall be formed from a sheet of 1.30 mm thick steel.
- .2 Doors shall be reinforced with vertical stiffeners, securely welded to each face sheet at 150 mm on center maximum.
- .3 Voids between vertical stiffeners shall be filled with fiberglass batt type insulation.

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

2.6 Glazing Stops

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

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

2.7 Finishes

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

Part 3 Execution

3.1 Manufacturer’s Instructions

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

3.2 Installation

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

.2 Fire-rated door and frame product shall be installed in accordance with NFPA-80.

.3 Prior to installation, remove temporary shipping spreaders.

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

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

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

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

.8 Secure anchorages and connections to adjacent construction.

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

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

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

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

.13 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 10 - Door Hardware. Coordinate with Section 08 71 13 for preparation and installation of automatic door operators.

.14 Adjust operable parts for correct clearances and function.

.15 Install louvers, glazing and door silencers.

.16 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows:
- .1 Hinge side: 1.0 mm.
- .2 Latch side and head: 1.5 mm.
- .3 Finished floor and thresholds: 13 mm.

.17 Caulk perimeter of frames. Refer to Section 07 92 00 – Joint Sealants.

3.3 Finish Repairs

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

3.4 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 04 22 00 Concrete Unit Masonry
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A653/A653M-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.2 National Fire Protection Association (NFPA)
  .1 NFPA 80 Fire Doors and Other Opening Protectives.

1.4 Submittals

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

.2 Shop Drawings: indicate material details, construction and accessory details, operating mechanisms, required clearances and electrical connections.

.3 Submit sample of door section showing construction, workmanship and finish.

.4 Submit manufacturer's installation instructions.

.5 Provide maintenance data for rolling metal door, hardware and operators for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals. Include instructions regarding adjustment, operator maintenance, wiring diagrams and troubleshooting

1.5 Requirements of Regulatory Agencies

.1 Fabricate rolling metal fire shutters to NFPA 80 with ULC labelled 1hr hour fire rating.

1.6 Quality Assurance

.1 Qualifications:
  .1 Manufacturer Qualifications: ISO 9001 registered and a minimum of five years of experience in producing fire units of the type specified.
  .2 Installer Qualifications: Manufacturer's approval.

1.7 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Manufacturers

.1 Rolling metal fire shutter specifications are based on products supplied by Cookson Co. Inc. Rolling fire shutters by the following are acceptable subject to compliance with specifications and performance requirements.
.1 Amstel Manufacturing Inc.
.2 Kinnear
.3 Dynamic Closures
.4 Richards Wilcox of Canada Ltd.
.5 Raynor

2.2 Materials

.1 Curtain:
.1 Slats: type and thickness to obtain required fire rating, Grade 40 steel, ASTM A653 galvanized steel zinc coating.
.2 Bottom Bar: Two 50 x 50 x 3.2 mm structural steel angles.
.3 Fabricate interlocking sections with high strength malleable steel endlocks on alternate slats each secured with rivets. Provide windlocks as required to meet specified wind load.
.4 Slat Finish: Coating System to include an ASTM A653 galvanized base coating, bonderized coating for prime coat adhesion, and factory applied thermosetting powder coating applied with a minimum thickness of 2.5 mils. The colour shall be selected by the Consultant from manufacturer's standard colour chart.
.5 Bottom Bar Finish: Factory applied thermosetting powder coat. The finish shall match the curtain as specified above.

.2 Guides: Fabricate with structural steel angles bolted together with 9.5 mm fasteners to form a channel for the curtain to travel. The wall angle portion shall be continuous and fastened to the surrounding structure with either minimum 12.7 mm fasteners or welds, both on 915 mm centers. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.
.1 Finish: Factory applied thermosetting powder coat. The finish shall be the same finish as indicated in the curtain section.

.3 Counterbalance Shaft Assembly:
.1 Barrel: Steel pipe of not less than 100 mm in diameter capable of supporting curtain load with maximum deflection of 2.5 mm per metre of width.

.2 Spring Balance: Oil-tempered torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 133 N. Provide wheel for applying and adjusting spring torque.

.4 Brackets: Fabricate from minimum 6.35 mm steel plate and shall be bolted to the wall angle with minimum 12.7 mm fasteners.
.1 Finish: Factory applied thermosetting powder coat. The finish shall be the same finish as indicated in the curtain section.

.5 Hood: 0.701 mm galvanized steel with reinforced top and bottom edges. Provide minimum 6.35 mm steel intermediate support brackets as required to prevent excessive sag.
.1 Finish: Coating System to include an ASTM A653 galvanized base coating, bonderized coating for prime coat adhesion, and factory applied thermosetting powder coating applied with a minimum thickness of 2.5 mils. The colour shall be selected by the Consultant from manufacturer's standard colour chart.

2.3 Operation

.1 Manual Auto-Test Crank Hoist: Provide combination crank / controlled closing system operator including removable hand crank and geared reduction unit. Integral to the unit is a releasing device for connection to a central alarm system or local smoke detectors and a governor to control automatic closing speed.
.1 Automatic closure shall be activated by a central smoke/fire alarm system.
.2 Doors shall maintain a closing speed of not more than 300mm per second during automatic closing.
.3 Doors shall be fail-safe and close upon power failure.
.4 Resetting of spring tension or mechanical dropouts shall not be required. Shutter shall be manually operable after alarm is cleared and/or power is restored.

PART 3 EXECUTION

3.1 Examination

.1 Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

.2 Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

.3 Commencement of work by installer is acceptance of substrate.

3.2 Installation

.1 Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports in accordance with manufacturer's instructions and reviewed shop drawings.

.2 Comply with NFPA 80 and follow manufacturer's installation instructions.

3.3 Adjusting

.1 Inspect, test and adjust installation to ensure smooth dependable operation in the presence of the Owner's representative.

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

3.4 Field Quality Control

.1 Site Test: Test doors for normal operation and automatic closing. Coordinate with authorities having jurisdiction to witness test and sign Drop Test Form.

3.5 Cleaning

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

3.6 Demonstration

.1 Demonstrate proper operation, testing and reset procedures to Owner's Representative.

.2 Instruct Owner's Representative in maintenance procedures.

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 07 92 00 Joint Sealants
.3 Section 08 44 13 Glazed Aluminum Curtain Walls
.4 Section 08 71 10 Door Hardware
.5 Section 08 80 05 Glazing

1.3 References

.1 American National Standards Institute (ANSI)
  .1 ANSI-Z97.1-2015 (R2020) Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test
.2 Underwriters Laboratories (UL)
  .1 UL 325 2017 Door, Drapery, Gate, Louver, and Window Operators and Systems.
.3 The Aluminum Association
  .1 Aluminum Association Designation System for Aluminum Finishes.
.4 CSA Group (CSA)
  .1 CSA S157-17/S157.1-17 (R2022) Strength Design in Aluminum
  .2 CSA-A440-17 North American Fenestration Standard / Specification for Windows, Doors, and Skylights
.5 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-1.108-M Bituminous Solvent Type Paint
.6 National Fire Protection Association (NFPA)
  .1 NFPA 101 Life Safety Code.
.7 Builders Hardware Manufacturers Association (BHMA)
  .1 BHMA A156.10-2017 Power Operated Pedestrian Doors
.8 International Code Council (ICC)
  .1 ICC A117.1-2017 Accessible and Useable Buildings and Facilities.

1.4 Submittals

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

.2 Product Data: Provide manufacturers product and complete installation data for all materials in this specification.
  .1 Installation Guide: Provide a written installation guide and/or installation recommendations.

.3 Shop drawings: Show profiles, joining method, location of components, anchorage details, adjacent construction interface, and dimensions as well as all necessary wiring and electrical requirements. Submit wiring schematics.

.4 Samples: Sized to adequately represent material.

.5 Operation and Maintenance Data: Provide operation and maintenance data for automatic entrance doors for incorporation into Operation and Maintenance Manuals specified under Section 01 78 00 –Closeout Submittals.

1.5 Quality Assurance

.1 Automatic sliding door system shall be certified by the manufacturer to meet performance design criteria according to the following test standards:
.1 Product shall meet or exceed air and water infiltration criteria of CSA A440.
.2 BHMA A156.10 Power Operated Pedestrian Doors
.3 NFPA 101, Life Safety Code.
.4 Underwriters Laboratories of Canada Ltd. listed.

.2 Structural performance shall be based on CSA Standard CSA S157, and a maximum deflection of 1/175 of span.

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 All materials shall arrive in the manufacturers original sealed, labelled containers.

.4 Store materials in a dry, protected, well-vented area.

1.7 Project Conditions

.1 Verify that other trades are complete before installing the automatic sliding door system.

.2 Mounting surfaces shall be plumb, straight and secure; substrates shall be of proper dimension and material.

.3 Refer to the construction documents, shop drawings and manufacturers installation instructions.

.4 Coordinate installation with the glass, glazing and electrical work.

1.8 Sequencing

.1 Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

.2 Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 Maintenance Materials

.1 Provide special wrenches and tools applicable to each different or special hardware component.

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 three years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Products manufactured by Stanley Access Technologies form the basis of this specification. Equivalent product by the following manufacturers are acceptable, subject to review and approval by the Consultant:
.1 Besam
.2 Ditec
.3 Dorma
.4 Entramatic
.5 Horton Automatics.
.6 Keane Monroe
.7 Nabco.

2.2 Automatic Sliding Door Systems

.1 Automatic Sliding Door System: Stanley DURA-GLIDE Series 2000. System shall consist of sliding aluminum doors, sidelights, header, operator, and actuating controls. All components shall be factory assembled in the header, adjusted and tested. No field wiring or operator adjustment shall be required other than the connection to job-site power and fine-tuning of door speeds to compensate for various door sizes and weights.

.2 Sliding Aluminum Doors: Provide door units to dimension heights and widths with corresponding glazing as shown on construction documents, medium stile. Provide door holders for all panels to control the doors as they swing in the direction of egress. Glass stops, 15.6 mm, shall be provided for all door panels. All doors shall have intermediate rails. The bi-part sliding door system shall include a two-point lock securing the lead edges of the door stiles together and to the hanger assembly.

.3 Door Operation: Shall be bi-part directional operation. Exit and entrance sides shall operate by sensor activation. Sliding door panels shall allow “breakout” to the full open position to provide instant egress at any point in the doors movement. To allow safe egress, automatic operation shall be discontinued when the SX panel is in the “breakout” mode. Doors and sidelights shall be sized to prevent pinch points at meeting stiles.

.4 Aluminum Frame and Extrusions: Shall be extruded 6063-T5 alloy and temper with a minimum 3.0 mm wall thickness in integral structural sections. Frames shall be 115 mm deep sections. The bi-part transom packages shall contain one vertical transom tube. Provide additional vertical tubes as required.

.5 Aluminum Finishes:
.1 Finishes shall be in accordance with Aluminum Association Designation System for Aluminum Finishes.
.2 Clear Anodized Finishes: Designation AA-M12-C22-A312, Class 1 and Class 2 Clear Anodic coating.

.6 Sidelights: Provide sidelights and transom panels to dimension heights and widths as shown on construction documents with corresponding glazing. All sidelight panels shall have intermediate rails to match doors. Sidelight shall be fixed assembly.

.7 Header Case: Shall be 152 mm wide by 203 mm high extruded aluminum and capable of supporting bi-parting doors of 220 pounds per leaf over a span of 7.30 metres with minimal deflection. Casing shall contain door operator and door mounting components. The header cover shall have a continuous self- locking hinge to open flush with the top of the header.

.8 Door Hanger Wheels: Shall be 65 mm diameter urethane wheels with precision steel lifetime lubricated ball bearing centres. The sliding doors shall be held on the track by 51 mm diameter anti-riser wheels and supported by a factory adjusted cantilever support and pivot assembly. This assembly shall allow the sliding doors to swing outward for emergency egress without the need for a lower door pivot support. The door height shall have an adjustment of 3.0 mm ± as required by field conditions.

.9 Door Operator and Controller: Stanley Dura-Glide System driven by electro-mechanical operator and regulated electronic controller. The operator components shall consist of a DC permanent magnet 1/8 horsepower motor, gear reduction drive, Stanley Pozi-Trac position encoder, and a microprocessor control box. Provide 120 VAC, 5 amps minimum to electrical door operator.

.10 Microprocessor Control Box: Torque shall be factory set as prescribed by ANSI A156.10. The control box and Stanley Pozi-Trac position encoder shall automatically set the opening and closing check positions, and the full open and full closed position of the door system.

.11 Threshold Sensor: Self-contained fully adjustable sensor system operating in conjunction with the motion sensors. Simultaneously with the door opening signal, the sensor shall be energized. It shall emit a 760 mm deep by 1840 mm maximum wide elliptical shaped infrared presence zone centred on the doorway threshold line. The door shall close after the sensors detect a clear surveillance field.

.12 Motion Sensor: Stanley SU-050 Motion Sensor. The unit shall be switchable between bi-directional and uni-directional k-band frequency to detect all motion, fast or slow, in both directions with a relay hold time of 2-30 seconds. The motion sensor shall be mounted to the header 2740 mm maximum above the finish floor on both sides of the door. Using the adjustable antenna the detection pattern shall be semi-circular, approximately 2135 mm wide by 1525 mm deep for a wide zone. The location of the detection zone shall be adjustable from the face of the door (20 degrees to 35 degrees in increments of 3 degrees). The unit shall operate between 30 degrees through 122 degrees F in all environmental conditions. The supply voltage shall be 12-24 V AC/DC ± 10% and the power consumption shall be 6 W maximum.

.13 Safety Search Circuitry shall be provided which will recycle the doors when an object is encountered during the closing cycle. The circuitry shall search for that object on the next closing cycle by reducing the door speed at the position the object was previously encountered, and will continue to close in check speed until the doors are fully closed, at which time the doors will reset to normal speed. If the obstruction is encountered again, the doors shall come to a full stop. The door shall remain stopped until the obstruction is removed and an operate signal is given, resetting the door to its normal speed.

.14 Accessories: The automatic sliding door system shall have the following accessories: selector switch located on the interior side of the unit to allow doors to open at full or reduced width according to traffic conditions, hydraulic closers, battery packs and alarm contact monitoring.

.15 Glazing: Prepare doors, sidelights and transoms to accept 6 mm thick tempered safety glass at all interior units and 25 mm thick sealed insulating units at exterior locations, supplied and installed under Section 08 80 05.

2.3 Operating Conditions

.1 Climatic Conditions: All automatic sliding door system components shall operate between -35° C and +55° C in all climatic conditions.

2.4 Fasteners

.1 Series 300 stainless steel or Series 400 stainless steel cadmium plated, of sufficient strength to perform the functions for which they are intended.

2.5 Bituminous Paint

.1 Bituminous paint for back painting shall be acid and alkali resistant type in accordance with CGSB 1-108-M, Type 2.

PART 3 EXECUTION

3.1 Inspection

.1 Verify that the automatic sliding door system installation will not disrupt other trades. Verify that the installation area is dry, clean and free of foreign matter.

.2 Check as-built conditions and verify the manufacturer’s automatic sliding entrance system details for accuracy to fit the wall assembly prior to fabrication.

.3 Report in writing to the Contractor any detrimental conditions to the proper functioning of the automatic sliding entrance system.

.4 Installation shall proceed once the unsatisfactory conditions have been corrected in accordance to the manufacturer’s recommendations

3.2 Fabrication

.1 Fabricate frames square to profiles shown and prepare for glazing.

.2 Design and fabricate necessary brackets and anchorage devices to compensate for unevenness and dimensional difference in the structure, to allow full expansion and contraction of framing members as a result of expansion and contraction of framing members and to adequately sustain themselves, and superimposed wind and rain loads and all other stresses.

.3 Take field measurements prior to fabrication.

.4 Jig assemble components in shop.

.5 Accurately form joints and intersections to tight, hairline fit.

.6 Nick threads to prevent loosening of nuts. Make bolted and screwed work as inconspicuous as possible.

.7 Finish: All frames and exposed aluminum components shall have clear anodized finish.

3.3 Installation

.1 Installation shall be by an installer approved and trained by the manufacturer in strict accordance with the manufacturer's instructions.

.2 Comply with the automatic sliding door system manufacturer's recommendations and/or installation guide when installing the automatic sliding entrance system. Set all units plumb, level and true.

.3 Provide all fasteners required for installation of the automatic sliding door system.

.4 Clean and restore primer and bituminous paint to surfaces distributed by field welding or other operations.

.5 Aluminum to be placed in contact with concrete mortar, plaster or dissimilar metals shall be given a heavy coat of bituminous paint on contacting surfaces.

3.4 Adjustment

.1 After repeated operation of the completed installation, re-adjust door operators and controls for optimum operating condition and safety.

3.5 Demonstration

.1 Explain and review the Daily Safety Check Procedure with Owner's Representative.

3.6 Cleaning

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

.2 Clean all metal surfaces promptly after installation.

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 06 20 00 Finish Carpentry
.4 Section 07 21 13 Building Insulation
.5 Section 07 21 29 Sprayed Insulation
.6 Section 07 26 00 Vapour Retarders
.7 Section 07 27 15 Modified Bituminous Sheet Air Barriers.
.8 Section 07 92 00 Joint Sealants.
.9 Section 08 71 10 Finishing Hardware
.10 Section 08 80 05 Glazing

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM B221-21 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(2021) 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.
.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)
.1 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 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes, fasteners, and caulking. Indicate location of manufacturer's nameplates.
.3 Submit point to point wiring diagrams for electric strikes.
.4 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
.7 Zimmcor

2.2 Materials

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:
.1 All doors and storefront framing shall be by same manufacturer.
.2 Sash: aluminum, thermally broken.
.3 Main frame: aluminum, thermally broken.
.4 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 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 Screen Types

.1 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: Kawneer 451 T series
  .2 Depth of framing units as indicated or as required by engineered design.

2.4 Doors

.1 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 the following hardware for aluminum doors, as appropriate to location and configuration:
- .1 Exterior Door 101:
  - .1 1 ½ pair stainless steel ball bearing butt hinges.
    - .1 Door width: Up to 915 mm: 114 mm x 102 mm hinge
    - .2 Door width: Over 915 mm: 127 mm x 114mm hinge.
  - .2 Adams Rite 1850A deadlock with interior thumbturn.
    - .1 Cylinder provided under Section 08 71 10.
  - .3 Style CO-12 Architects Classic Pull with clear anodized finish.
  - .4 Concealed heavy duty closer 2030 LCN.
  - .5 Kawneer controller locking system for paired doors.
  - .6 Extruded aluminum threshold for barrier free access, 102 mm wide x 12 mm high. Thermally broken.
  - .7 Weather-seal to head and jambs. Aluminum with sponge neoprene a minimum of 6.0 mm thick, width to suit frame. Type TW2000.
  - .8 Kawneer 1786 Rim Exit Device.
    - .1 Cylinder provided under Section 08 71 10.
  - .9 Meeting stiles: adjustable astragal utilizing wool pile with polymeric fin.
  - .10 Door sweeps to be Sealeze EB 395 EPDM blade gasket x door width.
  - .11 Automatic Door Operator: SW200i X 626 (110 V to head frames by Electrical).
  - .12 Push to open button CM-7536K (wireless).
  - .13 Electric Strike: Adams Rite 7130 electric strike. 24V AC.

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 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
.3 Section 08 50 00 Aluminum Doors, Windows and Screens

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/ICC A117.1-2017 Accessible and Usable Buildings and Facilities
  .3 ANSI/BHMA A156.1-2013 American National Standard for Butts and Hinges.
  .4 ANSI/BHMA A156.2-2011 Bored and Preassembled Locks and Latches.
  .5 ANSI/BHMA A156.3-2014 Exit Devices.
  .6 ANSI/BHMA A156.4-2013 Door Controls - Closers.
  .7 ANSI/BHMA A156.5-2014 Auxiliary Locks and Associated Products.
  .8 ANSI/BHMA A156.6-2010 Architectural Door Trim.
  .9 ANSI/BHMA A156.8-2010 Door Controls - Overhead Stops and Holders.
  .10 ANSI/BHMA A156.10-2011 Power Operated Pedestrian Doors.
  .11 ANSI/BHMA A156.12-2013 Interconnected Locks and Latches.
  .12 ANSI/BHMA A156.13-2012 Mortise Locks and Latches Series 1000.
  .13 ANSI/BHMA A156.15-2011 Release Devices - Closer Holder, Electromagnetic and Electromechanical.
  .14 ANSI/BHMA A156.16-2013 Auxiliary Hardware.
  .15 ANSI/BHMA A156.18-2012 Materials and Finishes.
  .16 ANSI/BHMA A156.19-2013 Power Assist and Low Energy Power - Operated Doors.
  .17 ANSI/BHMA A156.21-2014 Thresholds.
  .18 ANSI/BMHA A156.22-2012 Door Gasketing and Edge Seal Systems
.2 Canadian Steel Door Manufacturers' Association (CSDMA)
  .1 CSDMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): Standard Hardware Location Dimensions.
.3 National Wood Window and Door Association (NWWDA)
.4 Door Hardware Institute (DHI)
.5 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: Submit manufacturer's printed 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: Submit manufacturer's installation instructions.

.6 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 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 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.

.3 All door handles shall be lever type meeting requirements of the Ontario Building Code.

.4 Power Door Operators and controls shall be CSA approved and shall meet the requirements of the Ontario Building Code and the Accessibility for Ontarians with Disabilities Act (AODA).

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 Electrified Devices

.1 Electrified exit devices shall conform to all traditional exit device standards as specified above. All power requirements for exit devices used must utilize a continuous circuit electric hinge for clean design and no visible means of interrupting power to device.

.2 All exit devices with electric latch retraction shall provide for a remote means of unlocking for momentary or maintained periods of time.

.3 Exit devices with electrified trim shall be fail-secure unless otherwise specified.

2.4 Keying

.1 Keying: All permanent cylinders to be grandmaster-keyed as directed by the Owner. The factory shall key all locks and cylinders and maintain keying records. The factory shall establish a System Information Document (SID) to designate primary system administrators and require a separate letter of authorization for all future shipments of keyed products.

.2 Remove all construction cores and install all permanent cores. Unless otherwise directed by the Owner.

.3 Construction master/change keys are to be delivered by the contractor directly to The Owner.

.4 Ship all permanent cylinders and keys separately. Identify door number and keyset symbol on each envelope for direct factory delivery to the owner.

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 Installation of hardware shall be in accordance with ANSI A115.1G, manufacturer’s templates and instructions.

.2 Install each item of mechanical and electromechanical hardware and access control equipment to comply with the manufacturer’s written instructions and according to specifications. All items to be installed with fasteners identified by manufacturer’s installation instructions unless otherwise noted.

.3 Mounting Heights: Install door hardware at heights indicated in the following applicable publications unless; specifically indicated or required by local governing regulations, requirements to match for special templates, necessary coordination with door elevations, and or to ensure consistency with pairs of doors.
   .1 DHI’s “Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames”
   .2 DHI’s “Recommended Locations for Architectural Hardware for Wood Flush Doors”
   .3 ANSI/ICC A117.1 Accessibility Guidelines for Buildings and Facilities
   .4 NWWDA
   .5 AODA

.4 Power door operator products and accessories are required to be installed by an AAADM certified technician as approved by the manufacturer. Adjust for proper opening and closing operation after final balancing of HVAC system.

.5 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.

.6 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.

.7 Install all materials as listed in the Finishing Hardware Schedule on the doors and frames listed. Interchanging of hardware will not be allowed.

.8 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.

.9 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.10 Remove construction cores when directed by Owner’s Representative.

.11 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 Field Quality Control

.1 Conduct periodic inspections to ensure that door frames are installed plumb, level and square with verification by installer prior to installation of doors and door hardware.

.2 Hardware supplier to attend site meetings as required to ensure proper execution of the guidelines set forth herein.

.3 Hardware supplier will perform final field inspection of installed door hardware after final adjustment of all products and will document and report any deficiencies or omissions for correction and written acceptance by the Contractor.

3.6 Adjusting

.1 Adjust door hardware, operators, closers 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.

3.7 Demonstration

.1 Instruct Owner’s maintenance personnel in the proper adjustment, operation and maintenance of mechanical and electromechanical door hardware, electronic devices and maintenance of finishes.

3.8 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.

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 08 11 00 Metal Doors and Frames
.2 Section 08 50 00 Aluminum Doors and Screens
.3 Section 08 71 10 Door Hardware

1.3 References

.1 American National Standards Institute/Builders Hardware and Manufacturers Association (ANSI/BHMA):
  .1 BHMA A156.10: 2017 Power Operated Pedestrian Doors
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB 1.108-M89 Bituminous Solvent Type Paint
.3 Canadian Electrical Code.
.4 Ontario Building Code.
.5 Accessibility for Ontarians with Disabilities Act (AODA)

1.4 Submittals

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

.2 Shop Drawings: Submit shop drawings for review indicating all components, required clearances, electrical hook-up and coordination required with the work of related trades.
  .1 Indicate materials, thickness, anchorage, finishes and operation. Indicate minimum acceptable clearances required.
  .2 Provide layout for installation of door controller paddles and devices including mounting heights and conduit requirements.
  .3 Submit wiring diagrams and schematics.

.3 Provide maintenance data for automatic door operators complete with operation and maintenence instructions, pertinent details and spare parts list for incorporation into Maintenance Manuals specified in Section 01 78 00 – Closeout Submittals.

1.5 Maintenance

.1 Instruct Owner in operation and maintenance of door operators.

1.6 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Waste Management and Disposal

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

1.8 Warranty

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

Part 2 Products

2.1 General

.1 Power Door Operators and controls shall be CSA approved and shall meet the requirements of the Ontario Building Code and the Accessibility for Ontarians with Disabilities Act (AODA).

.2 Manufacturer: This specification is based on Stanley Access technologies Magic Swing Door Operators. Equivalent products by the following manufacturers are acceptable, subject to approval of the Consultant:
.1 Besam/Assa -Abloy
.2 Dormakaba
.3 Dor-O-Matic.
.4 Horton Automatics,

2.2 Material/Design/Operation

.1 Operator
.1 Shall be Stanley Magic-Swing, electro-mechanical system sealed against dirt, dust and corrosion in a cast aluminum case and fully lubricated to minimize wear and friction of the moving parts between temperature extremes of -20 ° C and +60 ° C. The entire operator shall be removable from the header as a unit.
.2 Size operators to suit weight of doors as indicated on the Door and Frame Schedule.

.3 Aluminum header extrusions to be minimum 3.0 mm wall thickness and have a clear anodized finish to match adjacent frames.
.4 Back paint all aluminum in contact with steel with bituminous paint to CGSB 1.108 and install PVC isolating strips.
.5 All automatic entrance equipment is to comply with all sectors of ANSI A-156.10 and be C.S.A. approved.

.2 Power Opening: The operator shall open the door with a 1/8 hp DC motor through reduction gears, ball screw actuator and a forged steel rack and pinion. Opening time to back-check (approximately 75°) shall be 1.25-1.6 seconds. The drive train shall have positive, constant engagement. A force no greater than 25 lbF at the lock stile shall stop the door from opening. The operator shall stop the door in the open position by electrically reducing the motor voltage and holding against an adjustable 90° stop.

.3 Spring Closing: The operator shall close the door by spring energy. Closing speed shall be controlled by employing the motor as a dynamic brake and closing to latch check (approximately 10°) shall be in 3 seconds. Closing through last 10° shall be in 1.5 seconds minimum. The closing spring shall be a helical compression spring, pre-loaded for positive closing action at a low material stress level for long spring life.

.4 Emergency Release: The operator shall have built in emergency release with controlled spring return to the closed position without manual resetting. While the door is in the emergency release mode, a disconnect switch shall prevent powered operation. No header or jamb mounted stops or cams shall be required for emergency function. Not more than 50 lbF at the lock stile shall be required for emergency use per ANSI A-156.10.

.5 Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power.
.1 Entrapment Protection: the forces and speeds of power opening, manual opening in both directions of swing, and spring closing in both directions of swing shall conform to the requirements of ANSI-A-156.10.

.6 Electrical Control: A solid state, completely enclosed electronic control with quick connect plugs shall incorporate the following features:
.1 A “safety plus” - 1 ½ second extension of both operate and safety signals after pressure has been removed from the control mats.
.2 A 2 ½ ampere current limiting circuit which limits the opening force of the operator to a maximum of 24 lbF at the lock stile.
.3 A “soft-start” motor driving circuit that reduces power to the motor after seven seconds of maintained opening speed.

.4 A cam actuated emergency breakout switch to disconnect power to the motor when the door is manually pushed in the emergency direction. The operator shall then automatically reset and power will be resumed.

.7 Door Arm
.1 Linkage assembly shall provide positive control of door through entire swing; shall permit use on butt hung doors.
.2 Header shall be 140 mm wide by 152 mm high extruded aluminum of 3.0 mm thickness. Access to the operator and electronic control box shall be by a full length removable cover, edge rabbited to the header to insure flush fit. Finish to be anodized.

.8 Controls
.1 Shall be manufacturer's standard Touchless "WAVE TO OPEN". Size of plate to meet Code requirements.
.2 CM-7536VR Clear Anodized.
.3 Provide CSA approved 50 x 100 mm minimum galvanized steel junction box or size to match frames.
.4 Control devices shall be weatherproof.
.5 Where indicated, install junction box/control on door control pedestal. Pedestal shall be stainless steel, brushed finish purpose made for door operator controls.
.1 152 x 152 mm stainless steel pedestal.
.2 1220 mm high with sloped top.
.3 1 single gang and 2 double gang openings. (Intercom/Card Reader/Door operator). Centrelines between 900mm and 1100mm to meet OBC Barrier Free requirements.

Part 3 Execution

3.1 Inspection

.1 Inspect the site to ensure that no defects are present in the completed phases of the work which would result in poor application or installation or cause latent defects of the automatic door equipment.

3.2 Installation

.1 Install components and wire operators in accordance with Manufacturer's instructions.

.2 Power door operator products and accessories are required to be installed by an AAADM certified technician as approved by the manufacturer. Adjust for proper opening and closing operation after final balancing of HVAC system

.3 Coordinate installation of operators with other Sections. Supply material to be built into the work when required.

.4 Install control switches at heights in accordance with referenced standards and reviewed shop drawings.

.5 Pedestals for automatic door operators shall be mounted on concrete foundations in accordance with manufacturer's recommendations and installation instructions. Exterior air entrained concrete as specified in Section 03 30 00.

.6 Maintain minimum headroom requirements at doors as indicated on the reviewed shop drawings.

.7 Adjust door operating components to ensure smooth opening and closing of doors.

.8 Instruct the Owner in the correct operation, care and maintenance of the door operators.

3.3 Cleaning

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

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 07 92 00 Joint Sealants
.2 Section 08 11 00 Metal Doors and Frames
.3 Section 08 44 13 Glazed Aluminum Curtain Walls
.4 Section 08 50 00 Aluminum Doors, Windows and Screens
.5 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 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.

.5 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

.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, 10 mm thick unless indicated otherwise. Type 2-tempered.
.1 Class B-float.
.2 Category 1
.3 Edge treatment: ground, bevel edge.

2.2 Insulating Glass Units

.1 Performance requirements for insulating glass units specified herein are the minimum permitted requirements. Provide engineered shop drawings and calculations showing that glazed assemblies including framing and glazing products in combination, meet or exceed the minimum requirements of MMAH Supplementary Standard SB-10.

.2 Insulating Glass Units: To CAN/CGSB-12.8-M, double glazed sealed units, 25 mm overall thickness.
- .1 Glass: to CAN/CGSB-12.1(tempered)
- .2 Glass thickness: 6.4 mm each light
- .3 Inter-cavity space thickness: 12.7 mm with low conductivity spacers.
- .4 Glass coating: surface number 2, low "E".
- .5 Inert gas fill: argon.

.3 Interior Units: Insulating Glass Type 2: For separation of “environmental areas”, between Rink and Heated Spaces:
- .1 Inner lite: 6mm tempered glass, clear.
- .2 Air space. Argon Filled
- .3 Outer lite: 6 mm tempered glass, clear.
- .4 Total thickness: 25 mm.

2.3 Glazing Products

.1 Select appropriate glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.

.2 Setting blocks: Neoprene 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.3 Spacer shims: Neoprene 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.4 Glazing tape:
- .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.5 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.

.6 Lock-strip gaskets: to ASTM C542.

.7 Glazing Gaskets: To ASTM C864.

.8 Sealant: as specified in Section 07 92 00 – Joint Sealants. Low VOC.

Part 3 Execution

3.1 Manufacturer’s Instructions

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

3.2 Examination

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 Preparation

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.4 Installation – General

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

3.5 Installation: Exterior Dry Method- Preformed Glazing

.1 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.

.2 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.3 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

.4 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.

.5 Trim protruding tape edge.

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

.1 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.2 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.5 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line.

.6 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.7 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.7 Installation: Interior - Dry Method

.1 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.2 Apply cap bead of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

.3 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.6 Place glazing tape on free perimeter of glazing.

.7 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.8 Knife trim protruding tape.

.9 Glaze hollow metal doors and pressed steel screens. Glass type as indicated.

.10 Install wired glass in fire rated doors and screens to meet requirements of NFPA 80.

3.8 Glazed Doors and Sidelights

.1 Doors and sidelights in a barrier-free path of travel consisting of a sheet of glass shall be marked with a continuous opaque strip conforming to Article 3.3.1.18 of the Ontario Building Code.

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 05 41 00 Structural Metal Stud Framing
.2 Section 06 10 00 Rough Carpentry
.3 Section 07 21 13 Building Insulation
.4 Section 07 26 00 Vapour Retarders
.5 Section 07 27 13 Modified Bituminous Sheet Air Barriers
.6 Section 07 84 00 Firestopping
.7 Section 07 92 00 Joint Sealants
.8 Section 09 22 16 Non-Structural Metal Framing
.9 Section 09 91 23 Interior Painting

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM C514-04(2020) Standard Specification for Nails for the Application of Gypsum Board
- .2 ASTM C840-20 Standard Specification for Application and Finishing of Gypsum Board
- .3 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
- .4 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
- .5 ASTM C1047-14a (2019) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
- .6 ASTM C1177/C1177M-17 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
- .7 ASTM C1178/C1178M-18 Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel
- .8 ASTM C1278/C1278M-17 Standard Specification for Fiber-Reinforced Gypsum Panel
- .9 ASTM C1280 - 18 Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing.
- .10 ASTM C1288-17 Standard Specification for Fiber-Cement Interior Substrate Sheets

.11 ASTM C1325-22 Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units
.12 ASTM C1396/C1396M - 17 Standard Specification for Gypsum Board
.13 ASTM C1629/C1629M-19 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
.14 ASTM E90-09 (2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
.15 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
.16 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-214-10 Recommended Levels of Gypsum Board Finish.
.2 GA-216-10 Application and Finishing of Gypsum Board.
.3 GA-253-12 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.

.5 Glass Mat Exterior Gypsum Sheathing: to ASTM C1177, 12.7 mm thick, 1219 mm wide x 2440 mm long, square edge.
  .1 Weight: 9.27 kg/m2
  .2 Surfacing: Fiberglass mat on face, back, and long edges.
  .3 Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
  .4 Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.

.5 Humidified Deflection (ASTM C1177): Not more than 6.0 mm.
.6 Permeance (ASTM E96): Not less than 23 perms.
.7 R-Value (ASTM C518): 0.56.
.8 Mold Resistance (ASTM D3273): 10, in a test as manufactured.
.9 Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
.1 CGC Securock
.2 Georgia Pacific DENS-Glass Gold
.3 Certainteed GlasRoc

2.2 Fibre Reinforced Polymer

.1 The FRP will be a standard white smooth sheet adhered to the underside of the gypsum board. The FRP is a standard sheet having a minimum thickness of 0.09” thickness or better. ASTM D3039: Tensile Properties of Polymer Matrix Composite Materials. ASTM D638: Tensile Properties of Plastics. ASTM C581: Chemical Resistance. ACI 440.1R: Guide for the Design and Construction of Concrete Reinforced with FRP Bars.

2.3 Cementitious Backer Board

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

2.4 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.

2.5 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/m3:
  - .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.

2.6 Accessories

.1 Casing beads, corner beads 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 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 Install Hi-Density Water Resistant Gypsum Sheathing in showers and other wet areas.

.7 Laminate gypsum board to existing masonry wall surfaces where indicated.

.8 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 Gypsum Sheathing

.1 Install in accordance with GA-253, ASTM C1280 and manufacturer's recommendations.

.2 Install exterior gypsum sheathing horizontally on all exterior walls where indicated. Stagger joints between adjacent sheets.

.3 Screw-attach gypsum sheathing to each stud with 32 mm self-drilling corrosion resistant sheathing screws spaced 10 mm from ends and edges 200 mm o.c. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink. Apply sealant around sheathing perimeter at interface with other materials and install flashing as indicated on the drawings.

.4 Apply fibreglass joint treatment to all joints, overlapping at intersections by the width of the tape. Apply 10 mm bead of sealant along the joint and embed the sealant into the entire surface of the tape with a trowel. Apply enough sealant to each exposed fastener to cover completely when trowelled smooth.

3.5 Cementitious Backer Board

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

3.6 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.

3.7 Access Doors

.1 Install access doors to electrical and mechanical fixtures specified in respective Sections.

.2 Rigidly secure frames to furring or framing systems, to satisfy fire rating requirements.

3.8 Taping and Filling

.1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
.2 Finish corner beads, control joints and trims as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

3.9 Cleaning

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

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 05 41 00 Structural Metal Stud Framing
.2 Section 09 21 16 Gypsum Board
.3 Section 09 21 16.13 Shaftwall Systems

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.

.2 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: to ASTM C645 , electro-zinc coated steel.

.3 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.

.4 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.

.5 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.

.6 Deflection Track: Bailey Multi-Slot Track MST 250, size to suit studs, and top deflection clips TDC 350 and TDC 587.

.7 Horizontal Flange attachment: Bailey Horizontal Flange Attachment Clip (HFA Clip)

.8 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild steel rods.

2.3 Shaft Wall Framing Systems

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

2.4 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.

2.5 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 All gypsum board shall be supported with steel framing whether indicated or not.

.3 Unless otherwise indicated on the drawings, all gypsum board partitions shall extend from floor level to the underside of floor or roof structures above.

.4 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,

.5 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.6 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.

.7 Erect metal studding to tolerance of 1:1000.

.8 Attach studs to bottom and ceiling track using screws.

.9 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.10 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.11 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.

.12 Install heavy thickness single jamb studs at openings.

.13 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.

.14 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.15 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.

.16 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.17 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.

.18 Erect drywall resilient furring transversely across studs and joists, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screws.

.19 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

.20 Install continuous insulating strips to isolate studs from un-insulated surfaces.

.21 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 Shaft Wall Framing

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

.2 Finished assembly shall meet requirements for ULC listed assembly indicated.

3.5 Suspended and Furred Ceilings and Bulkheads

.1 Erect hanger and runner channels for suspended gypsum board ceilings and 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.

3.6 Gypsum Board

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

3.7 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 03 30 00 Cast-in-Place Concrete
.2 Section 04 20 00 Concrete Unit Masonry
.3 Section 07 92 00 Joint Sealants
.4 Section 09 21 16 Gypsum Board
.5 Section 07 92 00 Joint Sealants

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C150/C150M-18 Standard Specification for Portland Cement
  .2 ASTM C207-06 (2011) Standard Specification for Hydrated Lime for Masonry Purposes
.2 American National Standards Institute (ANSI)
  .1 ANSI A108/A118/A136.1:2017 American National Specifications for the Installation of Ceramic Tile.
  .2 ANSI A118.10 Waterproof Membrane
  .3 ANSI A137.1: 2017 American National Standard Specifications for Ceramic Tile
.3 Canadian General Standards Board (CGSB)
  .1 CGSB 71-GP 22M 1978 Adhesive, Organic, for Installation of Ceramic Wall Tile
.4 International Standards Organization (ISO)
  .1 ISO 10545 Series Ceramic Tiles, Standards for Testing
  .2 ISO 13006-2012 Ceramic Tiles, Definitions, Classifications, Characteristics and Marking.
  .3 ISO 13007-2010 Ceramic Tiles, Grouts and Adhesives.
.5 Terrazzo, Tile and Marble Association of Canada (TTMAC)
  .1 TTMAC 2016-2017 Specifications Guide 09 30 00, Tile Installation Manual.
  .2 TTMAC Hard Surface Maintenance Guide.
.6 Ontario Regulation 565/90: Public Pools

1.4 Submittals

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

.2 Provide product data. Include manufacturer's information on:
  .1 Ceramic tile, marked to show each type, size, and shape required.

.2 Mortar and grout.
.3 Divider strip.
.4 Levelling compound.
.5 Waterproofing isolation membrane.

.3 Submit duplicate samples of tile. Samples to be submitted on 300 x 600 mm sample board for each colour, texture, size and pattern of tile. Grout sample joints for representative sample of final installation.

.4 Trim and Accessories: submit duplicate samples of each trim.

.5 Shop drawings: submit tiling plans giving all details of special fittings, expansion joints, joint layout, slopes, etc.

.6 Maintenance Data: Provide maintenance data for tile work, for incorporation into Maintenance Manuals specified under Section 01 78 00.

1.5 Quality Assurance

.1 Do tile work in accordance with Installation Manual 200, Ceramic Tile, by Terrazzo, Tile and Marble Association of Canada (TTMA), except where this specification is more stringent.

.2 For the installation of ceramic tile, use only skilled tradesmen who are familiar with the referenced standards and with the requirements for this Work. Installer of ceramic tiles shall have a minimum of 10 years of experience including at least five projects of similar scope and scale. Submit documented proof of experience prior to commencing work of this Section.

.3 The setting material manufacturer's representative shall review the details with the Contractor prior to the start of work. Instruct the Contractor on the proper installation procedures to ensure compliance with the guarantee requirements.

.4 Pre Installation Conference
.1 Convene one week prior to commencing work of this section.
.2 Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
.3 Meeting agenda includes but is not limited to:
.1 Tile and installation material compatibility.
.2 Grouting procedure.
.3 Maintenance and cleaning products and methods.
.4 Surface Preparation.

1.6 Shipping, Handling and Storage

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

.2 Deliver packaged materials in original unopened containers.

.3 Keep delivered material dry and free from stains. Store cementitious material off damp surfaces.

.4 Use all means necessary to protect materials, before, during and after installation and to protect the installed work and materials of all other trades.

.5 In the event of damage, immediately make all repairs and replacements necessary to the approval of the Consultant and at no additional cost to the Owner.

.6 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.7 Project Conditions

.1 Maintain air temperature and structural base temperature at ceramic tile installation area above 12 °C for 48 hours before, during and after installation.

.2 Do not install tiles at temperatures less than 12 °C or above 38 °C.

.3 Do not apply epoxy mortar and grouts at temperatures below 15 °C or above 25 °C.

.4 Provide and maintain temporary lighting. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas.

1.8 Waste Management and Disposal

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

1.9 Maintenance

.1 Upon completion of the installation and as a condition of acceptance, deliver to the Owner 2% of tile and accessory tiles in each colour and pattern of ceramic tiles installed under this section for the Owners maintenance program. Identify

each carton for location and installation date. Submission must be made all at one time and prior to Substantial Performance.

1.10 Warranty

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

Part 2 Products

2.1 Materials

.1 Materials shall be graded and containers grade sealed, delivered to the job site in their original packages or containers with the manufacturer's labels and seals intact.

.2 Tile and grout colours shall be selected by the Consultant from the manufacturer's standard range of colours.

.3 Tile shall conform to ANSI A137.1.

.4 Floor tile shall have coefficient of slip resistance conforming to ANSI A137.1.

.5 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

2.2 Porcelain and Ceramic Tile

.1 Tile Type 1: Wall Tile: Olympia Colour and Dimension Series 100 x 400 mm glazed ceramic tile (up to 4 colours will be selected from manufacturers’ full range of colours for accent tiles)

.2 Tile Type 2: Floor Tile: Olympia Tile, Quebec Series, 50 x 50 Mosaic, Anthracite Fleck Matte.

2.3 Mortar, Grout, Additives, Waterproof Membranes and Adhesives

.1 The products of one manufacturer shall be used throughout the project to ensure compatibility of materials. Manufacturers of commercial mortar, grout and adhesive having product considered acceptable for use:
.1 Laticrete
.2 Mapei
.3 Flextile

.2 Water: Fresh, clean, potable, free from deleterious matter, acids or alkalis.

.3 Floors: (thinset) T.T.M.A.C. Detail #311F.
- .1 Moisture mitigation system (where indicated) as specified in Section 09 05 61.13
- .2 Thinset mortar: Laticrete 4237 latex additive plus 211 Crete filler powder or Mapei Kerabond mixed with Keralastic high performance latex admixture or Flextile 52 thin set.
- .3 Levelling Compound (if required): Laticrete 3701 latex or 226 Mapecem mortar mixed with Planicrete 50.
- .4 Grout: Laticrete Latapoxy SP100, solid epoxy grout or Mapei Kerapoxy. Colours to Consultant's selection.

.4 Walls:
- .1 Concrete and Concrete Block: T.T.M.A.C. Detail #303W:
  - .1 Levelling Coat: Laticrete 3701 or Mapei Mapecem mixed with Planicrete 50.
  - .2 Thinset mortar: Laticrete 4237 latex additive plus 211 Crete filler powder or Mapei Kerabond mixed with Keralastic high performance latex admixture.
  - .3 Grout: Laticrete Latapoxy SP100 solid epoxy grout or Kerapoxy. Colours to Consultant's selection.

2.4 Patching and Levelling Compound

.1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors, capable of being applied in layers up to 50 mm thick, being brought to feather edge, and being trowelled to smooth finish and having not less than the following physical properties:
- .1 Compressive strength: 25 MPa.
- .2 Tensile strength: 7 MPa.
- .3 Flexural strength: 7 MPa.
- .4 Density: 1.9
- .5 Products containing gypsum are not acceptable.

.2 Levelling Compound: Laticrete 3701 latex or 226 Mapecem mortar mixed with Planicrete 50.

2.5 Floor Sealer and Protective Coating

.1 To tile and grout manufacturer’s recommendations.

2.6 Accessories

.1 CT Edge Protection: Schluter RONDEC, size to suit tile thickness. Satin anodized aluminum. Trim to come with all connectors or end caps required for a complete and finished installation. As a minimum, provide edge protection at the following locations:
   .1 Top of PC Base;
   .2 Top of CT wall tile;
   .3 All outside corners of wall tile or porcelain ceramic tile base.
   .4 All porcelain tile wall base through the change rooms shall be complete with a cove base and necessary transition at all terminations and corners in the wall. Poor workmanship with the cove base will not be accepted.

.2 Transition strip T1 Schluter Schiene Basic Finish, Zinc

.3 Sealant: as specified in Section 07 92 00.

Part 3 Execution

3.1 Surface Conditions

.1 Surfaces on which tile is to be applied, shall be thoroughly cleaned down.

.2 Verify that concrete substrates have been allowed to cure for a minimum of 28 days in accordance with T.T.M.A.C. requirements.

.3 Verify that Moisture Mitigation Control System specified in Section 09 05 61.13 has been installed, cured and accepted by the Consultant.

.4 Verify that substrates for bonding tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and are within starting flatness tolerances as specified in Section 03 30 00 and are ready for application of levelling materials specified in this Section.

.5 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.

.6 Drywall surfaces on which wall and floor tile is to be applied, shall be free from dust, excess plaster and shall be plain and true without any irregularities. Prepare existing gypsum board surfaces as recommended by TTMAC and product manufacturer to support tile installation.

.7 Existing painted masonry or concrete wall surfaces to receive ceramic tile shall be thoroughly cleaned of all paint down to concrete or concrete block surfaces

using paint stripper. Prepare painted surfaces in accordance with manufacturer's instructions and TTMAC recommendations.

.8 In the event of discrepancies, immediately notify the Consultant and do not proceed with installation in such areas until all such discrepancies have been fully resolved.

.9 Check that conditions of temperature, humidity, traffic and usage are suitable as required by Installation Manual specifications. Minimum temperature to be not less than 10 °C.

.10 Check that surfaces ready to receive tiling are cured, level and/or graded, plumb, smooth, firm, free from loose particles, droppings, projection, grease, solvent, paint and other foreign matter and from other unsuitable conditions.

.11 Install transition strips, reducers and edge trim at exposed edges of all tiled walls and floors in accordance with manufacturer's instructions.

3.2 Installation

.1 Install tiling in accordance with requirements of TTMAC Tile Installation Manual and parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials, and to methods required for complete tile installation.

.2 Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions:
  .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  .2 Make cut edges smooth, even and free from chipping.
  .3 Do not split tile.

.3 Accurately form intersections and returns; perform cutting and drilling of tile without marring visible surfaces:
  .1 Cut, drill, and fit tile to accommodate work of other subcontractors penetrating or abutting work of this Section.
  .2 Carefully grind cut edges of tile abutting trim, finish, or built in items for straight aligned joints.
  .3 Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile and to provide a uniform joint appearance.

.4 Lay tile in pattern indicated on Drawings and as follows:

.1 Align joints when adjoining tiles on floor, base, walls, and trim are the same size.
.2 Centre tile patterns between control and movement joints; notify Consultant for further instructions where tile patterns do not align with control or movement joints.
.3 Cut tile accurately and without damage.
.4 Smooth exposed cut edges with abrasive stone, where exposed.
.5 Chipped or split edges are not acceptable.
.6 Provide pool markings where required and in conformance with Ontario Regulation 565/90 – Public Pools.

.5 Bonding Bed: Set tile in place while bond coat is wet and tacky and as follows:
.1 Adjust amount of bonding materials placed on substrates based on temperature and humidity to prevent skinning over of bonding materials.
.2 Use sufficient bond coat to provide a minimum 80% contact for tiles smaller than 300 mm x 300 mm with bonding material evenly dispersed and pressed into back of tile; refer to back buttering requirements for larger materials and installations having Moderate or higher Load Bearing Performance requirements.
.3 Notch bond coat in horizontal straight lines and set on freshly placed bonding material while moving (sliding) tile back and forth at 90° to notches.
.4 Verify that corner and edges are fully supported by bonding material.
.5 Set tiles to prevent lippage greater than 1 mm over a 3 mm grout joint.
.6 Keep two-thirds of grout joint depth free of bonding materials.
.7 Clean excess bonding materials from tile surface prior to final set.
.8 Sound tiles after bonding materials have cured and replace hollow sounding tile before grouting.

.6 Back Buttering: Obtain 100% mortar coverage in accordance with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108 series of tile installation standards for the following applications:
.1 Tile in wet areas:
.1 Showers
.2 Tile installed with chemical resistant mortars and grouts
.3 Tile having tiles 300 mm or larger in any direction
.4 Tile having tiles with raised or textured backs
.5 Tile having tile installation rated for Heavy or Extra Heavy Duty.
.6 All porcelain tiles with more than 20% of the tile backs covered with firing release dust back buttered so that 100% of the back is covered with adhesive mortar rated for C627, Extra Heavy Duty rating.

.7 Install prefabricated edge strips and control at locations indicated or where exposed edge of floor tile meets different flooring materials and exposed substrates.

.8 Install finishing and edge protection at exposed corners of wall tile.

.9 Protect exposed edges of floor tile with properly sized transition strips, use sloped reducer strips where uneven transitions between 6 mm and 13 mm occur.

.10 Control and Movement Joints: Install control joints and expansion joints in tile work in accordance with TTMAC Detail 301MJ; keep control and expansion joints free of bonding materials and as follows:
- .1 Cut tiles to establish line of joints; sawn joints after installation of tiles will not be acceptable.
- .2 Locate joints in tile surfaces directly above joints in concrete substrates.
- .3 Provide floor control joints over structural control joints.
- .4 Install prefabricated joint profiles in accordance with manufacturer's written instructions, set with top surface of joint profile slightly below top surface of tile.
- .5 Prepare joints and apply sealants in accordance with requirements of Section 07 92 00.
- .6 Keep control and movement joints free from setting materials.
- .7 Form an open joint for sealant in tile wherever a change in backing material occurs, at all vertical interior corners, around penetrating pipes and fixtures, and where tile abuts other materials or fixtures.
- .8 Install control joints where indicated or at not less than the flowing spacings:

Environment	Minimum	Maximum	Joint Width (minimum)
Interior/Shaded	4800 mm	6100 mm	6 mm
Interior/Sunlight	2400 mm	3700 mm	6 mm

.11 Waterproof membrane and setting materials shall be installed in strict accordance with manufacturer's instructions.

3.3 Grouting

.1 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of TTMAC, and as follows:
- .1 Allow proper setting time before application of grout.
- .2 Pre-seal or wax tiles requiring protection from grout staining.
- .3 Force grout into joints to a smooth, dense finish.
- .4 Remove excess grout in accordance with manufacturer's written instructions and polish tile with clean cloths.

.2 Grout all tile using specified grout in strict accordance with manufacturers written instructions all to give a flush, hard joint.

.3 Joints in tile shall be filled solid and flush with grout.

.4 Prepare joints and mix grout in accordance with manufacturer's printed instructions. Force maximum amount of grout into joints, avoiding air traps or voids.

.5 Remove all excess grout by washing diagonally across the joints. Check for voids, air pockets and gaps and fill same. Remove all discoloured grout and replace with new.

.6 Cure all joints.

3.4 Floor Sealer and Protective Coatings

.1 Apply in accordance with manufacturer’s instructions.

3.5 Cleaning and Protection

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

.2 Cleaning: Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completion of placement and grouting and as follows:
.1 Remove grout residue from tile as soon as possible.

.2 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer’s written instructions, but no sooner than 10 days after installation; protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.
.3 Flush surface with clean water before and after cleaning.

.3 Protection: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies as follows:
.1 Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.
.2 Protect floor areas from traffic after grouting is completed in accordance with manufacturer’s written instructions.
.3 Prevent foot and wheel traffic from floors for a minimum of 24 hours after completion of grouting.
.4 Provide protective covering until Substantial Performance of the Work.

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 21 16 Gypsum Board
.2 Section 09 53 00 Acoustical Suspension

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C423-22 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
  .2 ASTM E84-22 Standard Test Method for Surface Burning Characteristics of Building Materials
  .3 ASTM E1264-22 Standard Classification for Acoustical Ceiling Products
  .4 ASTM E1414/E1414M-21a Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
  .5 ASTM E1477-98A(2017)e1 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
.2 Underwriters Laboratories of Canada (ULC)
  .1 ULC 102-2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.4 Submittals

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

.2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
  .1 Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

.3 Submit duplicate 300 x 300 mm samples of each type of acoustical units.

.4 Provide maintenance data for acoustic panel ceilings for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.5 Quality Assurance

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
  .1 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
  .2 Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 Classification.
  .3 Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

.2 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.3 Mock-up:
  .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  .2 Construct mock-up 10 m² minimum of acoustical panel tile ceiling including one inside corner and one outside corner.
  .3 Construct mock-up where directed.
  .4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with ceiling work.
  .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.6 Project Conditions

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15° C and humidity of 20-40% before and during installation.

.3 Store materials in work area 48 hours prior to installation.

.4 Building areas to receive ceilings shall be free of construction dust and debris.

1.7 Performance Requirements

.1 Surface-Burning Characteristics: Conform to ULC S102 or ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

.2 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake

motions determined according to applicable code.

1.8 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Protect on site stored or installed absorptive material from moisture damage.

1.9 Waste Management and Disposal

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

1.10 Extra Materials

.1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide acoustical units amounting to 5% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

Part 2 Products

2.1 Materials

.1 Acoustic units for suspended ceiling system: to ASTM E1264

.2 Panel Type 1: CGC Fissured.
- .1 Class A.
- .2 Composition: Water Felted Mineral Fiber
- .3 Pattern regular fissured.
- .4 Texture: medium.
- .5 Flame spread: ASTM E1264, Class A (U.L.C.), 25 or less.
- .6 Smoke developed 50 or less in accordance with ULC 102.
- .7 Noise Reduction Coefficient (NRC): ASTM C423; Classified with UL label, 0.55
- .8 Ceiling Attenuation Class (CAC): ASTM C1414; Classified with UL label, 35
- .9 Light Reflectance (LR) range of 0.81 to ASTM E1477.
- .10 Dimensional Stability: Standard
- .11 Edge Profile: Square Lay-In
- .12 Colour: White.
- .13 Size 610 x 1219 x 16 mm thick.

.14 Shape flat.
.15 Surface coverings: Ecolabel certified paint.

.3 Alternate manufacturer: Products as manufactured by the following are acceptable, subject to Consultants approval of style, finish, performance characteristics and texture:
.1 Armstrong Industries
.2 Certainteed

.4 Ceiling Suspension System: as specified in Section 09 53 00.

Part 3 Execution

3.1 Examination

.1 Do not install acoustical panels until work above ceiling has been inspected by Consultant.

3.2 Installation

.1 Co-ordinate with Section 09 53 00 - Acoustical Suspension.

.2 Coordinate layout and installation of ceilings with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and fire-suppression system.

.3 Install acoustical panels and tiles in ceiling suspension system.

.4 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width, with directional pattern running in same direction. Refer to reflected ceiling plan.

.5 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding

3.3 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 09 21 16 Gypsum Board
.3 Section 09 51 13 Acoustic Panel Ceilings
.4 Division 23 Mechanical
.5 Division 26 Electrical

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A307-21 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
  .2 ASTM A641/A641M-19 Standard Specification for Zinc–Coated (Galvanized) Carbon Steel Wire.
  .3 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
  .4 ASTM C635/C635M-17 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
  .5 ASTM C636/C636M-19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  .6 ASTM A653 / A653M – 20 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .7 ASTM E84-21a Standard Test Method for Surface Burning Characteristics of Building Materials
  .8 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
  .9 ASTM E1264-19 Standard Classification for Acoustical Ceiling Products

1.4 Submittals

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

.2 Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
.3 Acoustical Certifications: Manufacturer's certifications that products comply with

specified requirements, including laboratory reports showing compliance with specified tests and standards.

.4 Submit one representative model of each type of ceiling suspension system.
.1 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 Design Requirements

.1 Determine the superimposed loads that will be applied to suspension systems by components of the building other than the ceiling and ensure that adequate hangers are installed to support the additional loads in conjunction with the normal loads of the system.

.2 Design supplemental suspension members and hangers where width of ducts and other construction within ceiling plenum produces hanger spacing that interferes with location of hangers at required spacing to support standard suspension system members:
.1 Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

.3 Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360 to ASTM C635 deflection test.

1.6 Performance Requirements

.1 Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to applicable code.

1.7 Quality Assurance

.1 Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

.2 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
.1 Surface Burning Characteristics: Tested per ASTM E84 and complying with ASTM E1264 Classification.

.3 Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

.4 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.5 Construct mock-ups in accordance with Section 01 45 00 - Quality Control and as described in Section 09 51 13.

1.8 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.9 Waste Management and Disposal

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

Part 2 Products

2.1 Materials

.1 Components: All main beams and cross tees, base metal and end detail shall be commercial quality hot-dipped galvanized steel as per ASTM C635. Main beams and cross tees shall be double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

.2 Face width: 22 mm

.3 Edge Moldings and Trim: Hemmed angle moulding to match main beams and cross tees.

.4 Structural Classification: Intermediate Duty System, ASTM C635.

.5 Colour: White and match the actual colour of the specified ceiling tile.

.6 Standard of Acceptance:
.1 Armstrong Prelude XL
.2 Donn DXT
.3 Certainteed Classic Environmental Stab.

.7 Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated or required.

.8 Threaded Rod: to ASTM A397. Galvanized or zinc plated.

.9 Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 2.06 mm thick.

.10 Channel Framing and Fittings: Strut type metal framing and componenets to ASTM A1011 or ASTM A653. Unistrut P1000SL or equivalent. Galvanized.

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 Examination

.1 Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.3 Preparation

.1 Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

.2 Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
.1 Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.4 Installation

.1 Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines and in accordance with the manufacturer's installation instructions.

.2 Install wall moldings at intersection of suspended ceiling and vertical surfaces.

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.

.4 Secure hangers to overhead structure using attachment methods as indicated by manufacturer. Do not suspend ceiling systems from building services including plumbing lines, conduit, cable trays or duct work.

.5 Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies must be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.

.6 Install hangers spaced at maximum 1219 mm centres and within 152 mm from ends of main tees. Install hanger wires plumb and straight.

.7 Lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width.

.8 Ensure suspension system is coordinated with location of related components.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.

.10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 610 mm around perimeter of fixture.

.11 Interlock cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Install access splines to provide ceiling access.

.14 Finished ceiling system to be square with adjoining walls and level within 1:1000

3.5 Cleaning

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

.2 Touch up scratches, abrasions, voids and other defects in painted surfaces

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

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

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D2047-11 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine
  .2 ASTM D2240-05(2010) Standard Test Method for Rubber Property—Durometer Hardness
  .3 ASTM D5116-10 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
  .4 ASTM E648-15e1 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
  .5 ASTM E662-15a Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
  .6 ASTM E1745-11 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
  .7 ASTM F970-15 Standard Test Method for Static Load Limit
  .8 ASTM F1869-11 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
  .9 ASTM F710-11 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
  .10 ASTM G21-15 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
.2 National Fire Protection Association (NFPA)
  .1 NFPA 101, Code for Safety to Life from Fire in Buildings and Structures.
.3 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1168-03, Adhesives and Sealants Applications.

1.4 Submittals

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

.2 Before any rubber flooring materials are delivered to the job site, submit a complete list of all materials proposed to be furnished and installed under this

Section of the Work, stating manufacturer's name and catalogue number for each item, and product samples in colours specified.

.3 Submit two copies of the manufacturer's current recommended method of installation for each item.

.4 Submit Manufacturer’s current printed data sheets on specified products.

.5 Samples: submit duplicate 100” x 100 mm” samples of full range of manufacturer’s specified products and colours.

.6 Submit maintenance data for athletic rubber tile flooring for Operation and Maintenance Manual specified under Section 01 78 00.

1.5 Quality Assurance

.1 Manufacturer must be certified ISO 9001 and ISO 14001.

.2 Manufacturer must have experience in the manufacturing of prefabricated rubber athletic flooring.

.3 Installer must have performed installations of the same scale in the last three (3) years.

.4 Installer to be recognized and approved by the rubber athletic flooring manufacturer.

.5 Mock Up: Mock up is to be installed following the same procedures and utilizing the same specified materials that will be used for the actual project. Mock-up size: minimum 3.0 square meters.

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 Materials must be delivered in Manufacturer’s original, unopened and undamaged containers with identification labels intact.

.4 Store material upright on a clean, dry, flat surface protected from all possible damage, and protect from exposure to harmful weather conditions.

.5 Store materials at a minimum temperature of 13^0 C.

1.7 Project Conditions

.1 Maintain a stable room and subfloor temperature between 18^0 C to 30^0 C for a period of 48 hours prior, during and 48 hours after installation.

.2 Installation to be carried out no sooner than the specified curing time of concrete subfloor.

.3 Moisture vapor emission content of the concrete slab must not exceed the tolerance of the adhesive used when tested using the anhydrous calcium chloride test as per ASTM F1869.

.4 Perform an alkalinity test and moisture test before commencing. Moisture content must not exceed the capacity of the specified adhesive (verify using the anhydrous calcium chloride test as per ASTM F1869 and pH level should be in the range of 7 to 8.5.

.5 Installation of rubber athletic flooring shall not commence unless all other trades in the building are completed.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of three (3) 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 The following manufacturers of Athletic rubber systems are acceptable subject to approval of complete product specifications and details for manufacturer's premium system and on receipt of project references satisfactory to the Owner and Consultant:
.1 North West Rubber.

.2 Material shall be rubber athletic flooring, calendered and vulcanized with a base of natural and synthetic rubbers, stabilizing agents and pigmentation. Manufactured in two layers which are vulcanized together. The shore hardness of the top layer will be greater than that of the bottom layer; shore hardness of layers to be recommended by the manufacturer and the limits specified.
   .1 Thickness: 10 mm
   .2 Tile size: 610 x 610 mm
   .3 Colour: standard, solid background colours with random marbleization throughout material. Two (2) colours to be selected by the Consultant from manufacturer's standard colour range.
   .4 Finish: hammered.
   .5 Manufactured in two layers, which are vulcanised together. The shore hardness of the top layer will be greater than that of the bottom layer, shore hardness of layers to be recommended by the manufacturer and the limits specified.

.3 Performance of the prefabricated rubber athletic flooring shall conform to the following criteria:

Performance Criteria	**Test Method**	**Result**
Hardness Shore A	ASTM D2240	77/71
Critical Radiant Flux	ASTM E648, NFPA 101	0.58 W/cm², Type I
Optical Density of Smoke	ASTM E 662	< 450, Class I
Fungal Resistance Test	ASTM G21-90	No growth
Coefficient of Friction	ASTM D2047	1.0 dry, 1.2 wet
V.O.C. Compliant	ASTM D5116	Yes
Colour Stability		Good
Light reflection		Average
Chemical Resistance		Good

.4 Adhesive: Provide adhesive certified by the manufacturer, PU 105 Polyurethane Adhesive or EP 55 epoxy adhesive.

.5 Primers shall be waterproof, best quality formulated for the application of the rubber floor coverings over subfloor as indicated on the drawings and Room Finish Schedules. Primers to be type and brand recommended and certified by the manufacturer of the products for use with his materials and used in strict accordance with the manufacturer's directions.

.6 Patching or levelling compound to be supplied and/or recommended/approved by rubber athletic flooring Manufacturer and shall be compatible with tile adhesive.

.7 Reducer strips shall be manufacturer's standard reducer strips, 38 mm wide tapered from 9.5 mm to 0 mm.

.8 Sealant: As recommended by tile manufacturer.

Part 3 Execution

3.1 Examination

.1 New concrete floors and toppings must be thoroughly cured (minimum 28 days) prior to tile installation.

.2 Carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation of rubber flooring may properly commence.

.3 Confirm that rubber flooring may be installed in accordance with the original design and the manufacturer's recommendations.

.4 Ensure that no concrete sealers or curing compounds are applied or mixed with the subfloors.

.5 Ensure concrete surfaces are smooth, dense finish, highly compacted with a tolerance of 3 mm in 3.00 m radius.

.6 In the event of discrepancy, immediately notify the Consultant. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 Preparation

.2 Prepare subfloor in accordance with Manufacturer's current printed subfloor preparation guidelines and ASTM F710-11. Include levelling of existing floors and trenches.

.3 Allow for excessive levelling and preparation of existing floors where previous finishes have been removed.

3.3 Installation

.1 Install rubber athletic flooring in accordance with Manufacturer's current printed Installation Manual.

.2 Fill all cavities, cracks, joints and all other surface imperfections in concrete substrate with latex fill or other approved subfloor filler in order to produce a smooth, flat, hard surface for receipt of rubber flooring. Scrape off all ridges, droppings, scale and other projections. Clean floor with an industrial vacuum cleaner. Remove all substance and materials affecting adhesive bond.

.3 Prime concrete floors and apply adhesive uniformly with notched spreaders, at correct coverage as recommended by the manufacturer. Do not spread more adhesive than can be covered before initial set takes place. Place tiles so that adhesive is squeezed into tile joints and provides a watertight joint.

.4 Where tiles terminate at doorways, or where tiles of different type or colour butt together the joint shall centre on the door.

.5 Provide and install reducer strips where rubber floor tiles terminate against a concrete floor where no applied architectural floor finish is required. Reducer strip shall be installed below centre of door where a door occurs.

.6 Tile shall be laid with all joints square and tightly butted together. Start installation from centre of rooms to ensure equal maximum size edge tiles. Pattern and direction of tile shall be as directed by the Consultant.

.7 Tile to be laid full depth of closets, toe spaces, and recesses. Cut and fit tiles tightly against openings, breaks, frames, fixtures, columns and other vertical surfaces. Carry tile under all movable fitments. Apply adhesive to provide watertight joint around all cut areas.

.8 Seal perimeter of all athletic rubber tile at walls and penetrations in accordance with manufacturer’s recommendations.

3.4 Schedule

.1 Refer to the floor plans and schedules for areas to receive Athletic Rubber Flooring (RST)

3.5 Extra Stock

.1 Upon completion of the installation and as a condition of acceptance, deliver to the Owner 3% of tile and accessory tiles in each colour and pattern of resilient athletic flooring installed under this section for the Owners maintenance program. Identify each carton for location and installation date. Submission must be made all at one time and prior to Substantial Performance.

3.6 Cleaning

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

.2 Remove surplus adhesive from athletic rubber floor tiles as the work progresses.

.3 Maintain rubber athletic flooring according to manufacturer's current maintenance instructions for specified product.

.4 Protect with non-staining building paper or masonite.

.5 Immediately prior to Substantial Performance. Remove protection, clean, dry or damp mop floors.

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

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM F1869-16a Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
.2 American Concrete Institute (ACI)
  .1 ACI 308 Standard Specification for Curing Concrete
.3 International Concrete Repair Institute (ICRI)
  .1 ICRI 310.2R-2013, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
.4 South Coast Air Quality Management District (SCAQMD), California State
  .1 SCAQMD Rule 1113-06, Architectural Coatings.

1.2 Submittals

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

.2 Product data: Submit manufacturer's Product data indicating:
  .1 Two copies of manufacturer's Product data on characteristics, performance criteria, and limitations.
  .2 Preparation, installation requirements and techniques, Product storage, and handling criteria.
  .3 Submit MSDS for specified products and maintain copy on site.

.3 Manufacturer Certificate: Indicating products listed on Contractor's Product List are compatible and suitable for the specified application.

.4 Samples: Submit minimum 300 x 300 mm samples indicating coating and final concrete finish.

.5 Reports: Submit manufacturer's acceptance of substrate prior to installation in writing. Submit verification of moisture content of floor prior to installation.

.6 Provide maintenance data for floor coating for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00.

1.3 Quality Assurance

.1 Perform Work of this Section by a company that has a minimum of five years proven experience in installations of a similar size and nature and that is approved by manufacturer.

.2 Arrange with manufacturer's representative to inspect substrates and installation procedures 48 hours in advance of installation.

1.4 Project Conditions

.1 Do not install the Work of this Section outside of environmental ranges as recommended by the manufacturer without Product manufacturer's written acceptance and as follows:
.1 Relative Humidity: In accordance with manufacturers' requirements.
.2 When no dust is being raised.
.3 In well-ventilated and broom clean areas.

.2 Post do not enter and appropriate warning signs at conspicuous locations.

1.5 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

.3 Store materials at site in an area specifically set aside for purpose that is locked, ventilated, and maintained at a minimum temperature of 16° C.

.4 Ensure that health and fire regulations are complied with in storage area, and during handling and application.

1.6 Waste Management and Disposal

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

1.7 Warranty

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

Part 2 Products

2.1 Materials

.1 Provide liquid densifier sealer and related concrete treatment and admixture products from a single qualified manufacturer.

.2 Liquid Densifier Sealer: High performance, deeply penetrating concrete densifier; odorless, colorless, VOC - compliant, non-yellowing silicate and siliconate based solution designed to harden, dustproof and protect concrete floors and to resist black rubber tire marks. The compound must contain a minimum solids content of 20% of which 50% is siliconate.

.3 Basis of Design Product: Euco Diamond Hard by the Euclid Chemical Co.

.4 Acceptable Alternate Manufacturers:
.1 BASF
.2 SIKA
.3 W.R. Meadows.

Part 3 Execution

3.1 Examination

.1 Verify condition of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

.2 Examine concrete surfaces to receive liquid densifier sealer. Notify specifier if surfaces do not comply with manufacturer's recommendations. Do not begin surface preparation or application until unacceptable conditions are corrected

.3 Verify that concrete floor has cured 28 days minimum and that substrate is acceptable to sealer manufacturer.

.4 Test surfaces for moisture content to ensure that they are suitable for application.

3.2 Preparation

.1 Concrete must be cured a minimum of 28 days prior to installation of sealers. Ensure substrate is free of dust, dirt, oil, grease laitence and any other foreign material that may affect bond.

.2 Prepare substrate including existing concrete in accordance with manufacturer's written instructions. Diamond grind and vacuum substrate free of debris and dust.

.3 Project adjacent surfaces from damage resulting from Work of this section. Mask and/or cover adjacent surfaces, fixtures, and equipment as necessary.

3.3 Application

.1 Apply Liquid Densifier Sealer in strict accordance with the directions of the manufacturer. Spray, squeegee or roll on liquid to clean, dry concrete surface at a rate no greater than 5 m2. per litre. The liquid shall be scrubbed into the surface with a mechanical scrubber. Keep the surface wet for a minimum of 30 minutes with the liquid densifier sealer during the application process. When the product thickens, but not more than 60 minutes after initial application, the surface shall then be squeegeed or vacuumed to remove all excess liquid.

.2 Do not leave any residue on surface.

.3 Do not track material on to untreated surfaces.

3.4 Protection

.1 Prevent contamination and damage during application and curing stages.

3.5 Cleaning

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

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 09 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:
.6 Temperature is expected to drop below 10 °C before paint has thoroughly cured.
.7 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
.8 Surface to be painted is wet, damp or frosted.
.9 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.
.10 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.11 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 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.
  .1 EXT 2.1A - Latex zone/traffic marking finish. Line stripping to be yellow. Accessible parking spaces shall be blue.

.2 Concrete Vertical Surfaces:
  .1 EXT 3.1K - Latex semi-gloss finish (over alkali resistant primer).

.3 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 50 00 Metal Fabrications
.3 Section 06 20 00 Finish Carpentry
.4 Section 08 11 00 Metal Doors and Frames
.5 Section 09 21 16 Gypsum Board
.6 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 finish.
  .2 Concrete Floor Sealer: Refer to Section 09 67 72 Concrete Floor Sealer.

.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 Galvanized Metal: interior doors, frames, railings, misc. steel, pipes, and ducts.
.1 INT 5.3A Latex G5 semi-gloss finish

.5 Concrete Masonry:
.1 INT 4.2D High performance architectural latex G5 semi-gloss finish.

.6 Concrete masonry units at wet areas and change rooms:
.1 INT 4.2G Epoxy (tile-like) finish.

.7 Wood Clear Polyurethane Finish:
.1 INT 6.3K Polyurethane varnish G6 gloss finish.

.8 Electrical Equipment Backboards:
.1 INT 6.4P Fire retardant, pigmented coating. Low odour/low VOC. Semi-gloss (UL/ULC rated).

.9 Gypsum Board: Walls and Bulkheads.
.1 INT 9.2A Latex G3 eggshell finish over latex sealer.

.10 Gypsum Board: Ceilings and Bulkheads (wet areas and change rooms)
.1 INT 9.2E Epoxy (tile like) finish

.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 05 50 00 Metal Fabrications
.2 Section 10 28 10 Toilet and Bath Accessories

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A480/A480M-20a Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
  .2 ASTM E84-21a Standard Test Method for Surface Burning Characteristics of Building Materials
.2 CSA Group (CSA)
  .1 CSA-B651-12 Accessible Design for the Built Environment.
.3 American National Standards Association (ANSI)
  .1 ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates (HPDL)
.4 Underwriters Laboratories of Canada (ULC)
  .1 CAN/ULC-S102 Surface Burning Characteristics of Building Materials and Assemblies
.5 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: Submit manufacturer’s data sheets for each product specified.

.3 Shop Drawings: Submit manufacturer’s shop drawings for each product specified, including the following:
  .1 Plans, elevations, details of construction and attachment to adjacent construction.
  .2 Show anchorage locations and accessory items.
  .3 Verify dimensions with field measurements prior to final production of the toilet compartments.

.4 Samples:
.1 Submit duplicate 300 x 300 mm samples of panel showing finish on both sides, two finished edges and core construction.

.5 Submit duplicate representative samples of each hardware item, including brackets, fastenings and trim.

.6 Provide maintenance data for toilet compartments for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Quality Assurance

.1 Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

.2 Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.

.3 Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to AODA, ADA and ICC/ANSI A117.1 requirements as applicable.

1.6 Shipping, Handling and Storage

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

.2 Deliver, store, and handle materials and products in strict compliance with manufacturer’s instruction and recommendations. Protect from damage.

.3 Protect finished surfaces during shipment and installation. Do not remove until immediately prior to final inspection.

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 ten years from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.

Part 2 Products

2.1 Approved Manufacturers

.1 Basis-of-Design Products: Specifications are based on the products of Bobrick, www.bobrick.com.

.2 Equivalent products by other manufacturer's will be considered subject to compliance with specifications.

2.2 Compartments with Aluminum Frame and Pedestal Support

.1 Substrate Material:
  .1 Compact Grade Laminate (Phenolic Black Core)
    .1 Materials: Solidly fused plastic laminate with matte-finish melamine surfaces; integrally bonded colored face sheets and black phenolic-resin core
    .2 Edges: Black; brown edges not acceptable
    .3 Colour: Charcoal 0077-FH
    .4 Optional Dividing Panel Size: Panel up to 1829 mm deep to be one-piece panels

.2 Toilet Compartments:
  .1 Configuration: Floor-anchored, Overhead-braced toilet cubicles.
  .2 Basis-of-Design: Bobrick Evolve Toilet Cubicles

.3 Door Hardware and Pedestal: clear anodized aluminum
  .1 Standard Height: Overall height from finished floor to top of headrail is 2083 mm consisting of 229 mm floor clearance, 1811 mm doors, and 25 mm headrail.

.4 Fire Resistance:
  .1 Class A
    .1 Flame Spread Index (ASTM E 84): No more than 25 for panels, doors, and fascia panels
    .2 Smoke Developed Index (ASTM 84): No more than 450 for panels, doors, and fascia panels
    .3 National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class A
    .4 Uniform Building Code: Class I

.5 Frame:
  .1 Headrail: Secured to the top of the fascia for stability
  .2 Mounting Brackets and Fasteners: Clear anodized aluminum U-Channel brackets.
  .3 Privacy:
    .1 Full-length clear anodized aluminum frame provides built-in, no-sightline privacy on hinge and keeping-sides of the door.
  .4 Continuous clear anodized aluminum U-Channels fasten divider and fascia panels to the wall.

.6 Hardware:
  .1 Compliance:
    .1 Door handle shall be operable with one hand, without tight grasping, pinching, or twisting of the wrist, force to operate shall not exceed 5 pounds. Door pull: Barrier-free type suited for out-swinging doors, stainless steel. Conform to AODA and Ontario Building Code requirements.
    .2 Floor Clearance: 229 mm high minimum clearance maintained under fascia panel and side divider panels
    .3 Keyed Emergency Access: Latch shall allow door to be opened from the outside of the compartment with a 3mm Allen wrench in emergency release slot in the indicator
    .4 Fastening: Hardware secured to door and fascia by stainless steel sheet metal screws
    .5 Door-closing:
    .6 Standard: Clear anodized aluminum pedestal secured beneath door incorporates a spring closing mechanism, creating a soft door close and includes (+/-) 25 mm adjustment.

.7 Door Hardware Type:
  .1 Locking: clear anodized aluminum door handle located directly into the vertical keeping extrusion. Integral rubber door bumper shall cushion doors when closing.
  .2 Occupancy indicator: Clear anodized aluminum circular escutcheon with red and white indicator.
  .3 Standard: Cylindrical pedestal supports divider panels and shall maintain a 229 mm high floor clearance under fascia panel and side divider panels and include (+/-) 25 mm adjustment.
  .4 Robe hook: Clear anodized aluminum in matte finish.

Part 3 Execution

3.1 Manufacturer's Instructions

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

3.2 Preparation

.1 Prepare substrates including, but not limited to, blocking and supports in walls at points of attachment using methods recommended by the manufacturer for achieving the best results for the substrates under the project conditions
  .1 Inspect areas scheduled to receive compartments scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets
  .2 Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
  .3 If preparation is the responsibility of another installer, notify the Consultant in writing of deviations from manufacturer's recommended installation tolerances and conditions

.2 Do not proceed with installation until substrates have been properly prepared with blocking, supports in walls at points of connections, and deviations form manufacturer's recommended tolerances are corrected. Commencement of installation constitute acceptance of conditions

3.3 Installation

.1 Installation must be performed by a manufacturer trained and certified installer.

.2 Do work in accordance with CSA-B651.

.3 Install products in strict compliance with manufacturer's written instructions and recommendations, include the following:
  .1 Verify blocking and supports in walls have been installed properly at points of attachment
  .2 Verify location does not interfere with door swings or use of fixtures
  .3 Use fasteners and anchors suitable for substrate and project conditions
  .4 Install compartments rigid, straight, plumb, and level
  .5 Conceal evidence of drilling, cutting, and fitting to room finish
  .6 Test for proper operation
  .7 Verify that gaps between fascia panels and doors are blocked and ensure privacy

.4 Adjust hardware for proper operation after installation. Verify the doors self-close from the 90-degree position and door closes in no fewer than 4 seconds

3.4 Cleaning

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

.2 Touch-up, repair or replace damaged products.

.3 Clean exposed surfaces of compartments, hardware, and fittings.

End of Section

Part 1 General

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 05 50 00 Metal Fabrications
.2 Section 06 61 16 Solid Surfacing
.3 Section 08 80 05 Glazing
.4 Section 09 21 16 Gypsum Board
.5 Section 10 21 13 Compartments and Cubicles
.6 Section 10 51 23 Phenolic Lockers

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM A653/A653M-18 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  .2 ASTM A924/A924M-18 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
  .3 ASTM B456-17 Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
.2 Canadian General Standards Board (CGSB)
  .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
  .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
  .3 CGSB 31-GP-107Ma-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.
.3 CSA Group (CSA)
  .1 CSA-B651-12 (R2017) Accessible Design for the Built Environment.
  .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Submittals

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

.2 Shop Drawings: Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

.3 Samples:
  .1 Submit samples when requested.
  .2 Samples to be returned for inclusion into work.

.4 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.6 Waste Management and Disposal

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

1.7 Extra Materials

.1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Owner.

Part 2 Products

2.1 Materials

.1 Sheet steel: to ASTM A653 with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: Type 304, with Brushed finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, minimum 1.2 mm wall thickness.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 Manufacturers

.1 Products and components listed are minimum standard of acceptance. Alternative products by recognized manufacturers of toilet and bath accessories may be accepted subject to review by the Consultant of manufacturer's product information and specifications.

.2 Acceptable manufacturers include:
.1 Bobrick
.2 Bradley
.3 Frost
.4 Hafele
.5 Richelieu
.6 Watrous

2.3 Components

.1 TPD: Toilet Tissue Dispenser:
.1 Supplied by Owner, installed by Contractor.

.2 SD: Soap Dispenser: Liquid wall mounted soap dispenser
.1 Supplied by Owner, installed by Contractor.

.3 Surface Mounted Hand Dryers: Dyson Airblade, Automatic hand dryer, 220V, 20 Amp, 2300 Watt, white or approved equal.

.4 GB1: Grab Bar, 38 mm diameter x 1.6 mm wall tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN. 600 mm long.
.1 Bobrick B-6806.99 x 24

.5 GB2: Barrier Free Toilet Grab Bar (L-shaped) 760 x 760 38 mm dia. Peened finish c/w mounting kits.
.1 Bobrick B-6898.99, 90° Angle Grab Bar.

.6 Framed Mirror: Bobrick B-165 1830.

.7 SND: Sanitary Napkin Disposal: Contura Series, B-270, Surface Mounted Stainless Steel Sanitary Napkin Disposal.

.8 Stainless Steel Shelf: 100 mm wide x 457 mm long type 316 stainless steel shelf as specified in Section 05 50 00.

.9 Coat Hook: Bright polished stainless steel hook with 50 x 50 mm flange, hook 25 mm wide x 165 mm high. Concealed wall plate.
.1 Bobrick B-682

.10 Recessed Heavy Duty Soap dish Bobrick 4380.

.11 Robe/Towel Hook: Satin finish stainless steel. 50 x 50 mm flange. 50 mm projection. Satin stainless steel.
.1 Bobrick B-6717 Single Robe Hook.

.12 RSS: Retractable Shower Seat (left hand and right hand) Refer to drawings for locations.
.1 Bobrick B-5191

.13 GB4: Shower Grab Bar (Vertical 1000mm long) 38 mm dia. Peened finish c/w mounting kits.
.1 Bobrick B-6806.99 x 36

.14 GB3: Barrier Free Shower Grab Bar (L-shaped) 760 x 950, 38 mm dia. Peened finish c/w mounting kits.

.15 SC: Shower Rod, Curtain and Hooks: Bobrick B-6047, 32 mm diameter rod, 65 mm square flanges, Bobrick 204-2 white vinyl curtain and Bobrick B-204-1 Curtain Hooks.

2.4 Fabrication

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes, to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.5 Finishes

.1 Chrome and nickel plating: to ASTM B456, satin finish.

.2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Consultant.

.3 Manufacturer's or brand names on face of units not acceptable.

Part 3 Execution

3.1 Installation

.1 Install toilet and bath accessories in accordance with the Ontario Building Code, CSA B651 and manufacturer’s instructions.
.2 Coordinate installation of powered accessories with Electrical.

.3 Install and secure accessories rigidly in place as follows:
  .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
  .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
  .3 Solid masonry or concrete: use bolt with lead expansion sleeve set into drilled hole.

.4 Install grab bars on built-in anchors provided by manufacturer.

.5 Use tamper proof screws/bolts for fasteners.

.6 Fill units with necessary supplies shortly before final acceptance of building.

.7 Install products in strict compliance with manufacturer’s written instructions and recommendations, including the following:
  .1 Verify blocking has been installed properly.
  .2 Verify location does not interfere with door swings or use of fixtures.
  .3 Comply with manufacturer’s recommendations for backing and proper support.
  .4 Use fasteners and anchors suitable for substrate and project conditions.
  .5 Install units rigid, straight, plumb, and level, in accordance with manufacturer’s installation instructions and approved shop drawings.
  .6 Conceal evidence of drilling, cutting, and fitting to room finish.
  .7 Test for proper operation.

.8 Install electric hand and hair dryers according to manufacturer's instructions. Installation shall be by an electrician and shall be completed in accordance with all relevant standards and Codes.

3.2 Schedule

.1 Locate accessories where indicated. Exact locations determined by Owner.

3.3 Cleaning

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

.2 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

.3 Touch-up, repair or replace damaged products until Substantial Performance.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 10 00 Concrete Forming and Accessories
.2 Section 03 30 00 Cast-in-Place Concrete

1.3 References

.1 ASTM International (ASTM).
  .1 ASTM B221-21 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
  .2 ASTM D2047-17 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  .3 ASTM E648-19ae1 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
.2 Accessibility for Ontarians with Disabilities Act

1.4 Submittals

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

.2 Product Data Sheets. Including construction details, material descriptions, dimensions of individual components and profiles, and finishes for foot grilles and frames

.3 Submit complete shop drawings indicating size, location and details of each item. Include the following:
  .1 Items penetrating foot grilles and frames, including door control devices
  .2 Divisions between grille and sections
  .3 Perimeter floor moldings

.4 Submit duplicate copies full range of manufacturer's standard colours for selection by the Consultant.

.5 Submit manufacturer’s maintenance data in the form of printed instructions for cleaning and maintaining foot grilles, for inclusion in Operation and Maintenance Manuals specified in Section 01 78 00 – Closeout Submittals

1.5 Quality Assurance

.1 Slip resistance in accordance with ASTM D2047, Coefficient of Friction, minimum 0.60 for accessible routes.

.2 Deflection under live load: Design foot grilles to support a minimum uniform load of 1.7 kN applied over a 100 mm^2 surface with a maximum deflection of l/180.

.3 Single Source Responsibility: Obtain foot grilles and frames from one source of a single manufacturer.

.4 Flammability: in accordance with ASTM E648, Class 1, Critical Radiant Flux, minimum 0.45 watts/cm5.

1.6 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labelled to identify manufacturer.

1.7 Project Conditions

.1 Field measurements: check actual openings for foot grilles by accurate field measurements before fabrication. Record actual measurements on final shop drawings.

.2 Coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

1.8 Waste Management and Disposal

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

1.9 Warranty

.1 Warrant the work of this Section against defects of workmanship and material, for a period of twenty 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 General

.1 Items specified herein shall be standard manufactured items, modified if required and as specified to suit conditions of this project.

.2 Foot grilles shall be Pedigrid G1/M/PA/LBDP recess mounted, abrasive tread as manufactured by Construction Specialties Inc., Mississauga, Ontario.

.3 Equivalent products of the following manufacturers are approved, subject to compliance with the minimum levels of material and detailing specified herein:
.1 Grillage Bolar (Canada) Inc.
.2 K.N. Crowder.
.3 M.W. McGill
.4 Pawling Corp

.4 Floor Grid: G1- Pedigrid, extruded 6105-T5 aluminum alloy tread rails joined mechanically by extruded T6061-T6 aluminum alloy key lock bars. Welding or bolting is not permitted.

.5 Tread: PA- Poured Abrasive, factory bonded, two part epoxy containing aluminum oxide grit. Treads shall be locked into 6063-T5 aluminum alloy, continuously hinged tread rails, at 38 mm c/c
.1 Colour shall be selected by the Consultant from full range of manufacturer's standards.

.6 Grid Frame: LB- Level Base Frame, 6063-T5 alloy continuous extruded aluminum frame with 13 mm exposed surface and depth of 46 mm complete with manufacturer's standard anchors, fasteners. Provide 6 mm thick heavy gauge support cushions 25 mm long mounted to each continuous foot at 510 mm c/c. Frames in contact with concrete to be primer coated.

2.2 Materials

.1 Aluminum: ASTM B221, alloy 6105 T5 for rail extrusions and 6061 T6 for key lock bars.

.2 Flexible and prime PVC extrusions.

.3 Vinyl/Acrylic - High Impact PVC alloy.

PART 3 EXECUTION

3.1 Examination

.1 Verification of conditions: examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion. Do not proceed until unsatisfactory conditions have been corrected.

3.2 Preparation

.1 Provide templates and inserts for casting into concrete, in sufficient time to ensure a proper installation.

3.3 Fabrication

.1 Fabricate foot grilles in maximum practical sizes. Field splices shall be kept to a minimum. Where necessary, centre all splices between doors.

.2 Fabricate work true to dimensions, square and plumb, to suit site conditions.

.3 Thickness of metals shall be adequate for the various conditions with requirements specified as a minimum.

.4 Finished work shall be free from warping, open seams, weld marks, rattles and other defects. Drilling shall be reamed and exposed edges finished smooth.

.5 All fastenings shall be concealed.

3.4 Installation

.1 Install foot grilles in accordance with manufacturers printed instructions and recommendations.

.2 Apply two coats of waterproofing bituminous paint to the concrete base to avoid water infiltration.

.3 Foot grilles shall be installed on leveled concrete

.4 Install grilles with treads at right angles to traffic flow.

.5 Install foot grille, square and level with finished floor so as to permit easy manipulation of all sections.

.6 Frame members and intermediary supports are to be level and well supported on all their lengths in order to avoid any long term deflection.

.7 Coordinate top of grid surfaces with bottom of doors that swing across to provide ample clearance between door and mat/grid.

.8 Frames and pans are to be thoroughly cleaned before installing any grille section.

3.5 Protection

.1 After completing required frame installation and concrete work, provide temporary filler of plywood in recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of Substantial Performance.

.2 Defer installation of floor mats/grids until time of Substantial Performance of Project.

3.6 Cleaning

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

.2 Clean the tread insert surface and recessed well immediately prior to Substantial Performance.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 03 10 00 Concrete Forming and Accessories
.2 Section 03 20 00 Concrete Reinforcing
.3 Section 03 30 00 Cast-in-Place Concrete

1.3 References

.1 The Ontario Building Code
.2 ASTM International (ASTM)
  .1 ASTM B221-14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  .2 ASTM B429/B429M-10e1 Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
  .3 ASTM C920-14a Standard Specification for Elastomeric Joint Sealants
.3 Canadian Standards Association (CSA)
  .1 CSA S157-05/S157.1-05 (R2015) Strength Design in Aluminum / Commentary on CSA S157-05, Strength Design in Aluminum
  .2 CSA G40.20-13/G40.21-13 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014)
  .3 CSA S136S1-04 North American Specification for the Design of Cold Formed Steel Structural Members
  .4 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles
  .5 CSA O121, Douglas Fir Plywood
  .6 CSA W59.2-M1991 (R2013) Welded Aluminum Construction
.4 Canadian General Services Board (CGSB)
  .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass
.5 Aluminum Association (AA), Designation System for Aluminum Finishes (2000)

1.4 Submittals

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

.2 Submit complete set of manufacturer's standard specifications, installation instructions and details for dasherboard systems including promotional literature. Include list of similar projects utilizing similar board systems and completed within last ten years including current references.

.3 Submit complete list of materials and products to be used in the construction of dasher board systems and indicate clearly, any deviation from the specified requirements.

.4 Shop drawings shall bear the seal of a professional engineer licensed to design structures in the Province of Ontario.

.5 Submit layout of the ice surface showing dasherboards, size and location of doors and gates, players and penalty boxes, removable panels and glass shields.

.6 Show and describe in detail all components of the work of this Section including large scale details of members and materials, of connection and jointing details and of anchorage devices.

.7 Submit a dimensioned layout drawing showing location of floor inserts, anchors and base plates to be set into concrete slabs by this Section.

.8 Indicate layout of advertising panels. See plan for extents of advertising boards.

.9 Submit calculations certified by the professional engineer affixing seal to the shop drawings substantiating sizes for members and connections based on the design loads, before commencing fabrication

.10 Submit duplicate 12” x 12” samples of each colour of plastic surfacing materials.

.11 Submit duplicate 12” long samples of protective padding.

.12 Submit a copy of the pre-installation survey for the rink surface, signed by an Ontario Land Surveyor.

.13 Operating and Maintenance Data: Submit operating instructions and maintenance manuals for installed system outlining all required maintenance and cleaning procedures in accordance with the requirements of Section 01 78 00.

1.5 System Description

.1 Dasherboard system shall be Pro XL Series Dasherboards by Sports Systems Unlimited DBA Athletica Sports Systems or approved equivalent.

.2 Complete panelized arena board system of prefabricated lightweight removable modular panel sections having structural aluminum framing of welded or screwed construction, and high density polyethylene facing. Panelized sections shall be 48” high and not more than 8’-0” long with caprail, kickplate, ice dams and thresholds.

.3 Dasher boards shall be installed on HDPE thermal bridge to isolate metal and concrete surfaces. Material shall be same width as board system.

.4 Spectator Shielding:
.1 Stanchion supported tempered glass at rink ends and curved sections.
.2 Stanchion supported tempered glass at rink sides.

.5 Player, penalty and timekeepers boxes with glass surrounds, overhead roof systems, benches, shelves and raised floors.

.6 3/4” Rubber mat flooring in players, penalty and timekeepers benches.

.7 Hardware and accessories including anchor brackets.

.8 Gates and hardware.

.9 Advertising panels.

.10 Anchor bolt system for securing to existing and new concrete apron slab.

.11 Ice rink inserts for goal frames (Hockey and broomball).

.12 Safety features as specified.

1.6 Design and Performance Requirements

.1 Arena board systems shall be manufacturer's premium quality system.

.2 Arena board systems shall be to sizes as indicated on the drawings.

.3 The work of this Section shall be designed by a professional engineer licensed in the Province of Ontario.

.4 There shall be no gaps in the dasherboard system sufficiently excessive to act as "stick traps" or "finger traps". The maximum gaps exposed to the playing side of the dasherboard system shall be no greater than 1/8".

.5 Design aluminum members in accordance with CAN3–S157.

.6 Design loadings (Specified):
- .1 Concentrated load P= 2.7 kN applied at mid span of top rail (i.e. top of arena board assembly).
- .2 Uniformly distributed load of P= 2.7 kN applied along top rail.
- .3 Uniformly distributed load of 4.8 kPa applied across the entire face of the arena board.

.7 Member Resistances (Factored):
- .1 Axial Resistance:
  - .1 Tension: Tr = An.Fy; Tr = 85 An.Fu
  - .2 Compression: Cr = A.Fc
- .2 Shear Resistance:
  - .1 Vr = 0.60 Aw.Fc; 0.60 Aw.Fy; hNWR
- .3 Moment Resistance:
  - .1 Mr = S.Fy (Class 2 Sections).

1.7 Quality Assurance

.1 System manufacturer shall have a minimum 5 years of experience in the manufacture, design and installation of aluminum dasherboard systems.

.2 Installation of complete dasherboard system shall be by manufacturer's own forces.

.3 A copy of the manufacturers printed installation instructions shall be kept on site for the duration of the work of this Section.

.4 Pre-Installation Conference: Arrange for a pre-installation conference, including Contractor, Consultant, Owner, concrete finisher, and the dasher board system manufacturer and installer to coordinate the design and installation of the dasher board system.

.5 Welding shall be performed by trades persons certified by the Canadian Welding Bureau under CSA Standard W47.1.

.6 The dasher board manufacturer shall have representative on site during the pouring of the refrigerated slab to ensure anchors are not damaged or moved during pouring and finishing of the refrigerated slab.

1.8 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

.3 Deliver materials to site in crates, with all seals and labels intact. Identify all materials with regards to locations and orientation.

.4 Store materials, under cover, in designated area on site. Materials may not be stored in concentrated loads on the newly poured rink slab.

.5 Store tempered glass arena shields vertically, on wood sleepers. Protect glass from work of other trades.

1.9 Site Conditions

.1 Permanent lighting and power shall be installed and functional.

.2 All overhead work is to be complete prior to the work of this Section commencing.

.3 Perimeter apron slabs and ice surface slabs are to be in place prior to the work of this Section commencing. Verify tolerance requirements of systems manufacturer have been met and report any discrepancies to the Consultant.

.4 Environmental Requirements: Ensure that installation takes place only when temperatures and other conditions are suitable for a safe and proper installation.

.5 Field Measurements: Site verify dimensions of rink surface. Verify location and layout of arena gates, to align with aisles where required. Final arena board anchor insert locations shall be coordinated between Contractor, manufacturer, and ice floor installer.

.6 Pre-Installation Survey: During and upon completion of apron slab construction, and prior to installation of the rink board anchor bolts, retain the services of a registered Ontario Land Surveyor to verify all dimensions and radii of refrigerated ice slab surface and apron slab. Make adjustments as necessary to eliminate or conceal gaps and similar defects. Provide remedial details for review and acceptance when requested by the Consultant. Refer to Section 01 45 00.

1.10 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

.2 Deliver, handle and store materials in accordance with manufacturer's printed instructions.

1.11 Mock Up

.1 Supply and install a mock-up of the arena board system consisting of one flat section, 8'-0" long minimum, complete with glass shield supports, glass and coloured trim.
.2 Accepted mock up shall represent the standard of quality for the remainder of the arena board

system work.

1.12 Maintenance Materials

.1 Supply, in addition to the quantities required for the Work, extra materials and products for the Owner's future use as follows:
.1 1 Glass storage Dolly.
.2 2 Typical glazing panels ½" thick, side board section
.3 2 Typical glazing panel 5/8" thick, end board section.
.4 2 Typical glazing panel 5/8" thick, curved end board section.
.5 2 Typical HDPE Panel, side board section.
.6 2 Typical HDPE Panel, end board section
.7 2 Typical HDPE Panel, curved end board section.
.8 Two Hundred (200) additional painted screws of each colour required for fastening of HDPE facing materials
.9 5m^2 additional rubber floor matting.

.2 Deliver extra stock to Owner in cartons clearly labelled to identify contents as soon as permanent locking storage facilities are available. Place extra stock in designated storage areas.

1.13 Waste Management and Disposal

.1 Refer to Section 01 74 10 – Cleaning.

1.14 Warranty

.1 Guarantee that the entire work of this Section shall remain free from defects in materials and workmanship including warping, twisting, de-lamination, cracking, sagging of gates and other defects for a period of two (2) years from the date of Substantial Performance. Glass breakage is excluded.

.2 The manufacturer's representative shall attend a walk-through of the dasherboard system at least one month prior to the end of the warranty period.

PART 2 PRODUCTS

2.1 Manufacturers

.1 The following manufacturers of aluminum dasher board systems are acceptable subject to approval of complete product specifications and details for manufacturer's premium system and on receipt of project references satisfactory to the Owner and Consultant:
.1 Sports Systems Unlimited Corp. DBA Athletica Sports Systems
.2 Riley Manufacturing.
.3 Raita Sport
.4 Sound Barriers.
.5 Other manufacturers, meeting the requirements of this specification and complying with all provisions of the contract, approved by the Consultant prior to close of tenders.

.2 Use of specific requirements set forth in the specification does not preclude the use of equivalent products by approved manufacturers, but are given for the purpose of establishing a standard of design, quality of materials, product content, construction and workmanship.

2.2 Materials

.1 Aluminum Extrusions: CSA CAN3-S157 or ASTM B221, 6065-T5 or 6005A-T6 alloy and temper.

.2 High Density Polyethylene (HDPE): High impact, integrally coloured, high density polyethylene, bright white and other colours as specified, 13 mm thickness.

.3 Tempered Safety Glass: CAN/CGSB-12.1-M90 or ASTM C1048, Type 2, clear, colourless, fully toughened, heat tempered safety glass. Tempered glass material shall come from same tempering furnace and shall be tempered to minimize distortion. Roll wave distortion shall not exceed 0.005” from peak to valley.

.1 Each piece of tempered glass shall bear the stamp of approval from a certified testing facility, proving the glass meets specified standard. The stamp shall be in a location that will be visible and legible after boards and shielding are installed.

.4 Hardware: Stainless or galvanized mild steel.

.5 Fasteners: Zinc plated steel unless indicated otherwise.

.6 Anchors: Zinc plated steel.

.7 Gap Closures: Provide 2-piece HDPE angle between the boards and all raised areas behind the boards and / or as shown on drawings.

.8 Plywood: To CSA O121, Douglas Fir plywood, thickness as indicated or as required by manufacturer.

.9 Sealants: to ASTM C920 sealing compound, low VOC type, one component, elastomeric chemical curing.

2.3 Fabrication

.1 As far as practical, execute fitting and assembly in the shop with the various parts or assemblies ready for erection at the project site.

.2 Accurately fit together all joints, corners and intersections. Match components carefully to produce continuity of line and design.

.3 Provide devices for anchoring the assemblies to the substrate with adjustment to permit correct and accurate alignment.

.4 Fabricate anchoring devices required to secure the work of this Section. Supply anchors and layout drawings where required to be built into work of other Sections.

.5 System components shall be numbered for ease of installation, disassembly and reinstallation.

2.4 Arena Panels

.1 Arena panels shall be factory prefabricated in demountable sections. The design of all panels whether straight, curved or in which a gate is located shall be similar. Each panel shall be made of extruded or rolled aluminum sections assembled into frames using high strength fasteners or welded joints. Frames shall allow for fastening of the HDPE facing and anchoring at base. Ensure flush mating of the HDPE facing at arena panel joints.

.2 Typical sections shall consist of two vertical posts and minimum of three horizontal stringers. Frames shall be connected end to end with heavy duty bolts and shall be connected to rink slab concrete structure at the posts with aluminum anchor brackets.

.3 Aluminum sections shall be isolated from the concrete slab with a HDPE facing material, full width of dasher board.

.4 Standard size of straight arena panels shall be 8'-0" long, 4'-0" high.

.5 The ice rink side of the arena panel shall be faced with ½" thick, high impact, integrally coloured white high density polyethylene (HDPE) facing. Both sides of the arena facing shall have smooth surfaces. Colour of arena facing shall be identical on both sides.

.6 The spectator side of the arena panel, where indicated, shall be faced with 3/8" thick, high impact, integrally coloured white high density polyethylene (HDPE) facing.

.7 HDPE facing shall be attached to the arena board framing with ¼" diameter screws. Heads of screws shall be painted to colour match arena facing, kickplate or caprail sill as appropriate. Spacing of the screws shall not exceed 8" on centre.

.8 Colour extensions of red and blue lines shall be coloured HDPE strips inlaid flush to the HDPE facing and inlaid flush to the HDPE kickplate in conformance with Owner's layout requirements.

.9 Provide a ½" thick colour impregnated HDPE caprail fastened to top horizontal framing member. Both edges of caprail shall have a smooth and radiused edge.

.10 Colour of caprail shall be selected from manufacturer's standard colour range

2.5 Player's Penalty and Timekeeper Boxes and Benches

.1 Boxes shall consist of arena board enclosures similar to rink arena boards.

.2 Interior finish of boxes shall be of similar construction as ice-side of arena boards, utilizing 3/8" thick white HDPE. Framing shall be similar construction as arena boards. Install 3/8" thick white HDPE flush to top of mid stringer height to act as a water bottle shelf.

.3 Player' boxes, penalty boxes and access gates shall be as indicated.

.4 Official's box and access gates shall be as indicated.

.5 Scorer's table shall be 1'-8" deep for the full width of the box and constructed of minimum 1 ¼" thick solid or laminated HDPE surfacing material. Wood tables are not permitted. Provide lockable storage in the Timekeepers Table. (For storing electrical components)

.6 Scorekeeper booth shall be complete with walls and pass through gates to the penalty boxes see plans.

.7 Benches shall be as detailed. Removable bench supports shall be of a ¼" steel base plate with minimum 2 2/7" diameter steel post at a maximum of 48" o.c. All steel components shall be hot dip galvanized. Benches shall be fabricated from 1 ½" x 10" solid or laminated white HDPE surfacing material. Wood benches are not permitted. Bench base plates and bolts are to be protected to prevent skate blade contact.

.8 Provide raised floor at players, penalty and timekeepers boxes, 8" high with 3/4" rubber mat on top and exposed sides covered with 3/8" white HDPE.

2.6 Gates

.1 All gate sizes and direction of swing shall be as indicated on drawings.

.2 Standard access gates shall be built into standard 2440 mm board sections.

.3 Player's gates shall be built into standard 2440 mm sections.

.4 Gate latches shall be a single latch type with rink and spectator or bench side access. A flush mounted push-button latch shall be incorporated in the caprail on the ice entrance gates to the penalty boxes and ice access gates where shields would otherwise prevent latch operation. The button shall be approximately 75 mm in diameter. The push-button shall be designed to be simple to operate yet prevent accidental opening.

.5 Hinge assemblies shall be constructed of 6 mm stainless steel. The hinge pins shall be minimum 16 mm diameter.

.6 Equipment gates shall be electrically operated vertical lift gates as specified in section 13 18 05.

OR

.7 Equipment gates shall be double gates with a minimum 3048 mm overall opening width. The threshold top to be 25 mm stress relieved white Polypropylene and the bottom 38 mm to be galvanized steel tubing.
  .1 Each equipment gate unit shall be equipped with one locking clamp or sliding bar and two retractable flush bolts into the threshold or floor.

.8 Provide Stainless Steel Gate Hardware.

.9 Each equipment gate and all gates over 914 mm width shall be equipped with adjustable heavy duty spring loaded casters, with the direction of travel fixed to the arc of the door.

.10 Provide "Gate Levelling Screws" at all gate locations to allow gates to be realigned with the ice in place.

2.7 Spectator Shielding Supports

.1 Spectator shielding system shall be Pro Series Dasherboards by Sports Systems Unlimited DBA Athletica Sports Systems or approved equivalent.

.2 Provision for attachment of shielding glazing to the vertical supports shall be by means of an extruded, mill finish aluminum “Quick Release” shield support. This aluminum support shall run continuously to within 12” of the top of the glazing; an extruded face plate will slot into aluminum support with no screws. Plastic “U” shaped gaskets protect the glass edges. At the gates only, the support is a two piece with a screw -applied face plate. The shield support system must facilitate the replacement of shields from the ice side without requiring additional support or securing of the adjacent shields.

.3 Shielding and supports shall be designed for easy removal without tools for events when arena boards will remain in place but shielding and shielding supports are to be removed, including the gates.

2.8 Spectator Shielding Glazing

.1 Tempered Safety Glass: ½” thick at glass areas to 48” height above the top of the boards, and 5/8” thick at glass areas to 72” height above the top of the boards.

.2 Three edges of the tempered glass shall be seamed edges channel sides and flat ground on the top side, and the two top corners shall have a ½” radius.

.3 Glazing shall be mounted in the middle of the caprail.

.4 At any interruption of the protective shielding, at glazing terminations and corners, there shall be protective non-branded high quality, vinyl covered urethane foam padding to prevent the injury of the players.

.5 Between players boxes, install aluminum termination posts that are attached only to the shielding that runs perpendicular to the perimeter boards. Posts to be set back from the perimeter boards not less than 18”. Posts to be covered on 3 sides by vinyl covered urethane foam padding.

2.9 Kickplates

.1 Kickplates shall be fabricated of 5/8” thick HDPE colour impregnated sheets in 8” x 8’-0” segments.

.2 Colour of kickplate shall be selected from manufacturer’s standard range of colours.

.3 The kickplate shall be fastened to the bottom of the arena panel using colour matched screws.

2.10 Thresholds

.1 Player gates and access gate thresholds shall have a 1” thick white HDPE covering that can be removed and replaced when wearing occurs.

.2 Thresholds of equipment and access gates shall be 1 ½” above rink level.

.3 Thresholds of public skating gates and players gates shall be 2 ½” above rink level.

2.11 Board Anchors

.1 The dasher board manufacturer shall be responsible for supply, locating and installation of anchors.

.2 All arena boards shall be tightly fastened to the refrigerated slab by means of zinc plated bolts.

.3 Provide removable board sections as indicated with concealed or removable anchor bolts to allow access. Provide snap-in covers with flush tops to fill the anchors when the boards are removed.

.4 Anchors shall be embedded in the apron slab

2.12 Advertising Panels

.1 Advertising panels shall be 30” x 94” at straight board sections and 30” x 86” at curved sections.

.2 Advertising panels shall consist of removable 1/8” clear polycarbonate sheets fastened to the ice side of the HDPE facing material and matching the HDPE in size. Panels shall be held in place with colour matched fasteners. Fasteners are to be a minimum of 12” O.C. about the perimeter and 24” O.C. elsewhere.

.3 Provide advertising panels as follows:
.1 Eight (8) straight board panels (30”x94”).
.2 four (4) curved board panels (30”x86”).

2.13 Accessories

.1 Shield Removal Devices: Supply three (3) suction cup type glass lifting tools to facilitate removal and installation of shield glazing units.

2.14 Rubber Mat Flooring

.1 Rubber mat flooring in players, penalty and timekeepers bench shall be, 13 mm thick recycled rubber matting, colour black with longitudinal grooves at 19 mm centres on the underside for air circulation and as manufactured by Royal Mat Inc. or approved equivalent.

.2 Provide rubber skate tile where required to infill gap between existing skate tile, and outside face of dasherboards where the new or existing apron slab is exposed by the placement of the new dasherboard system

2.15 Finishes

.1 All aluminum sections shall have a manufacturer’s standard anodized or mill finish.

.2 Anodizing shall be clear anodized finish equivalent to Aluminum Association designation AA M12C22A31 with 0.0002 inch minimum coating thickness.

.3 Plating: All precision ferrous hardware such as hinge pins, latches, casters, and miscellaneous nuts, bolts and fasteners shall be clear zinc electroplated or cadmium plated to allow for smooth operation.

PART 3 EXECUTION

3.1 Inspection

.1 Before commencing erection and installation, examine the work of other Sections to which the work of this Section will be attached.

.2 Examine apron slab.

.3 Report immediately in writing to the Consultant, all discrepancies in accuracy and suitability, conditions that will adversely affect the installation and permanency of the work of this Section.

.4 Ensure that openings and recesses to receive the work of this Section are within acceptable tolerances. Remove dust and other loose material from openings.

3.2 Preparation

.1 Supply all anchors and similar items, required to be installed in the work of other Sections. Provide instruction for proper installation and arrangement.

.2 Setting of base plates shall be done under the direct supervision of a representative of the dasherboard manufacturer. Supply all necessary templates and instructions to ensure a satisfactory installation. The dasherboard manufacturer shall be responsible for verifying the base plate layout on the concrete forms prior to pouring concrete.

.3 Space anchors at centres specified on the manufacturer’s shop drawings.

.4 Fabricate panelized dasher board sections off site.

3.3 Installation

.1 The finished rink shall have dimensions as indicated. Site verify all dimensions including corner radii prior to preparation of shop and erection drawings.

.2 All dimensions shall be site verified prior to preparation of shop drawings.

.3 Install the arena board system in accordance with drawings and specifications.

.4 Ensure a complete arena system with all arenas and spectator shielding straight and true to line and properly braced. Set work level, plumb, square and true with uniform joints.

.5 Fasten the work securely as erection progresses. Provide all units with suitable temporary braces, shores, and stays to hold them in position until permanently secured.

.6 The flat top surface of the sill and 2” down the face of the dasherboards on the spectator side shall be encased in 0.22” thick plastic material secured with colour matched fastenings. Colour of sill to Owner's selection.

.7 Install surfacing material to inside surfaces of players, penalty and timekeepers boxes, including gates.

.8 Install surfacing material on spectator side of arena boards, at all raised floors, bleachers, aisles and stairs and wherever else indicated.

.9 All exposed edges of board surfacing materials shall be chamfered, rounded, ground or otherwise machined for safety.

.10 Adjust as necessary to ensure no openings or gaps in surfacing materials exceed 1/8” in width.

.11 Install advertising panels where indicated on reviewed shop drawings.

.12 Coordinate installation of wiring, conduit and devices for timekeeper’s areas and goal lights and for general service electrical outlets at rink perimeter.

3.4 Player’s, Penalty and Timekeeper Boxes and Benches

.1 Provide team boxes, penalty boxes and timekeeper's area and benches as specified and indicated on drawings.

.2 Provide raised floors in player’s benches, penalty boxes and timekeeper’s box, 8” high.

.3 Install rubber mat flooring in players, penalty and timekeeper’s benches in accordance with manufacturer’s instructions. Install rubber matting to fit over base plates and anchor bolts at player’s benches and penalty boxes.

3.5 Gates

.1 Provide access gates as indicated on the drawings.

.2 Access gates shall be to sizes indicated. Fabricate gates with aluminum tubular framing similar to board sections.

.3 Bevel edge of gate and jamb at latch side of gate. Allow minimum 3/8” clearance.

.4 Install and adjust hardware.

.5 Dasherboard systems manufacturer will supply and install vertical lift gates as specified under Section 13 18 05.

.6 Provide an ALTERNATE PRICE to supply and install bi-fold machine gates in lieu of the vertical lift gate specified in Section 13 18 05.

3.6 Spectator Shielding

.1 Lay out glass shields to minimize number of sizes required.

.2 Install support framing in accordance with the manufacturer’s instructions.

.3 Spectator shielding glazing shall not be installed in front of team boxes. At shielding external corners on ice side, an easily replaceable protective corner bumper pad shall be provided for full mullion height.

.4 Between players boxes, install aluminum termination posts that are attached only to the shielding that runs perpendicular to the perimeter boards. Posts to be set back from the perimeter boards not less than 18”. Posts to be covered on 3 sides by foam padding covered by a vinyl outer layer that has been tested and certified by engineers.

.5 Spectator shielding shall be installed behind, alongside and in front of the penalty boxes.

.6 Spectator shielding shall be installed behind, alongside and in front of the timekeeper’s box.

.7 Install tempered glass shields into support system. Provide EPDM gaskets at all supports.

.8 At timekeeper's benches, provide glass shields with 3 ¼" diameter "speak holes", located 66" above refrigerated slab surface on front panel and 51" above floor slab on side panels (penalty boxes)..

3.7 Protective Netting

.1 Existing netting is to be reused.

3.8 Sealants

.1 Upon completion of the dasherboard installation, and prior to placement of ice surfaces, seal entire perimeter of dasherboards at base to prevent leakage.

3.9 Adjusting

.1 Upon completion of the work of this Section, inspect, test and adjust installation.

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

3.10 Cleaning

.1 Proceed in accordance with Section 01 74 10 – Cleaning.

.2 Upon completion of the work of this Section, remove all scrap materials from the site and leave premises in a neat and tidy condition.

.3 Prior to Substantial Performance, wipe down plastic surfacing materials and clean all marks in accordance with the manufacturer's directions.

.4 Clean glass in accordance with manufacturer's directions.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 22 19 Rough Grading
.2 Section 31 23 10 Excavating, Trenching and Backfilling
.3 Section 32 92 19 Seeding
.4 Section 32 92 23 Sodding

1.3 References

.1 Agriculture and Agri-Food Canada (AAFC)
  .1 The Canadian System of Soil Classification, Third Edition, 1998.
.2 Canadian Council of Ministers of the Environment
  .1 PN 1340-2005 Guidelines for Compost Quality.

1.4 Submittals

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

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

1.5 Definitions

.1 Compost:
  .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss on Ignition (LOI) test.
  .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25) and contain no toxic or growth inhibiting contaminates.
  .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category A.

1.6 Quality Assurance

.1 Topsoil from each source, native and imported shall be tested for N.P.K., altrazine, monor elements as well as clay and organic matter contents and acidity (PH) range. Topsoil shall be tested, and written test report received and approved by Consultant prior to delivery to site. Contractor to allow minimum three-weeks lead time for Consultant to submit samples and await laboratory test results prior to installation date.

1.7 Shipping, Handling and Storage

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

1.8 Waste Management and Disposal

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

.2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Owner.

.3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 Topsoil in Seeded and Sodded Area

.1 Topsoil for seeded areas planting beds: mixture of particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.
  .1 Topsoil shall be fertile, friable natural loam containing not less than 4% of organic matter for clay loams and not less than 2% of organic matter for sandy loams to a maximum of 10% by volume. Topsoil to have an acidity value ranging from a Ph of 6.0 to a Ph of 7.5.
  .2 Topsoil to be capable of sustaining vigorous plant growth and to be free from subsoil, roots, vegetation, debris, toxic materials, invasive species seeds and weeds and stone over 50mm diameter.
  .3 Topsoil to be screened prior to delivery to site.

.2 Fertilizer: Complete commercial synthetic fertilizer as required by soil tests.

.3 Limestone: Ground agricultural limestone containing minimum 85% of total carbonates.
  .1 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.4 Elemental Sulphur: Sulphur comprised of ninety (90) percent sulphur and ten (10) percent Bentonite Clay.
  .1 Consistence: friable when moist.

2.2 Topsoil for Tree and Ornamental Grass/Perennial Plantings

.1 Imported topsoil: friable , neither heavy clay nor of very light sandy nature, containing a minimum of 4% organic matter for clay loam and 2% sandy loams to a maximum of 10% by volume. Free from subsoil, roots, grass, weeds, invasive species seeds, toxic materials, stones, foreign objects and with an acidity range (ph) of 6.0 to 7.5. Topsoil containing crabgrass, couch grass or noxious weeds is not acceptable.

2.3 Soil Amendments

.1 All soil amendments where specified shall be thoroughly and evenly blended to provide uniform consistency of final soil mixture.

.2 Fertilizer:
  .1 Fertility: major soil nutrients present in following amounts:
  .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
  .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
  .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

.5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
.6 Ph value: 6.0 to 7.5.

.3 Peatmoss:
.1 Derived from partially decomposed species of Sphagnum Mosses.
.2 Elastic and homogeneous, brown in colour.
.3 Free of wood and deleterious material which could prohibit growth.
.4 Shredded particle minimum size: 5 mm.

.4 Sand: washed coarse silica sand, medium to course textured.

.5 Aggregate: Pea gravel 12mm dia. Round Clear.

.6 Organic matter: compost Category A, in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.7 Limestone: Ground agricultural limestone.
.1 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

.8 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

2.4 Source Quality Control

.1 Advise Consultant of sources of topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Contractor to bare all costs for testing required for initially non-conforming laboratory results requiring further soil amendments.

.5 Testing of topsoil will be carried out by a testing laboratory approved by Consultant.
.1 Soil sampling, testing and analysis to be in accordance with Provincial Standards

PART 3 EXECUTION

3.1 Stockpiling of Topsoil Prior to Use

.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.2 Stockpile in off-site location unless otherwise agreed to at pre-construction meeting.
.1 Stockpile height not to exceed 2 m if stockpile location on site is identified.

.3 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Consultant and at the expense of the Contractor.

.4 Protect stockpiles from contamination and compaction.

3.2 Preparation of Existing Grade

.1 Verify that grades are correct.
  .1 If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches and stones in excess of 25 mm diameter and other deleterious materials.
  .1 Remove debris which protrudes more than 25 mm above surface.
  .2 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100mm.
  .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 Placing and Spreading of Topsoil/Planting Soil

.1 Place topsoil after Consultant has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 For seeded areas keep topsoil at finished grade.

.4 Spread topsoil as indicated to following minimum depths after settlement.
  .1 600mm minimum for ornamental grass and perennial beds and planters.

.5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 Finish Grading

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  .1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Consultant.
  .1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.5 Acceptance

.1 Consultant will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.6 Surplus material

.1 Dispose of materials not required off-site.

3.7 Cleaning

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

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

.3 Leave all adjacent hard surfaces swept and washed clean of topsoil.

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 07 26 00 Vapour Retarders
.3 Section 33 44 16 Trench Drains

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))
  .2 ASTM D1557-12e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
.2 Ontario Ministry of Transportation
.3 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 180 General Specification for the Management Of Excess Materials (November 2011)
  .2 OPS.PROV. 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
.4 The Occupational Health and Safety Act.

1.4 Examination

.1 Examine the building site and determine the nature and extent of the materials to be removed or the additional fill required to provide depths and levels indicated on drawings. Field check the site to review existing conditions. Verify locations of all existing utilities and services that will affect the work.

1.5 Setting Out Work

.1 Employ a competent instrument man and provide all lines and levels, limit lines and boundary stakes for the execution of the work as required. All bench marks shall be carefully protected.

.2 Provide all Subcontractors with, and be responsible for, all lines, levels and dimensions which such trades require to relate their work to the work of the Contractor or other trades. All trades shall be notified that all such levels and dimensions must be obtained from the Contractor.

1.6 Quality Assurance

.1 Conform to the applicable requirements of the Ontario Provincial Standard Specifications (OPSS).

1.7 Inspection and Testing

.1 Provide proper and sufficient samples, ample opportunity and access at all times for the Consultant or Testing Agency to inspect materials, operations and completed works carried out under this Section.

.2 Sample and test excavated material prior to shipping to landfill off the site. Samples shall be tested for compliance of acceptable material for landfill. Furnish to the Owner the results of all testing and location of landfill site used. This testing will not be undertaken by the Owner's Inspection and Testing Agency.

.3 Provide 24 hours notice to inspection laboratory and request tests as follows:
.1 Sieve Analysis: Proposed fill materials will be tested to confirm stability for intended use and conformity with specifications.
.2 Density Test: Tests will be conducted on compacted fill, to ASTM D698.
.3 Frequency Test: Excavated Surfaces: When existing compacted fill surface is being prepared, make a series of three tests of surface for each 500 m² area.
.4 Fills under Slabs on Grade: Make three tests for every two lifts of compacted fill for each 500 m² area.

1.8 Standards

.1 Carry out all work in accordance with the applicable OPSS, OPSD and site drawings. The applicable Ontario Provincial Standard Specifications are listed hereafter.

.2 The following shall apply:
.1 OPS 180 Management and Disposal of Excess Material

1.9 Protection of Existing Services

.1 Before starting the work, verify the location of all known underground services and utilities occurring in the work site area.

.2 Notify the Owner in advance of planned excavations adjacent to their services.

.3 Take care not to damage or displace encountered known and unknown services.

.4 When such services are encountered during the execution of work, immediately notify the Consultant and protect, brace and support active services. Where repairs to these services become necessary use the following procedure:
.1 Known services, repair at no expense to the Owner.
.2 Unknown services, forward to the Consultant a complete breakdown of the estimated cost of such work. Proceed only upon written authorization.

.5 In the case of damage to, or cutting off of an essential service, notify Consultant, the Owner, and Public Utility or Municipal authorities immediately and repair the service under the Consultant's direction.

1.10 Shoring and Bracing

.1 Shoring and trench timbering, in addition to requirements of local authorities, shall be carried out in accordance with the requirements of The Occupational Health and Safety Act, "November 1992 Ontario Regulation 213/91" and Regulations for Construction Projects by Ontario Ministry of Labour and to Construction Safety Association brochure "Trenching Safety April 1994".

1.11 Dewatering

.1 Keep excavations and backfill dry at all times.

PART 2 PRODUCTS

2.1 Materials

.1 Type A Fill: Class "A" material conforming to OPS.PROV 1010, latest edition.

.2 Type B Fill: Class "B" material conforming to OPS.PROV 1010, latest edition.

.3 Sand Fill: Clean, well graded compactable sand to OPS.PROV 1010, Granular “M” fill.

PART 3 EXECUTION

3.1 Preparation

.1 Clearing: Refer to Section 31 10 00 - Site Clearing.

.2 Lines and Levels: Refer to Section 01 71 00 - Examination and Preparation.

.3 Stock Piles: Materials shall not be stockpiled on the site except with the prior approval of the Consultant.

3.2 Excavation Work

.1 Excavate to elevations and dimensions indicated or required by the work, plus sufficient space to permit erection of forms, shoring and inspection. Excavation shall be made to clean lines to minimize quantity of fill material required.

.2 Remove large rocks, stumps and other obstructions of whatever nature encountered in the course of excavation and haul away off the site.

.3 Unauthorized Excavation - Excavation to greater than required depth shall be corrected by the Contractor at his own expense in a manner as directed by the Consultant. Fill over-excavated areas under structure bearing surfaces and footings with concrete as specified for foundations.

.4 Remove all concrete, masonry, rubble or other construction debris encountered during the work.

.5 Keep excavation free of water by bailing, pumping or a system of drainage as required and provide pumps, suction and discharge lines or well points of sufficient capacity and maintain until such time as the permanent drainage system is installed or until the Consultant's approval of removal of equipment is obtained. Take all necessary measures to prevent flow of water into the excavation.

.6 Protect the bottom and sides of excavated pits and trenches from freezing. Protect also from exposure to the sun and wet weather to prevent cave-ins and softening of the bed upon which concrete or drains rest.

.7 Excavations must not interfere with the normal 45 degree plane of bearing from the bottom of any footing.

.8 Keep bottoms of excavations clean and clear of loose materials levelled and stepped at changes of levels with exception of excavations made for drainage purposes and those to slope as required.

.9 If the excavations reveal seepage zones, springs or other unexpected sub-surface conditions which may necessitate revisions or additions to any drainage system, inform the Consultant immediately so that remedial action can be taken.

.10 If removal of earth causes displacement of adjacent earth, the earth so disturbed shall be removed at no additional cost to the Owner.

.11 Conditions of Excavated Surfaces
- .1 Excavate to a depth sufficient to expose firm undisturbed subsoil, free of organic matter and to the Testing Agency's approval.
- .2 Remove soft, wet or unconsolidated ground and organic material encountered in excavating.
- .3 Should the nature of the sub-soil at the depths shown prove to be unsatisfactory to the Consultant for the placing of the concrete work, then upon the Consultant's written order, the Contractor shall excavate to greater depth until a satisfactory bottom is reached.

.12 Tolerances: General excavation shall be to the elevations shown on the drawings, plus or minus 25 mm.

3.3 Backfilling

.1 Proceed promptly with backfilling as the building progresses, and as work to be backfilled has been inspected and approved by the Consultant. The backfill in areas where settlement cannot be tolerated, e.g. service and footing trenches under the floor slab, should be compacted to at least 100 per cent of its Standard Proctor Maximum Dry Density. The backfill should be placed in lifts not greater than 200 mm thick in the loose state, each lift being compacted with a suitable compactor to the specified density.

.2 Do not commence backfilling operations until mechanical and electrical services, has been inspected and approved by Consultant and authorities having jurisdiction. Existing floor subgrade must be proof rolled before backfilling.

.3 Withdraw shoring material during backfill. Lumber left in place without the Consultant's approval will not be paid for by the Owner.

.4 Backfill evenly on both sides of foundation walls to avoid unequal fill pressures on walls.

.5 Place fill around foundation walls and footings so that footings will have a minimum of 1200 mm coverage, measured at an angle of 45 degrees from bottom of footing to protect against frost until final grading is complete.

.6 Where fill is placed adjacent to structures or vulnerable building components or in restricted areas, the fill shall be compacted to the same degree as specified by suitable equipment approved by the Consultant. Avoid damage to or displacement of walls, columns, piers, underground services, and process/ production equipment.

.7 Add water in amounts required only to achieve the optimum moisture content, in accordance with ASTM D1557.

3.4 Fills Unders Concrete Slab

.1 The fill shall be deposited in layers of such thickness that the equipment being used for compacting can produce the specified density but in no cases, more than 200 mm thickness. If lumps are present in the material each layer shall be continuously disced in order to ensure proper compaction.

.2 The exposed subgrade shall be proof rolled to ensure its integrity. If the subgrade consists of engineered fill, the fill shall be compacted to at least 98% of its maximum Standard Proctor Dry Density for native materials or 100% compaction for Granular “A” and “B” materials, using equipment approved by the Consultant. Any loose, wet or deleterious material shall be sub-excavated and replaced by the Contractor with Type B Engineered fill which must be compacted to 98% Standard Proctor Maximum Density.

.3 Immediately after levelling, each layer of fill shall be thoroughly compacted by the use of approved mechanical equipment.

3.5 Compaction Density

.1 Use approved equipment for compaction. Maintain materials at optimum moisture content to obtain required compaction. Special care shall be taken to prevent disturbance of the existing subgrade and adjacent structures and equipment.

.2 Be responsible for damage to the subgrade and installed materials due to improper compaction methods. Make good to approval of the Consultant.

.3 The minimum density of fill in place shall be the following values of Standard proctor densities for corresponding locations in accordance with ASTM D698.
.1 Type A Fill: To 100% Standard Proctor Maximum Density.
.2 Type B Fill: To 100% Standard Proctor Maximum Density.
.3 Engineered Fill: To 98% Standard Proctor Maximum Density.

.4 If during progress of work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace and retest at own expense.

.5 Ensure compacted fills are tested and approved before proceeding with placement of surface materials.

3.6 Water on Prepared Surfaces

.1 Promptly remove, by approved methods, water rising from seeping of the soil or resulting from rainfall wherever such water is on the surface of sub-grade soil and compacted fill.

.2 Where proper drainage and pumping is not carried out as specified herein, and any prepared sub-grade soil for under structural work, and any compacted fill for under concrete slabs, is softened or disturbed by water due to improper drainage and pumping, the Contractor shall remove the unsatisfactory soil and fill, and bear all incidental costs in connection with additional excavation and placing and compacting of granular fill under floor slabs.

3.7 Surplus Soil Disposal

.1 Surplus soil and excavated material shall be promptly removed and disposed of off the site at legal dump sites. Conform to local bylaw requirements for trucking and disposal. Complete testing as described in Part 1 of this specification.

3.8 Cleaning

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

.2 As excavation proceeds, keep roads and aisles clean of dirt and excavated material.

.3 Clean up and wash down to remove all dirt and excavated materials caused by the work of this section daily.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 22 19 Topsoil Placement and Fine Grading
.2 Section 31 23 10 Excavating, Trenching and Backfilling
.3 Section 32 12 16 Asphalt Paving

1.3 References

.1 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 206 Grading (2014)

1.4 Project Conditions

.1 The Contractor shall make himself aware of all utilities prior to commencement of any works on site.

1.5 Protection

.1 Prevent damage to fencing, trees, landscaping, existing pavement, surface or underground utility lines, which are to remain.

.2 Utilize proper equipment and make good any damage to areas disturbed during construction.

.3 Mud tracking and cleaning of roads, walkways and other surfaces both on and off the site will be the responsibility of the Contractor.

PART 2 PRODUCTS

2.1 Materials

.1 Obtain approval of all excavated or graded material used as fill for grading work.

.2 Include for all excavation of materials required, except as specifically provided elsewhere in the contract to the lines and grades as shown on the plans, or as directed by the Owner or Consultant.

PART 3 EXECUTION

3.1 Grading

.1 Rough grade to levels and contours as shown on the contract drawings.

.2 Rough grade to following depth below finished grade, or as directed by Consultant:
  .1 150 mm for sodded areas.
  .2 600 mm for shrub beds.
  .3 Depth for asphalt parking determined by Section 32 12 16 – Asphalt Paving.

.4 Depth for concrete sidewalks and exterior concrete surfacing by Landscape Drawings.
.5 Depth for concrete curbs as indicated on Drawings.

.3 Prior to placing fill over existing ground, scarify the existing subgrade surface to a depth of 150mm.

.4 Compact fill material to Standard Proctor density as follows:
.1 95% landscaped areas
.2 98% paved and concrete areas

.5 Do not disturb soil within canopy spread of trees or shrubs to remain.

.6 All work shall be in accordance with OPSS 206.

3.2 Testing

.1 Inspection and testing of soil compaction will be carried out by testing laboratory designated by Owner. Costs of tests will be paid by Owner. Refer to Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

.2 Acceptance of grades and soil compaction by is subject to final test results.

.3 Acceptance of sub-grade by Consultant prior to topsoil or drainage installation.

3.3 Surplus Material

.1 If after excavating to the elevations shown on the drawings, the material encountered should prove unacceptable to the Consultant, perform additional excavation as directed by the Owner, payment for which will be paid under this item.

.2 Materials which are surplus to, or, unsuitable for the fill under the contract awarded shall be disposed of away from the site at the Contractor's expense at an approved location arranged by the contractor and to the satisfaction of the Owner.

.3 The Contractor shall supply to the owner, a minimum of seventy-two hours prior to off-site disposal or reuse of excess material, a plan illustrating the proposed place of reuse or disposal.

.4 Obtain and provide to the Owner proof that the requirements applicable to Municipal By-Laws have been complied with.

3.4 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM C117-17 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
- .2 ASTM C131/C131M - 20 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- .3 ASTM C136/C136M-19 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- .4 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
- .5 ASTM D1557-12e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
- .6 ASTM D1883-16 Standard Test Method for California Bearing Ratio (CBR) of Laboratory Compacted Soils.
- .7 ASTM D4318-17e1 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

.2 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material

1.4 Submittals

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

1.5 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Granular Sub-Base Material:
- .1 Crushed, pit run or screened stone, gravel or sand shall be supplied in accordance with OPSS 1010.

PART 3 EXECUTION

3.1 Placing

.1 Place granular sub-base after subgrade is inspected and approved by Consultant.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean unfrozen surface, free from snow or ice.

.5 Place granular sub-base materials using methods which do not lead to segregation or degradation.

.6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Consultant may authorize thicker lifts (layers) if specified compaction can be achieved.

.7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.8 Remove and replace portion of layer in which material had become segregated during spreading.

3.2 Compaction

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Consultant before use.

.3 Equipped with device that records hours of actual work, not motor running hours.

.4 Compact to density of not less than 100% maximum dry density in accordance with ASTM D698.

.5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.6 Apply water as necessary during compaction to obtain specified density.

.7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Consultant.

.8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 Proof Rolling

.1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with center to center spacing of 730 mm maximum.

.2 Obtain approval from Consultant to use non-standard proof rolling equipment.

.3 Proof roll at level in sub base as indicated. If non-standard proof rolling equipment is approved, Consultant to determine level of proof rolling.

.4 Proof roll top of compacted, prepared subgrade.

.5 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.6 Where proof rolling reveals areas of defective subgrade:
.1 Remove sub base and subgrade material to depth and extent as directed by Consultant.
.2 Backfill excavated subgrade with sub base material and compact in accordance with this section.

.7 Where proof rolling reveals areas of defective sub base, remove and replace in accordance with this section at no extra cost.

3.4 Site Tolerances

.1 Finished sub-base surface to be within 10 mm of elevation as indicated by not uniformly high or low.

3.5 Protection

.1 Maintain finished sub base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Consultant.

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General Requirements

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 02 41 00 Demolition
.2 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

.1 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
  .2 OPSS 1001 Material Specification For Aggregates – General (2013)
  .3 OPSS 1860 Material Specification For Geotextiles
.2 Ontario Provincial Standard Details (OPSD)
  .1 OPSD 219.110 Heavy Duty Silt Fence Barrier

1.4 Samples

.1 Submit samples in accordance with Section 01 30 00.

.2 Allow continual sampling by Consultant during production.

.3 Provide Consultant with access to source and processed material for sampling.

PART 2 PRODUCTS

2.1 Materials

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Clear stone for mud mat and along bottom of silt control fencing: 50 mm clear stone in accordance with OPSS 1001.

.3 Geotextile for siltation control fence shall be Class I non-woven geotextile fabric in accordance with OPSS 1860.

.4 Straw bales:
  .1 Straw shall be either wheat or oat straw.
  .2 Straw bales shall be dry and firm, be tied tightly in at least two places, show no evidence of straw or tie decay, and be free of sediment. They shall be of agricultural, rectangular formation and dimensions, as specified in the Contract Documents

2.2 Source Quality Control

.1 Inform Consultant of proposed source of aggregates and provide access for sampling at least four weeks prior to commencing production.

.2 If, in opinion of Consultant, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements. Advise Consultant four weeks in advance of proposed change of material source.

.3 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 EXECUTION

3.1 Installation

.1 Complete erosion and sedimentation controls at perimeter of work areas limits in accordance with OPSS 805.

.2 Protect existing catch basins.
- .1 Light-duty straw bale barriers shall be constructed as specified.
- .2 Straw bales shall be placed completely around catch basins and ditch inlets without gaps. When a double row of straw bales is specified in the Contract Documents, the straw bales shall be placed such that the joints between the straw bales of each row are not in-line with the joints of the straw bales of the adjacent row.
- .3 Stakes securing the bales shall be driven through the bales without breaking the bale ties or otherwise disturbing bale firmness and shape.
- .4 Maintenance shall include the replacement of each bale at intervals not exceeding 45 Days

.3 Silt Control Fence:
- .1 Install silt control fence according to OPSD 219.110 along construction site perimeter as per EMP detail and as shown on plan.
- .2 Protect existing drainage structures, catch basins and manholes as indicated an in accordance with OPSS standards.

.4 Mud Mat Installation:
- .1 Mud mats shall be installed on all access roadways at the point of connection to a municipal right-of-way. Unless otherwise indicated, the mud mat shall be a minimum 6.0m in width, 30m in length and be constructed of a 0.5 m depth of 50mm diameter clear stone. The mud mats shall be maintained and stone replaced if deemed necessary by the Consultant.
- .2 Remove and replace top layers of clear stone when they become ladened with mud and the mud mat becomes ineffective in removing mud from equipment exiting the site.
- .3 The mud mat installation does not alleviate the contractor's responsibility to clean mud from adjacent roadways as a result of the construction.

3.2 Maintenance

.1 Maintain silt control fencing for the duration of the demolition project and replace as required until the site is stabilized.

.2 Maintain the mud mat and replace clear stone as required during the demolition project as required to maintain the function of the mud mat.

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 31 23 10 Excavating, Trenching and Backfilling
.3 Section 32 16 13 Concrete Curbs
.4 Section 32 16 23 Sidewalks
.5 Section 32 17 23 Pavement Markings

1.3 References

.1 Ontario Provincial Standard Specification (OPSS)
  .1 OPSS 1003 (2013) Material Specification for Aggregates - Hot Mix Asphalt
  .2 OPSS 1010 (2013) Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
  .3 OPSS 1101 (2014) Material Specification for Performance Graded Asphalt Cement
  .4 OPSS 1103 (2012) Material Specification for Emulsified Asphalt
  .5 OPSS 1150 (2008) Material Specification for Hot Mix Asphalt

1.4 Protection

.1 Protect work of all trades and adjacent properties from damage from the work of this section.

.2 Barricade paved areas to prevent vehicle traffic for at least 24 hours after completion.

1.5 Quality Assurance

.1 All work of this Section shall be completed by a bona fide road building contractor engaged in paving work for a minimum of 5 years and having all equipment necessary to complete the work as specified.

1.6 Inspection and Testing

.1 The Owner will engage an independent inspection and testing company.

.2 The inspection and testing company shall perform the following services:

.1 Sample proposed sources of fill materials and advise as to acceptability, maximum densities obtainable and compaction procedures.
.2 Carry out density tests to ensure that the required density is achieved and report the results of such tests in writing.

.3 The cost of employing the inspection and testing company shall be paid for by the Contractor out of the cash allowances specified in Division 00.

Part 2 Products

2.1 Engineered Fill

.1 Compacted Granular ‘B’ fill or other suitable fill as approved by the Consultant to thickness required to bring subgrade to level of underside of Granular ‘B’ base course.

2.2 Granular Base Materials

.1 Granular 'B' Base Course: Crushed or uncrushed bank or pit gravel or stone obtained from an approved source, conforming to requirements for Granular 'B' aggregate, Ontario Provincial Standard Specifications Form No. 1010.

.2 Granular 'A' Base Course: Crushed gravel or stone, obtained from an approved source conforming to requirements for Granular 'A' aggregate, Ontario Provincial Standard Specifications Form No. 1010.

2.3 Asphalt Materials

.1 Asphalt Cement: OPSS 1101

.2 Aggregates: OPSS 1003 and OPSS 1010

.3 Filler: OPSS 1003

.4 Asphalt (H.L.8) conforming to OPSS Form 1150
.1 Bituminous First Course - shall be dense graded, hot mixed, hot laid.

.5 Asphalt (H.L.3) conforming to OPSS Form 1150
.1 Asphalt surface course shall be hot mixed, hot laid.

.6 Emulsified Asphalt OPSS 1010 or MTO primer.

2.4 Joint Painting Material and Asphaltic Primer

.1 SS-1 Emulsion to OPSS 1103.

2.5 Cold Patch

.1 Asphaltic patching materials in accordance with Ontario Provincial Standard Specifications.

2.6 Painted Line Markings

.1 As specified in Section 32 17 23 – Pavement Markings.

Part 3 Execution

3.1 Surface Conditions

.1 Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

.2 Verify that asphalt pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

.3 Check rough grading, re-grade, re-level and re-compact as required. Soft spots, wet holes, shall be dug out and filled with granular fill placed in not over 150 mm layers and compacted. Remove surplus material from the site.

.4 Sub-grade shall be fully stabilized, compacted to 100% of standard Proctor Density and levelled to a tolerance of not more than 13 mm measured on a 3.0 m straight edge.

.5 In the event of discrepancy, immediately notify the Consultant.

.6 Place and compact engineered fill in sufficient quantities to bring subgrade up to specified level of underside of Granular ‘B’ base course. Compact engineered fill to 95% Standard Proctor Density.

3.2 Placement of Granular Base

.1 Granular material shall be placed in layers of such thickness that the equipment being used can produce the specified density.

.2 Immediately after leveling the material shall be compacted to the specified density.

.3 Compaction: All granular material shall be compacted to a minimum of 100% Standard Proctor Maximum Density.

.4 Finished elevation tolerance will be to within 13 mm of the required elevation.

3.3 Placement of Asphaltic Surfacing

.1 Asphalt driveway surfacing shall be placed in accordance with Ontario Provincial Standard Specification for Hot Mix Hot Laid Asphaltic Concrete. Materials, equipment and construction methods shall be in accordance with the current edition of OPSS 1010 including all amendments thereto.

.2 Place asphalt driveway paving where indicated on the drawings.

.3 Pavement structures including asphalt course and fill shall be as noted on the drawings.

.4 Finished surface shall be smooth of uniform density and texture and true to established finished elevations. Paving shall be of thickness specified and when checked with a 3 m straight edge shall show no irregularity exceeding 6 mm in depth. Surface shall be sloped in order that all surface water will be drained to perimeter of asphalt.

.5 Paint contact edges of abutting concrete paving with a thick coat of hot asphalt cement before paving mixture is placed against them.

.6 Joints in asphalt shall be kept to a minimum. Joints in base and top asphalt shall be staggered.

.7 Base asphalt shall be thoroughly cleaned prior to placing of top course of asphalt.

.8 Where asphalt does not adjoin concrete paving, edges shall be trimmed and hand tamped to a clean straight line.

3.4 Patching Asphalt Pavement

.1 Saw cut perimeters of areas to be patched or joined. Remove existing asphalt and base material to depth required.

.2 Grind top surface of asphalt to depth of 38 mm for width of 300 mm from saw cut. Paint exposed edge of asphaltic joints, edge of maintenance holes and catch basin frames, curbs and similar items with SS-1 emulsified asphalt.

3.5 Asphalt Prime

.1 Paint contact of curbs and like structures with thin, uniform coat of asphalt prime material.

.2 Do not apply prime when air temperature is less than 5 ° C or when rain is forecast within 2 hours.

.3 Where traffic is to be maintained, treat no more than one-half width of surface in one application.

.4 Prevent overlap at junction of spreads.

.5 Do not prime surfaces that will be visible when paving is complete.

.6 Apply additional material to areas not sufficiently covered.

.7 Keep traffic off primed areas until asphalt prime has cured.

.8 Permit prime to cure before placing asphalt paving.

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 32 12 16 Asphalt Paving
.2 Section 32 17 23 Pavement Markings

1.3 References

.1 ASTM International (ASTM)
- .1 ASTM D522/D522M-17 Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
- .2 ASTM D570-98(2018) Standard Test Method for Water Absorption of Plastics
- .3 ASTM D1475-13 Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
- .4 ASTM D1653-13 Standard Test Methods for Water Vapor Transmission of Organic Coating Films
- .5 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
- .6 ASTM D2369-20 Standard Test Method for Volatile Content of Coatings
- .7 ASTM D2697-03(2014) Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings
- .8 ASTM D3960-05(2018) Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- .9 ASTM D4060-19 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- .10 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- .11 ASTM D5895-20 Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders
- .12 ASTM E303-93(2018) Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
- .13 ASTM G155-13 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

1.4 Submittals

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

.2 Product Data:
- .1 Submit manufacturer’s product information and data sheets, and application instructions.
- .2 Submit colour samples in duplicate.

1.5 Quality Assurance

.1 Solar reflective pavement coatings shall be supplied and installed by an accredited applicator approved by the material manufacturer in accordance with the plans and specifications. In any circumstance, do not begin installation without confirmation of Applicator certification

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 Apply the coatings only when the air temperature is 10° C and rising and will not drop below 10° C within 24 hours. No precipitation should be expected within 24 hours.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Manufacturer

.1 Acceptable Manufacturer: GAF, Commercial Roofing Products Division: 1 Campus Drive; Parsippany, NJ 07054; Toll Free Tel: 800-ROOF-411; Tel: 973-628-3000; Fax: 973-628-3451; Email: technicalquestions@gaf.com ; Web: www.gaf.com

2.2 Materials

.1 StreetBond SB150 two-part premium epoxy-modified, acrylic, waterborne coating specifically designed for application on asphalt pavements but also excel over concrete when a primer is used. It has a balance of properties to ensure good adhesion and movement on flexible pavement, while providing good durability. StreetBond® SB150 is durable in both dry and wet environments.

.2 StreetBond Colorant highly concentrated, high quality, UV stable pigment blend designed to add color to StreetBond SB150 coatings. One unit of Colorant shall be used with one pail of StreetBond coating material.

2.3 Coating Performance Properties

.1 The physical and performance properties of the asphalt pavement coating shall be as follows and as determined and verified by an independent testing laboratory.

.1 Table 1: Typical Physical Properties

Characteristic	Test Specification	SB150
Solids by Volume	ASTM D2697	55%
Solids by Weight	ASTM D2369	68.9%
Density	ASTM D1475	1.59 kg/l

.2 Table 2: Typical Performance Properties

Characteristic	Test Specification	SB150	
Dry time (To re-coat)	ASTM D5895 23°C; 37% RH	35 min	
Taber Wear Abrasion Dry H-10 wheel	ASTM D4060 7 days cure	0.98 g/1000 cycles	
Taber Wear Abrasion Wet H-10 wheel	ASTM D4060 7 days cure	3.4 g/1000 cycles	
QUV E Accel. Weathering environment.	ASTM G155 2,000 hours (CIE units)	∆E = 0.49 (brick colour)	
Hydrophobicity Water absorption	ASTM D570	8.3 %(9 days immersion)	
Shore hardness	ASTM D2240	63 Type D	
Mandrel Bend	ASTM D522	1/4" @ 21° C	
Permeance	ASTM D1653	3.45 g/m²/hr (52 mils)	
VOC	EPA-24 ASTM D3960	18.7 g/l	
Adhesion to Asphalt	ASTM D4541	Substrate Failure	
Friction Wet	ASTM E303 British Pendulum Tester	WP* coated	64
		WP* uncoated	57
		AC** coated	73
		AC** uncoated	60
*WP – test conducted on asphalt in wheel path			
**AC – test conducted on asphalt adjacent to curb.			

2.4 Equipment

.1 Equipment for application of pavement coatings shall be as recommended by the material manufacturer.

PART 3 EXECUTION

3.1 Surface Preparation

.1 The pavement surface shall be clean and free of all dust, silt, grease, oil, debris and chemical residue from de-icing materials. If de-icing materials have been used and are still present, cleaning shall be carried out using pressure washing. All loose material on the pavement surface shall be removed either by mechanical brooming, compressed air or pressure washing.

.2 Clean and fill all cracks 3 mm and larger with crack filler. Larger cracks may require several applications. For best results, it is recommended that all broken asphalt be removed and patched with new asphalt. Extreme low spots be filled with new asphalt. New asphalt patches should cure

for 30 days and replaced asphalt 100 mm or more in depth should cure for 180 days minimum before application.

3.2 Application

.1 The coating shall be applied in accordance with the manufacturer's recommended application procedure guide and as follows:
  .1 The first layer of coating shall be spray applied over the surface area and broomed to work the material into the pavement surface. The coating shall be allowed to dry to the touch before applying the next layer.
  .2 Subsequent layers shall also be sprayed and broomed.
  .3 Apply the coatings only when the air temperature is 10° C and rising and will not drop below 10° C within 24 hours. No precipitation should be expected within 24 hours.

.2 Build Thickness
  .1 Apply surface coatings in mot less than four layers at the application rates listed below.

3.3 Coating Coverage and Thickness

.1 Coating coverage and thickness is as outlined in Table 3 below. Actual coverage may be affected by the texture of the asphalt pavement substrate and the imprint pattern.
  .1 Table 3: Coating Coverage and Thickness

	COVERAGE (approx.)		THICKNESS (approx.)			
# OF LAYERS	TEXTURED (Offset brick) SF/pail	NON-TEXTURED SF/pail	WET		DRY	
			mm	mil	mm	mil
3	200	225	0.65	25.7	0.36	14.1
4	150	175	0.87	34.3	0.48	18.9
Additional layers of coating can be applied as deemed necessary.						

3.4 Opening to Traffic

.1 The surface coating must be 100% dry before traffic is permitted.

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 03 10 00 Concrete Formwork
.2 Section 03 30 00 Cast-in-Place Concrete
.3 Section 31 23 10 Excavating, Trenching and Backfilling
.4 Section 32 16 23 Sidewalks

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C309-19 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  .2 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))
.2 CSA Group (CSA)
  .1 CSA-A23.1-14/ CSA-A23.2 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
.3 Ontario Provincial Standard Specifications and Details (OPSS and OPSD)
  .1 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
  .2 OPSS1308 Material Specification for Joint Filler (Concrete).
  .3 OPSD 600.110 Concrete Barrier Curb.

1.4 Quality Assurance

.1 Do concrete work in accordance with the requirements of Division 3, except where otherwise specified herein.

1.5 Shipping, Handling and Storage

.1 Refer to Section 01 16 00 – Common Product Requirements.

1.6 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Base: Granular "A", OPSS 1010.

.2 Concrete: CSA-A23.1

.3 Curing Compound: Chlorinated rubber based, ASTM C309 Type 2, suitable for exterior use.

.4 Form Work: Steel or wood, capable of producing smooth, flat surfaces.

.5 Joint Filler: Pre moulded, non-extruding and resilient bituminous. OPSS 1308 Type 'A' joint filler. 13 mm thick

.6 Reinforcing Steel: Deformed billet steel bars to CSA G30.12-M, Grade 400.

.7 Sealer: A-H anti-spalling compound by Anti-Hydro, or Sealtight CS-309 by W.R. Meadows.

2.2 Concrete Mix

.1 Concrete Mixes and materials: in accordance with Section 03 30 00.

PART 3 EXECUTION

3.1 Preparation

.1 Establish lines and levels as required for completion of work.

.2 Excavate for curbs to lines and grades required.

3.2 Placing Granular Base

.1 Sub-grade must be dry and compacted to smooth surface and required grade prior to placing granular base material. Compact to minimum of 98% of Standard Proctor density.

.2 Place Granular Base to a uniform cross-section over required area in layers not exceeding 150 mm un-compacted thickness and to total depth of 300 mm.

.3 Finish granular base surface true to curb founding elevations and compact to minimum of 98% of Standard Proctor density, ASTM D698.

3.3 Placing Concrete Curbs

.1 Align concrete curbs and gutters with curves and tangents as shown on Drawings.

.2 Curbs shall be in accordance with OPSD 600.110

.3 Pour concrete on prepared sub-base to required levels and dimensions. Execute work to requirements of CSA A23.1 and CSA A23.2.

.4 Do not pour concrete when air temperature is or may fall below 5 ° C during or within 24 hours of pour, unless precautions are taken to prevent damage to concrete resulting from low temperature.

.5 Remove and replace any concrete damaged by freezing at no extra cost.

.6 Finish concrete with a wooden float to produce an even gritty surface.

.7 Finish edges of concrete curbs and gutters in accordance with OPSD Standard Drawings.

.8 Provide mountable curb along length of barrier free parking spaces and drop curbs at all pedestrian crossings, as indicated on the drawings.

.9 Apply membrane forming curing compound as soon as surface is free of bleed water to uniformly cover exposed concrete surfaces at rate of not less than 1.0 litre/5 m². Maintain this protection for minimum 7 days.

.10 Apply sealer to exposed surfaces of curbs and gutters, in two coats, in accordance with manufacturer's directions. Prevent contamination of adjacent surfaces.

3.4 Joints

.1 Joints between curb and gutter and any abutting sidewalk, catch basin and manhole frames, gutter outlets, or any structure, shall be formed with 13 mm thick panels of joint filler, except for control joints for extruded or formed curb and gutter, where they may be sawcut or formed with a "Guillotine" knife.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 10 – 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 07 92 00 Joint Sealants
.3 Section 31 23 10 Excavating, Trenching and Backfilling
.4 Section 32 16 13 Concrete Curbs
.5 Section 32 17 26 Tactile Warning Surfacing

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C171-16 Standard Specification for Sheet Materials for Curing Concrete
  .2 ASTM C309-19 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  .3 ASTM D698-12e2 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3))
.2 CSA Group (CSA)
  .1 CSA-A23.1-14/ CSA-A23.2 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
.3 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 351 Construction Specification for Concrete Sidewalk
  .2 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material
  .3 OPSS1308 Material Specification for Joint Filler (Concrete)
.4 Ontario Provincial Standard Details (OPSD)
  .1 OPSD 310.010 Concrete Sidewalk

1.4 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Base: Granular "A", OPSS 1010.

.2 Concrete: CSA A23.1-M.

.3 Curing Compound: Chlorinated rubber based, ASTM C309 Type 2, suitable for exterior use.

.4 Joint Filler: Premoulded, non-extruding and resilient bituminous. OPSS 1308 Type A joint filler.

.5 Form Lumber: No. 2 S.P.F., 28 x 89 mm, free of twist and warp.

.6 Reinforcing Steel: 152 x 152 mm MW18.7/MW18.7 welded wire mesh, in flat sheets, not rolls.

.7 Polyethylene Sheeting: 0.100 mm thickness, to CGSB CAN2-53.33.

2.2 Concrete Mixes

.1 Concrete Mixes and materials: in accordance with Section 03 30 00.

PART 3 EXECUTION

3.1 Preparation

.1 Establish lines and levels as required for completion of work.

.2 Check adequacy of preparations for sidewalks done under Section 31 23 10. Ensure that sub-base is compacted to 98% of Standard Proctor density ASTM D698.

3.2 Placing Granular Base

.1 Sub-grade must be dry and compacted to smooth surface and required grade prior to placing granular base material.

.2 Place Granular Base to a uniform cross-section over required area in minimum 100 mm thickness.

.3 Finish granular base surface true to sidewalk founding elevations and compact to minimum of 98% of Standard Proctor density, ASTM D698.

3.3 Installation

.1 Construct Sidewalks to OPSD 310.010

.2 Coordinate installation of tactile warning surfacing specified in Section 32 17 26.

.3 Erect formwork for sidewalks to achieve lines and grades shown on the drawings.

.4 Cut expansion joint filler to full cross sectional shape of the sidewalk and place at intervals not exceeding 6.0 m. Locate expansion joints at intersections in accordance with OPSD 310.010. Refer to plans for patterns.

.5 Place expansion joint filler between sidewalks and curbs, between sidewalks and building foundations and between sidewalk and any poured concrete bases or piers.

.6 Pour concrete on prepared sub-base to required levels and dimensions. Execute all concrete work to CSA A23.1, and CSA A23.2.

.7 Pour concrete sidewalks with minimum 125 mm depth, and with transverse slope of 2 mm/ 100 mm (2%). Sidewalk thickness adjacent to curbs shall be 150 mm thick.

.8 Do not pour concrete when air temperature is or may fall below 5 ° C during or within 24 hours of pour, unless precautions are taken to prevent damage to concrete resulting from low temperature.

.9 Remove and replace any concrete damaged by freezing at no extra cost.

.10 Finish concrete with light broom finish, transverse to direction of travel.

.11 Trowel smooth edges, minimum 75 mm wide.

.12 Apply membrane forming curing compound as soon as surface is free of bleed water to uniformly cover exposed concrete surfaces at rate of not less than 1.0 litre/5 m². Maintain this protection for minimum 7 days.

.13 Divide sidewalk between expansion joints into lengths not exceeding 1.5 m on centre equally spaced between expansion joints, with power driven carbide tipped blade, or other device approved for use by the Consultant.

.14 Tool contraction joints with smooth edges, 75 mm wide.

3.4 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

.1 Conform to the requirements of Division 1.

1.2 Related Sections

.1 Section 32 12 16 Asphalt Paving

1.3 References

.1 Ontario Provincial Standard Specifications (OPSS)
  .1 OPSS 710 Construction Specification for Pavement Marking
  .2 OPSS 1716 Water-Borne Traffic Paint
  .3 OPSS 1750 Traffic Paint Reflectorizing Glass Beads
.2 American Association of State and Highway Transportation Officials (AASHTO)
  .1 AASHTO M 248-91 (2012) Standard Specification for Ready-Mixed White and Yellow Traffic Paints
.3 United States Federal Standards
  .1 Federal Standard 595B, Colors Used in Government Procurement
.4 The Accessibility for Ontarians with Disabilities Act, 2005 (AODA)

1.4 Submittals

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

.2 Submit to Consultant following material sample at least 4 weeks prior to commencing work.
  .1 Paint colour selection.

.3 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, reference specification number and formulation number and batch number.

1.5 Shipping, Handling and Storage

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

.2 Deliver, handle and store materials in accordance with manufacturer’s printed instructions.

1.6 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

.1 Paint:
  .1 To OPSS 1716, Water-Borne Traffic Paint
  .2 Colour: Federal Standard FS Federal 595B, Yellow 33538.
  .3 Provide H.C. Blue (Pantone 293 C) to OPSS standards for accessible parking spaces.
  .4 Paint shall be non-slip.

.2 Glass beads: Overlay type: OPSS 1750 Traffic Paint Reflectorizing Glass Beads

PART 3 EXECUTION

3.1 Equipment

.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.

.2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.

3.2 Condition of Surfaces

.1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.

3.3 Application

.1 Lay out pavement markings.

.2 Unless otherwise approved by Consultant, apply paint only when air temperature is above 10° C, wind speed is less than 60km/h and no rain is forecast within next 4 hours.

.3 Apply traffic paint evenly at rate of 3m² /L.

.4 Do not thin paint unless approved by Consultant.

.5 Symbols and letters to conform to dimensions indicated.

.6 Paint lines to be of uniform colour and density with sharp edges.

.7 Paint accessible parking spaces blue with a painted pavement marking in the centre of the space, in contrasting colour to the pavement, 1000mm in length, with the International Symbol of Accessibility.

.8 Thoroughly clean distributor tank before refilling with paint of different colour.

.9 Apply glass beads at rate of 200g/m² of painted area immediately after application of paint.

3.4 Tolerance

.1 Paint markings to be within plus or minus 12 mm of dimensions indicated.

.2 Remove and replace incorrect markings.

3.5 Protection

.1 Protect pavement markings until dry.

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 30 00 Cast-in-Place Concrete
.2 Section 32 16 23 Sidewalks

1.3 References

.1 ASTM International (ASTM)
  .1 ASTM C501-84(2015) Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
  .2 ASTM C1028 - 07e1 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
  .3 ASTM D638-14 Standard Test Method for Tensile Properties of Plastics
  .4 ASTM D695-15 Standard Test Method for Compressive Properties of Rigid Plastics
.2 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: Submit manufacturer's literature describing products, installation procedures and routine maintenance.

.3 Samples for Verification Purposes: Submit one plate sample that shows dome size and spacing.

.4 Submit shop drawings showing fabrication details, fastener and anchor locations, plans of plate placement including joints, and material to be used as well as outlining installation materials and procedure.

.5 Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Cast Iron Detectable/Tactile Warning Surface Indicator Plate as certified by a qualified independent testing laboratory.

.6 Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Detectable/Tactile Warning Surface Indicator Plate and accessory as required for inclusion in the Operation and Maintenance Manuals specified in Section 01 78 00.

1.5 Quality Assurance

.1 Provide Polymer cast in Detectable/Tactile Warning Surface Indicator Plates and accessories by a single supplier with a minimum of three years' experience in the supply of Polymer cast Detectable/Tactile Warning Surface Indicator Plates.
.2 Installer's Qualifications: Engage an experienced installer certified in writing by Cast in Place Warning tiles Detectable/Tactile Warning Surface Indicator Plate supplier as qualified for

installation, who has successfully completed installations similar in material, design, and extent to that indicated for the project.

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 Vitrified Polymer Composite (VPC) Warning Surface Indicator Plates shall be suitably packaged or crated to prevent damage in shipment and handling. Detectable/Tactile Warning Surface Indicator plate type shall be identified by part number.

1.7 Project Conditions

.1 Environmental Conditions and Protection: Maintain minimum temperature of 5° C in spaces to receive Cast Iron Detectable/Tactile Warning Surface Indicator Plates for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.

.2 The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Manufacturer

.1 The Gray polymer based Detectable/Tactile Warning Surface Indicator Plate specified is based on Armor Tile Tactile Cast in Place as distributed by Kinesik Engineered Products, 2213 North Sheridan Way Mississauga, Ontario L5K 1A3.

.2 Provide Polymer Tactile Warning Surface Indicator Plates which are in compliance with the Accessibility for Ontarians with Disabilities Act

.3 Vitrified Polymer Composite (VPC) Cast in Place Warning tiles shall include: continuous strand woven fiberglass sheet matrix embedded within an epoxy polymer composition with a ultraviolet coating employing aluminum oxide particles in the truncated domes; "Armor Tile" as distributed under license by Engineered Plastics Inc. (1-800-682-2525) or equivalent product approved in writing during bidding process

.1 Dimensions: The plate shall incorporate an in-line pattern of truncated domes measuring nominal 5.0 mm height, 23 mm base diameter, 11.4 mm top diameter spaced center-to-center 60 mm (+/- 1.2 mm). For wheelchair safety the field area shall consist of a series of micro texture 1.5 mm high.

.4 Vitrified Polymer Composite (VPC) Detectable/Tactile Warning Surface Indicator Plates shall meet or exceed the following test criteria:

ASTM Reference	Test Description	Value
ASTM C1028	Static Coefficient of Friction	≥ 1.0 wet/dry
ASTM D5420	Impact Resistance	≥ 550 in-lbf/in
ASTM D695	Compressive Strength	28,000 psi
ASTM D638	Tensile Strength	19,000 psi
ASTM C501	Abrasive Wear Index	≥ 500

.2 Tactile warning surface tiles shall be 610 mm deep x 914 mm minimum total accumulated width unless otherwise indicated. Tile are based on Advantage Cast Iron Tactile model ADV-CI-1824.

.3 Existing engineered and field tested products, which have been in successful service for a period of three years and in compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

2.2 Materials

.1 Optional fasteners required if plates are assembled together prior to installation: Corrosion resistant, hex head bolt, 10 mm diameter x 45 mm long. Minimum two per Detectable/Tactile Warning Surface Indicator plate connection.

PART 3 EXECUTION

3.1 Installation

.1 During all surface preparation and installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

.2 Related materials shall be in strict accordance with the contract documents and the guidelines set by their respective manufacturers.

.3 Coordinate to ensure that the surfaces being prepared and fabricated to receive the plates are constructed correctly and adequately for plate installation. Review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Consultant.

.4 The physical characteristics of the concrete shall be consistent with the contract specifications while maintaining a slump range of 76 to 100 mm to permit solid placement of the Cast Iron Detectable/Tactile Warning Surface Indicator Plates.

.5 When preparing to set the plate, ensure that the area to receive the plates has been finished to its final elevation. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the plate placement. Vents in the plate allow air and displaced concrete to escape during the installation process.

.6 Lift the Detectable/Tactile Warning Surface Indicator plate and place into position onto the wet concrete. The plate shall be placed true and square to the curb edge in accordance with the contract drawings. Press into the concrete. The Cast Iron Detectable/Tactile Warning Surface Indicator Plates shall be tamped into the fresh concrete to ensure that the field level of the plate is flush to the adjacent concrete surface.

.7 Immediately after placement, the plate elevation is to be checked to adjacent concrete, and the concrete around the perimeter of the tile should be finished. The elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. Ensure that the field surface of the plate is flush with the surrounding concrete and back of curb so that no ponding is possible on the plate at the back side of curb, and to eliminate tripping hazards between adjacent finishes.

.8 While concrete is workable, create a 6 mm concrete-free recess around the perimeter of the plate. Use a 9.5 mm radius edging tool to create a finished edge of concrete. A steel trowel shall be used to finish the concrete around the plate's perimeter, flush to the field level of the plate.

.9 Clean the surface of the tile of any concrete that has protruded from the vent holes.

.10 During and after the Detectable/Tactile Warning Surface Indicator Plate installation and the concrete curing stage, it is imperative that there is no walking, leaning or external force placed on the plate that may rock the plate causing a void between the underside of Detectable/Tactile Warning Surface Indicator Plate and concrete.

.11 Following Detectable/Tactile Warning Surface Indicator Plate placement, review installation tolerances to contract drawings and adjust plate before the concrete sets.

.12 Following the concrete curing stage clean the residue using a soft brass wire brush without damage to the plate surface.

3.2 Protection

.1 Protect plates against damage during construction period to comply with Detectable/Tactile Warning Surface Indicator plate manufacturer's specification.

.2 Protect plates against damage from rolling loads following installation by covering with plywood.

3.3 Cleaning

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

.2 Comply with manufacturer's maintenance manual for cleaning and maintaining plate surface.

End of Section