



Toronto District School Board

Accessibility Upgrades

Parkdale Collegiate Institute

209 Jameson Ave, Toronto, ON M6K 2Y3

TR-25-0958

“Issued For Tender”

Project 25253

April 29, 2026



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End of Section

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ARCHITECTURAL				
A000	OBC Matrix and Drawing List	2	-	April 2, 2026
A101	Site Plan	2	-	April 2, 2026
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A202	Part Demo. Plans	2	-	April 2, 2026
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A205	Part Reflected Ceiling Plans	2	-	April 2, 2026
A301	Elevations	2	-	April 2, 2026
A401	Building Sections	2	-	April 2, 2026
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A410	Section Details	2	-	April 2, 2026
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A501	Plan Details	2	-	April 2, 2026
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STRUCTURAL				
S101	General Notes	2	-	April 2, 2026
S102	Typical Details	2	-	April 2, 2026
S103	Typical Details	2	-	April 2, 2026
S201	Part Foundation Plan, Framing Plans & Schedules	2	-	April 2, 2026
S501	Sections	2	-	April 2, 2026
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M2-00	Mechanical Plans	4	-	April 2, 2026
M3-00	Mechanical Schedules	4	-	April 2, 2026
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End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Work covered by contract documents
- .2 Owner
- .3 Place of the Work
- .4 Site access
- .5 Work sequence
- .6 Contractor use of premises
- .7 Working hours
- .8 Sign in requirements and identification badges
- .9 Communications
- .10 General work requirements
- .11 Engineer design
- .12 Designated substances: ACM and others
- .13 Building smoking environment
- .14 Special conditions
- .15 Site security
- .16 "By Others"
- .17 Protection of Drawings

1.2 Work Covered by Contract Documents

- .1 Work of this Contract comprises the construction of the **Accessibility Upgrades, Parkdale Collegiate Institute** as indicated on the Contract Drawings and Specifications.

1.3 Owner

- .1 Toronto District School Board.

1.4 Place of the Work

- .1 The Work of this Contract is located at 209 Jameson Ave, Toronto, ON M6K 2Y3

1.5 Metric Project

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

1.6 Site Access

- .1 Access to the site to be arranged by the Owner.
- .2 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work
- .3 Provide secure construction fencing as specified and where indicated.
- .4 Contractor parking is not available. The contractor will need to make all arrangements for offsite parking in accordance to all applicable By-law, zoning, etc.

1.7 Work Sequence

- .1 Construct Work continuously.

1.8 Contractors Use of Premises

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

1.9 Working Hours

- .1 Are to comply with the requirements of the City of Toronto by-law.
- .2 From June 29, 2026, to August 28, 2026, Work can be completed anytime, if it complies with the City of Toronto by-law.
- .3 It is the Successful Bidder's responsibility to schedule shift work (as required) to meet Project schedule deadlines; this may mean daytime as well as after-hours Work.
- .4 Prior to June 29, 2026, and after August 28, 2026, all Work must be completed outside of school operational hours of 9:00AM – 4:00PM and on weekends.
- .5 Prior to June 29, 2026, and after August 28, 2026, all Work which would cause a disturbance or safety hazard (including Work that generates odours, any asbestos abatement, any environmental demolition, or cutting/coring) must be completed prior to 9:00 AM or after 6:00 PM Monday to Friday, or anytime on weekends.
- .6 Prior to June 29, 2026, and after August 28, 2026, all tools, equipment, and materials must be brought into or taken out of the construction space(s) prior to 9:00 AM and/or after 4:00 PM.

1.10 Sign-In Requirements and Identification Badges

- .1 The Contractor shall obtain identification badges by filling out the "Request for Issue of Identification Badges for Consultant/Contractor" form and submitting, along with badge deposit (\$75.00 each) attention Jeanette Li at 15 Oakburn Cres, North York, On. For more information or assistance with obtaining ID Badges please contact Jeanette Li via email at jeanette.li@tdsb.on.ca or by phone at 416-395-4080.
- .2 The Contractor is required to sign-in themselves, their subcontractors or any other person associated with the project at school main office to record their arrival time.
- .3 The Contractor will compile a sign-in sheet with for all forces working on the project and submit to the main office at the start of each day.
- .4 ID badges shall be worn at all times while on Board property. It shall be the Bidder's responsibility to assign and track each badge. The wearing of badges by all personnel shall be strictly enforced.
- .5 At the end of each day the Contractor shall obtain the sign-in sheet previously submitted to the main office, record the departure times of themselves, Subcontractors or any other person associated with the project and return the sign-in sheet to the main office.
- .6 The Bidder's inability to access the site due to not having current badges will not absolve the Bidder of not being able to complete the project by the stipulated date.

1.11 Communications

- .1 At the outset of the project the Contractor shall provide to the Board Project Manager all relevant contact information for the Site Superintendent and GC Project Manager including names and cell phone numbers.
- .2 The Contractor shall provide at least one “emergency contact” telephone number at which the Contractor’s representative can be reached directly during all work hours.
- .3 The Site Superintendent must have the ability to be reached directly during all times or a contact provided that can be provided during all times.
- .4 In the event of a safety issue requiring contractual clarification or action (i.e. Change Notice, etc.), the contractor shall ensure that, where applicable, the action is followed up with appropriate documentation.

1.12 General Work Requirements

- .1 All access and egress of all sub trades is to be coordinated through the site supervisor.
- .2 No deliveries of equipment or material, whether contractors or subcontractors, is to be made to the school facility. The school will reject any packages, material or equipment addressed to them. It is the responsibility of the contractor and all sub trades to make appropriate arrangements for deliveries and to ensure they are addressed to them.
- .3 Delivery and/ or movement of any material, debris or equipment during the school day within common use areas is strictly prohibited.
- .4 Fire Watch- the contractor is responsible for conducting and maintaining all appropriate logs associated with fire watch within the construction area. Any fire watch required beyond the construction area must be identified to the project manager with a minimum of 5 days notice.
- .5 Shutdown of any services/ utilities must be coordinated for afterhours. A minimum of 5 business days notice is required for any service/ utility shut downs (including electrical, gas, water, PA, Fire alarm, etc.).
- .6 The Contractor shall organize his work at the school in cooperation with the Principal, through the Owner’s Representative, so that the academic program of the school is not disrupted. The Contractor shall include in his/her tender price, all costs required to phase or stage the project so that construction does not interfere with normal operations of the school.
- .7 In areas where room(s) are required by the school the following day, each room must be ready for occupancy the following morning. All furniture must be in place and the room clean and tidy.

1.13 Engineer Design

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

1.14 Designated Substances: ACM and Others

- .1 The Owner shall provide any prospective constructor or contractor a copy of building ACM surveys and information on designated substances that are known or suspected of being present

within the area or scope of work.

- .2 The General Contractor shall ensure that a copy of the ACM survey is provided to each contractor and subcontractor who will be working on the Project.
- .3 Any findings of undeclared ACM, or damaged ACM that could pose a risk to workers is to be brought to the attention of the Owner immediately, and work is to be stopped.
- .4 All project design and construction activities must be carried out in compliance with the Regulations.
- .5 No asbestos-containing materials, as defined by O. Reg. 278/05, may be specified or used in any project.

1.15 Verification

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

1.16 Building Smoking Environment

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

1.17 Special Conditions

- .1 The following general and special conditions apply:
 - .1 All existing surfaces and finishes are to be repaired wherever damaged during the course of the Work.
 - .2 Wherever existing floor and wall finishes are to be removed, include full removal down to the existing 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. Install Moisture Mitigation system specified in Section 07 26 19 on all concrete floors scheduled to receive new finishes.
 - .3 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.
 - .4 All exposed interior surfaces except prefinished surfaces shall be painted whether referred to in the specifications and drawings or not.

1.18 Site Security

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

1.19 "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.

1.20 Use of Drawings

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

1.21 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 platforms with access only to those parties 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 ARCHITECT:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Attention: Crystal Gardner M. Arch. OAA, LEED BD+C
- .2 STRUCTURAL ENGINEER:
Barry Bryan Associates
201 - 250 Water Street
Whitby, Ontario L1N 0G5
Tel: (905) 666-5252
Attention: Mr. Doug McLaughlin, P. Eng.
- .3 MECHANICAL ENGINEER:
MCW Consultants Ltd.
207 Queens Quay W, Suite 615
Toronto, Ontario M5J 2M6
Tel: (416) 598-2920
- .4 ELECTRICAL ENGINEER:
MCW Consultants Ltd.
207 Queens Quay W, Suite 615
Toronto, Ontario M5J 2M6
Tel: (416) 598-2920

PART 2 PRODUCTS

3.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.2 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Definitions

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

1.3 Procedures

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

1.4 Substitutions – Products

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

1.5 Substitutions – Manufacturers

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

1.6 Proprietary Specifications

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

1.7 Changes to Accepted Products and Manufacturers

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

1.8 Product Data

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

1.9 Consultant Procedure

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Request for Information (RFI)

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

1.3 Submittal Procedures

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

1.4 Screening of RFI's

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

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

1.5 Response to RFI's

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

1.6 Response Timing

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Preconstruction Conference
- .2 Project Meetings
- .3 On Site Documents
- .4 Cost Breakdown

1.2 Preconstruction Conference

- .1 The Consultant will call for and administer a Preconstruction Conference at time and place to be announced.
- .2 Contractor, all major Subcontractors, and major suppliers shall attend the Preconstruction Conference.
- .3 Agenda will include, but not be limited to, the following items.
 - .1 Permits
 - .2 Lines of communication and contact information
 - .3 Submittal and RFI procedures
 - .4 Schedules
 - .5 Personnel and vehicle permit procedures
 - .6 Use of premises
 - .7 Location of any Contractor on-site facilities
 - .8 Security
 - .9 Housekeeping
 - .10 Inspection and testing procedures, on-Site and off-Site
 - .11 Control and reference point survey procedures
 - .12 Health and safety
 - .13 Contractor's Schedule of Values
 - .14 Contractor's Schedule of Submittals
- .4 The Consultant will distribute copies of minutes to attendees. Attendees shall have seven days to submit comments or additions to minutes. Minutes will constitute final documentation of results of Preconstruction Conference.

1.3 Project Meetings

- .1 The Contractors Site Supervisor and Project Manager are required at all site meeting during the course of the project.
- .2 The Contractor shall record minutes of each meeting and promptly distribute copies to be received by all participants not later than three days after meeting has been held. Distribute minutes of meetings to all Consultants, whether in attendance or not.
- .3 Meetings will be held minimum bi-weekly.

1.4 On-Site Documents

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addenda.

- .4 Reviewed shop drawings, product data, and samples.
 - .5 Requests for Information (RFI's)
 - .6 Change Orders and other modifications to Contract.
 - .7 Site instructions.
 - .8 Field test reports.
 - .9 Inspection certificates.
 - .10 Manufacturer's certificates.
 - .11 Geotechnical reports
 - .12 DSS reports
 - .13 Approved Work schedule.
 - .14 Manufacturers' installation and application instructions.
 - .15 Safety Data Sheets (SDS).
 - .16 Health and Safety Plan and other safety related documents.
 - .17 Colour schedule.
 - .18
 - .19 Paint materials schedules.
 - .20 Hardware list.
 - .21 Progress reports.
 - .22 Meeting minutes.
 - .23 Other documents as specified.
-
- .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.
- 1.5 Cost Breakdown
- .1 Within 7 days after award of Contract, submit, in form approved by Consultant, cash flow chart broken down on a monthly basis in an approved manner. Cash flow chart shall indicate anticipated Contractor's monthly progress billings from commencement of work until completion.
 - .2 Update cash flow chart whenever changes occur to scheduling and in manner and at times satisfactory to Consultant.
 - .3 The Consultant reserves the right to receive from the Contractor at any time, upon request, copies of actual purchase or work orders of any material or products to be supplied for the Work.
 - .4 If materials and products have not been placed on order, the Consultant may instruct such items to be placed on order, if direct communication in writing from the manufacturer or prime suppliers is not available indicating that delivery of said material will be made in sufficient time for the orderly completion of the Work.
 - .5 The Consultant's review of purchase orders or other related documentation shall in no way release the Contractor, or his subcontractors and suppliers from their responsibility for ensuring the timely ordering of all materials and items required, including the necessary expediting, to complete the work as scheduled in accordance with the Contract Documents.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used

PART 3 EXECUTION

3.1 Not Used

.1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Submittals

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

1.3 Schedules Required

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

1.4 Format

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

1.5 Submission

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

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

1.6 Critical Path Scheduling

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

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

1.7 Submittals Schedule

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Administrative
- .2 Requests for Information
- .3 Shop Drawings and Product Data
- .4 Interference Drawings
- .5 Progress Photographs
- .6 Samples
- .7 Mock-Ups
- .8 Certificates and Transcripts

1.2 Administrative

- .1 Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in metric units.
- .4 Where items or information is not produced in metric units converted values are acceptable.
- .5 Verify field measurements and affected adjacent work are coordinated.
- .6 Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review.
- .7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.
- .8 Keep one reviewed copy of each submission on site.

1.3 Requests for Information (RFI's)

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

1.4 Shop Drawings and Product Data

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, product data and other data which the Contractor provides to illustrate details of a portion of Work.
- .2 Coordinate each submission with requirements of Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
- .3 Submit shop drawings bearing stamp and signature of qualified professional Engineer registered or licensed in the Province of Ontario where required by the individual specification sections. Each submittal and each resubmittal must bear the stamp of the Engineer
- .4 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where

articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .5 Prior to submission to Consultant, review all submitted drawings. By this review, Contractor represents to have determined and verified field measurements, site conditions, materials, catalogue number and similar data and to have checked and coordinated each drawing with the requirements of Work and of Contract Documents. Contractor's review of each drawing shall be indicated by stamp, date and signature of a responsible person.
- .6 At time of submission, notify Consultant in writing of any deviations in drawings from the requirements of the Contract Documents.
- .7 Allow ten days for Consultant's review of each submission.
- .8 Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .9 Make any changes in submitted drawings which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, notify Consultant in writing of any revisions other than those requested by Consultant.
- .10 Accompany submissions with transmittal letter containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .11 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .12 After Consultant's review, distribute copies.

- .13 Submit one electronic copy in PDF format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.
- .14 Submit electronic copy in PDF format of product data sheets or brochures for requirements requested in Specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.
- .15 Delete information not applicable to project.
- .16 Supplement standard information to provide details applicable to project.
- .17 If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned, and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .18 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Consultant approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.5 Interference Drawings

- .1 Prepare interference drawings to coordinate the installation of the work of all sections, within available space. Conflicts between trades which could be determined beforehand, by the careful coordination and preparation of interference drawings, shall be corrected at no expense to the Owner.
- .2 Prepare interference drawings of all buried services as necessary to avoid conflicts with new or existing structures, foundations or services.
- .3 Submit interference and equipment placing drawings as specified in Section 01 71 00, when requested by the Consultant.

1.6 Progress Photographs

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

1.7 Samples

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin, manufacturer, product information, applicable specification section, and intended use.
- .2 Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .3 Where colour, pattern or texture is criterion, submit full range of manufacturer's samples.

- .4 Adjustments made on samples by Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.
- .5 Make changes in samples which Consultant may require, consistent with Contract Documents.
- .6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.8 Mock-Ups

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

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 Excess Soil Management
- .6 Pollution Control
- .7 Unanticipated Soil Contamination

1.2 References

- .1 Statutes of Canada 1999 Chapter 33.
 - .1 Canadian Environmental Protection Act 1999.
 - .2 SOR/2003-289. Federal Halocarbon Regulations, 2003.
 - .3 Transportation of Dangerous Goods Act, 1992 (1992, c. 34)
- .2 OPSS 805 "Construction Specification for Temporary Erosion and Sediment Control Measures".
- .3 Province of Ontario Environmental Protection Act, R.S.O. 1990, c. E.19
- .4 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.3 Administrative

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

1.4 Fires

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

1.5 Disposal of Wastes

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

1.6 Drainage

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

- .4 Control disposal or runoff of water containing deleterious substances or other harmful substances in accordance with local authority requirements.

1.7 Excess Soil Management

- .1 Comply with the requirements of Ontario Regulation O. REG 406/19, “On-Site and Excess Soil Management”, for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

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.
- .2 Removal and disposal off site of contaminated materials shall comply with the requirements of Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 References

- .1 Perform Work in accordance with Ontario Building Code (OBC), National Fire Code of Canada (NFC), the Canadian Electrical Code CSA C22.1:21, including all Supplements and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Where a material is designated in the Contract Documents for a certain application, unless otherwise specified, that material shall conform to standards designated in the Code. Similarly, unless otherwise specified, installation methods and standards of workmanship shall also conform to standards invoked by the aforementioned Code.
- .3 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
 - .3 Manufacturer's instructions.
- .4 Where requirements of Contract Documents exceed Code requirements provide such additional requirements.
- .5 Where the Contract Documents or the Building Code do not provide all information necessary for complete installation of an item, then the manufacturer's instructions for first quality workmanship shall be strictly complied with.

1.3 Owner's Regulations

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

1.4 Standards and Definitions

- .1 Where a reference is made to specification standards produced by various organizations and agencies, 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 the work available on the site to be produced immediately on Consultant's request.

1.5 Designated Substances

- .1 Known designated substances are identified in the Designated Substance Report provided by the Owner.
- .2 Stop work immediately when material resembling asbestos, mould or any other designated substance which is not identified in the Designated Substance Report is encountered during the course of the work. Notify Owner and Consultant immediately.
- .3 The Owner will arrange for independent testing of suspected designated substances and removal of such substances encountered on the site during the course of the work which are not identified in the Designated Substance Report.

1.6 Hazardous Materials

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

1.7 Spills Reporting

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

1.8 Protection of Water Quality

- .1 No waste or surplus organic material including topsoil is to be stored or disposed of within 30 metres of any watercourses. Run-off from excavation piles will not be permitted to drain directly into watercourses. Where this measure is not sufficient or feasible to control sediment entering the watercourses, sedimentation traps or geo-textile coverage will be required.

- .2 If de-watering is required, the water shall be pumped into a sedimentation pond or diffused onto vegetated areas a minimum of 30 metres from any watercourses and not pumped directly into the watercourses.
- .3 Provide all de-watering and sedimentation control required to properly complete the work of this contract.
- .4 Supply, install and maintain silt/sediment control fencing along the edge of the site or where indicated to intercept construction runoff silt, to the satisfaction of the Owner.

1.9 Potable Water Systems

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

1.10 Soils Management

- .1 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

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 Inspection

- .1 Contractor is responsible for Quality Control (QC).
- .2 Allow Owner and Consultant access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Consultant instructions, or law of Place of Work.
- .4 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .5 Consultant will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.3 Independent Inspection Agencies

- .1 Independent Inspection and Testing Agencies will be engaged by Contractor for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Contractor and paid from the cash allowances specified in Section 01 21 13. Refer to Section 01 29 83 - Payment Procedures for Testing Laboratory Services.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Consultant at no cost to Owner. Pay costs for retesting and re-inspection.

1.4 Access to Work

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

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

1.5 Procedures

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

1.6 Rejected Work

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

1.7 Reports

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

1.8 Contractors Responsibilities

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

necessary to correct non-conforming Work.

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

1.9 Tests and Mix Designs

- .1 Furnish test results and mix designs as requested.

1.10 Mockups

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

1.11 Equipment and Systems

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Temporary utilities

1.2 Installation and Removal

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

1.3 Dewatering

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

1.4 Water Supply

- .1 Use of existing school services, including but not necessarily limited too; Water, Hydro, Internet, Phones/Fax and heat is not permitted. The Contractor will include in their contract price all temporary services required to carry out the works.

1.5 Temporary Heating and Ventilation

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless type. Solid fuel salamanders are not permitted, unless prior approval is given by the Consultant.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10° C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building may not be used when available, unless there are savings to the Contract Price and Consultant's written permission is obtained stating conditions of use, provisions relating to guarantees on equipment and operation and maintenance of system. Be responsible for damage to heating system if use is permitted.

- .7 On completion of Work for which permanent heating system is used, replace filters.
- .8 Ensure Date of Substantial Performance and warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Consultant.
- .9 Pay costs for maintaining temporary heat, when using permanent heating system. Owner will pay utility charges when temporary heat source is existing building equipment.
- .10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform to applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct fired combustion units to outside.
- .11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 Temporary Power and Light

- .1 Use of existing school services, including but not necessarily limited too; Water, Hydro, Internet, Phones/Fax and heat is not permitted. The Contractor will include in their contract price all temporary services required to carry out the works.
- .2 Provide and maintain temporary lighting throughout project. Lighting levels shall be sufficient to complete work including inspections. Provide minimum lighting levels of 400 lux at work areas. Lighting levels at floors and stairs not within work areas shall be not less than 160 lux at all times during construction activity.
- .3 All equipment used shall be CSA approved.
- .4 Wiring and method of installation shall conform to local power requirements and shall be reviewed by a licensed inspector prior to use.

1.7 Temporary Communication Facilities

- .1 Provide and pay for temporary telephone, fax, cellular data, lines and all equipment necessary for Contractor's own use.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Construction aids
- .2 Construction staging
- .3 Construction parking
- .4 Offices
- .5 Equipment, tool and material storage
- .6 Operation of motor vehicles and equipment
- .7 Sanitary facilities
- .8 Signage
- .9 Shoring

1.2 References

- .1 CSA Group (CSA)
 - .1 CAN/CSA Z321-96 (R2006) Signs and Symbols for the Workplace
 - .2 CSA Z797:18 (R2023) Code of Practice for Access Scaffold

1.3 Installation and Removal

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

1.4 Scaffolding

- .1 Scaffolding in accordance with CSA Z797.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.
- .3 Enclose and heat scaffolding during cold weather.

1.5 Hoisting

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

1.6 Construction Staging

- .1 No storage is available on site for the Contractor. The Contractor must make all necessary arrangements for storage containers as needed and ensure security of such.
- .2 Prior to construction start, the Contract must provide the Board and Consultant a copy of their construction staging plan. The plan is to include a site plan identifying location of proposed fencing, location of portable toilets, storage containers, etc. The plan is to identify which doors the Contractor will be using to enter the school, path of travel for equipment deliveries etc. The Board and Consultant reserve the right to request any changes to the plan to ensure the safety of students, staff and maintaining the ongoing operations of the school.

1.7 Construction Parking

- .1 Contractor parking is not available. The contractor will need to make all arrangements for offsite parking in accordance to all applicable By-law, zoning, etc.
- .2 If authorized to use existing roads and driveways for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 Offices

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

1.9 Equipment, Tool and Material Storage

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

1.10 Operation of Motor Vehicles and Equipment

- .1 Vehicles shall not enter, be parked or operate at school sites without first obtaining authorization from the assigned project manager.
- .2 Such vehicles shall be always operated with due caution while on school property on or near school grounds, conforming to all posted traffic controls such as speed limit, stop signs, etc.
- .3 Vehicles or equipment are not permitted on school yards without prior approval from the project manager. Should approval be granted, vehicles and equipment operated in the school yard are not permitted within 30 minutes of school bell times, during recess, lunch hour or other times of outdoor activity.
- .4 Must employ flag person to manage all operations of vehicles and equipment on site at all times they are in operation.
- .5 Vehicles or equipment must never be left unattended with the engine running. Engines must not be left idling unnecessarily.
- .6 All tools, supplies, equipment, etc. are to be securely stored at all times.

1.11 Sanitary Facilities

- .1 Use of school washrooms, both student and staff is strictly prohibited at all times. It is the responsibility of the Contractor to provide appropriate washroom facilities as per the regulations set out by the Authority Having Jurisdiction for all staff, subcontractors and delivery drivers associated with the construction project and coordinate such location with the project supervisor. The Contractor is responsible to secure any portable toilet facilities to mitigate vandalism, security issues, etc. and is responsible for the ongoing maintenance of such facility.

1.12 Construction Signage

- .1 Signs and notices for safety and instruction shall be in English. Graphic symbols shall conform to

CAN/CSA Z321.

- .2 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project.
- .3 Install signage to direct site traffic and deliveries to the Construction work areas.
- .4 Standardized Safety Signage is required at all construction entrances.
- .5 If not designated in the Contract Documents, the location of the Safety Signage shall be confirmed with the Board Project Manager and Consultant at the outset of the Project and before the placement of hoarding and fencing.
- .6 Total surface area of signage is to avoid exceeding municipal standards that would require a separate signage permit.

1.13 Shoring

- .1 Examine the site to determine the conditions under which work will be performed.
- .2 Contractor shall formulate his own conclusions as to the extent of the existing conditions and shoring required.
- .3 The method of shoring shall be according to the Contractor's and his Engineer's directions.
- .4 All existing loads must be shored prior to commencement of demolition and removal of load bearing elements.
- .5 All shoring and frame braces must be supplied with a safe load rating which must not be exceeded. Install in accordance with manufacturer's recommended procedures and safety guidelines. Ensure that the safe load conditions of the shoring are not exceeded by dead, live or construction loads.
- .6 All shoring shall be subject to the Consultant's review and approval prior to commencing demolition work.
- .7 Completely remove all shoring after new structure is installed and all concrete is set.
- .8 Submit shoring drawings and a proposed installation procedure stamped by a professional engineer registered in the Province of Ontario. Procedures shall follow the information provided on these drawings. The shoring design engineer shall be retained and paid for by the Contractor. The shoring engineer shall review all existing conditions on site prior to completing shoring design.
- .9 Removal of existing materials without proper engineered shoring is a safety hazard and will not be permitted.
- .10 Make good all damage to the existing structure and adjoining structures and bear full responsibility for failure to provide adequate shoring.
- .11 The failure or refusal of the Consultant to suggest the use of shoring, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of the work or of any of their obligations under the Contract, nor impose any liability on the Owner or their agents; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Owner, or their agents, or employees, relieve the Contractor from necessity of properly and adequately protecting the existing structure from collapse or damage, nor from and of his

obligations under the Contract relating to injury to persons or property, nor entitle him to any claims for extra compensation or an extension in schedule.

1.14 Elevators

- .1 Use of existing school elevators by the Contractor, Subcontractor, Suppliers or another individual associated with the project is prohibited. The Contractor will not be permitted to utilize the elevator for moving of materials, equipment or personnel while carrying out the works.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Barriers.
- .2 Environmental Controls.
- .3 Traffic Controls.
- .4 Fire Routes.

1.2 Installation and Removal

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

1.3 Site Fencing

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

1.4 Hoarding

- .1 Design and erect temporary site enclosure where directed by the Owner, using new solid plywood hoarding, minimum 1.8 metres high. Hoarding shall be designed by a professional engineer registered in the Province of Ontario, to withstand all applied loads.
 - .1 Hoarding shall be of adequately substantial construction to serve its purpose without failure throughout the duration of use. Materials shall be suitable for the intended purpose but shall not violate requirements of applicable codes and standards.
 - .2 Use material with smooth surfaces for Work exposed to the public.
 - .3 Provide lockable gates as necessary.
 - .4 Maintain hoarding in secure and safe condition during entire construction period.

1.5 Guard Rails and Barricades

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

1.6 Weather Enclosures

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

1.7 Dust Tight Screens

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

1.8 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.

1.9 Protection of Building Finishes

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with Consultant locations and installation schedule 3 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

1.10 Protection of Surrounding Work

- .1 Provide protection for finished and partially finished Work from damage.
- .2 Provide necessary cover and protection.
- .3 Be responsible for damage incurred due to lack of or improper or inappropriate protection.

1.11 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.

1.12 Fire Routes

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Tolerances for Execution of Work.
- .5 Protection of Work in progress.
- .6 Existing Utilities

1.2 Definition – Basis of Design

- .1 Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
 - .1 Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- .2 Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
 - .1 Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
- .3 Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 -Submittal Procedures.

1.3 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.

1.4 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.

1.5 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.

1.6 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.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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.

1.15 Dielectric Separation

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

1.16 Tolerances for Execution of Work

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

1.17 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 the Consultant.

1.18 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.

1.19 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 Incident Reporting
- .4 Records on Site

1.2 References

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Fire Commissioners of Canada, FC 301, Standard for Construction Operations
- .3 National Fire Protection Agency (NFPA)
 - .1 NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- .4 Occupational Health and Safety Act
 - .1 R.R.O. 1990, Reg. 860: Workplace Hazardous Materials Information System (WHMIS)
 - .2 O. Reg. 632/05: Confined Spaces
- .5 Ontario Building Code

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit to Owner and Consultant copies of the following documents, including updates issued:
 - .1 Notice of Project filed with Provincial Ministry of Labour or equivalent for Place of Work
 - .2 Site-specific Health and Safety Plan prior to commencement of work on the work site. Plan shall include but not be limited to the following:
 - .1 Name and contact info of Contractor's Health and Safety Representative for Work Site; including twenty-four (24) hour emergency contact phone numbers.
 - .2 Phone numbers of local fire, police, and ambulance outside of 911 services.
 - .3 Location of nearest medical facility and level of injury that each can service.
 - .3 Submit to the Owner, Consultant and Municipal Fire Department, for review, a "Fire Safety Plan" conforming to Section 2.14 of the National Fire Code of Canada. Maintain a copy of the "Fire Safety Plan" on site.
 - .4 Copies of certification for all employees on site of applicable safety training including, but not limited to:
 - .1 WHMIS.
 - .2 Fall arrest and protection.
 - .3 Suspended Access Equipment.
 - .4 Erection of Scaffolding.
 - .5 License for powder actuated devices.
 - .5 On-site Contingency and Emergency Response Plan addressing:
 - .1 Standard procedures to be implemented during emergency situations.
 - .2 Preventative planning and protocols to address possible emergency situations.
- .3 Guidelines for handling, storing, and disposing of hazardous materials that maybe encountered on site, including measures to prevent damage or injury in case of an accidental spill.
- .4 Incident and accident reports, promptly if and upon occurrence
 - .1 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.
 - .2 Accident or Incident Reports, within 24 hours of occurrence.

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

1.4 Compliance Requirements

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

1.5 Constructor

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

1.6 Board Health and Safety Department Representative

- .1 A representative of the Board's Health, & Safety Dept. ('Environment, Health and Safety Officer') may visit site at any anytime throughout the duration of the Contract to review the site, as it relates to the safety of the occupied areas of the site. Such site review shall neither constitute an inspection or approval for the Contractor.
- .2 Concerns or issues identified by the representative from the Board's Health, Wellness & Safety Dept. shall be communicated through the Board Project Manager and the school Principal for corrective action.
- .3 Contractor shall ensure full access to all site areas, at all times, for the Board's Health, Wellness & Safety Department Representative.

1.7 Safety Requirements

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

- .2 Obey all Federal, Provincial and Municipal Laws, Acts, Statutes, Regulations, Ordinances and By-laws which could in any way, pertain to the work outlined in the Contract, or to any employees of the Contractor. Satisfy all statutory requirements imposed by the Occupational Health and Safety Act and Regulations made thereunder, on a Contractor, and Constructor and/or Employer with respect to or arising out of the performance of the Contractors obligations under this Contract.
- .3 Working at Heights: The supervisor of the project, will be responsible to ensure that his employees and subcontractors/suppliers have current Working at Heights and Fall Protection certification.
- .4 The supervisor of the project will be responsible for his employees and subcontractors/suppliers maintaining standard safety practices, as well as the specific safety rules listed below, while working on the Owner's property.
- .5 The Owner reserves the right to order individuals to leave the site if the individual is in violation of any safety requirement or any Act. Any expense incurred will be the responsibility of the Contractor.
- .6 Notify the Owner should any hazardous condition become apparent.
- .7 Enforce the use of CSA approved hard hats, reflective vests and safety boots for all persons entering or working at the construction site. Refuse admission to those refusing to conform to this requirement.
- .8 Provide safeguard and protection against accident, injury or damage to any person on the site, adjacent work areas and adjacent property.

1.8 Confined Space

- .1 Confined Space: Where applicable, provide the Consultant and all Regulatory Authorities with a copy of the Contractors' Confined Space Entry Procedure. In the event that defined procedures are not available, abide by the applicable requirements of the Occupational Health and Safety Act and all regulations made thereunder.
- .2 Persons intended to work in confined spaces, as defined by the Owner, must have formal training in performing work in confined spaces.
- .3 Provide proof of valid certificates of such training for all workers prior to entry of such workers into confined spaces.
- .4 Provide all necessary safety equipment for entry into confined spaces.
- .5 Where workers are required to enter a confined space, as defined by the OHSA, O. Reg. 632/05 Section 221.2, ensure that workers of the Contractor and all Subcontractors follow the requirements of the above legislation, including but not limited to:
 - .1 Having a method for recognizing each confined space to which the program applies
 - .2 Having a method for assessing the hazards to which workers may be exposed
 - .3 Having a method for the development of confined space entry plans (which include on-site rescue procedures)
 - .4 Having a method for training workers
 - .5 Having an entry-permit system.
 - .6 Supply the necessary tools and equipment to perform the confined space entry. These items include, but are not limited to, required documentation, gas detectors, breathing equipment, fall protection and rescue equipment.

1.9 Safety Meetings

- .1 Site toolbox safety meetings will be held weekly for all Contractor employees and all sub trade contractors.
- .2 Where a Joint Health and Safety Committee is required on a project, workers and supervisors, selected, as members of the committee must attend.

1.10 Workplace Hazardous Materials Information System (WHMIS)

- .1 Be familiar with WHMIS regulations and be responsible for compliance.
- .2 Provide to the Consultant a list of Designated Substances that will be brought to the site prior to commencing work. Safety Data Sheets (SDS) and the hazardous material inventory for each substance listed must be kept on the Project.
- .3 Be responsible for all other requirements of regulations as applicable to Employers.
- .4 All controlled products to be properly labelled and stored.
- .5 Immediately inform Owner and Consultant if any unforeseen or peculiar safety-related factor, hazard, or condition becomes evident during performance of Work.

1.11 Fire Protection

- .1 Provide and maintain safeguard and protection against fire in accordance with current fire codes and regulations.
- .2 Provide temporary fire protection throughout the course of construction. Particular attention shall be paid to the elimination of fire hazards.
- .3 Comply with the requirements of FCC No. 301 Standards for Construction Operations issued by the Fire Commissioner of Canada and the National Building Code.
- .4 Provide and maintain portable fire extinguishers during construction, in accordance with Part 6 of the National Fire Code of Canada 2015 and NFPA 241.
- .5 Maintain unobstructed access for firefighting at all areas in accordance with the National Building Code of Canada.

1.12 First Aid

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

1.13 Incident 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 If at the workplace an accident, explosion, or fire causes a person injured (where they cannot perform their regular duties), a death or a critical injury the Contractor must follow all applicable regulations with respects to reporting. When reporting to the authority having jurisdiction the

Board's Project Supervisor and Health & Safety Representative will be copied on the correspondence.

1.14 Records on Site

- .1 Maintain on site a copy of the safety documentation as specified in this Section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.
- .2 Upon request, make copies available to the Consultant.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 References

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

1.3 Submittals

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

1.4 Examination of Work and Site

- .1 Examine the site and existing building to be fully informed of their particulars as related to the Work.
- .2 Verify dimensions of completed Work in place before fabrication of Work to be incorporated with it. Ensure that all necessary job dimensions are taken for the proper execution of the work. Assume complete responsibility for the accuracy and completeness of such dimensions.
- .3 No claims for extra payment will be paid for extra work made necessary or for difficulties encountered due to conditions of the site which were visible or reasonably inferable from an examination of the site at the time prior to tender closing date and furthermore, failure of the Contractor to visit and examine the site shall be deemed a waiver of all claims for extra payment due to any condition of the site existing prior to tender closing date.
- .4 As-found damage: Record by photography and submit evidence to Consultant before commencing work, any found damaged surfaces or materials adjacent to new work, and not included under scope of this new work. Remedial work to any damage, not so recorded, shall be the responsibility of the Contractor.

1.5 Qualifications of Surveyor

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

1.6 Survey Reference Points

- .1 Existing control points are designated on drawings.
- .2 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Consultant.

- .4 Report to Consultant when reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.7 Survey Requirements

- .1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement and landscaping features.
- .4 Stake slopes and berms.
- .5 Establish pipe invert elevations.
- .6 Stake batter boards for foundations.
- .7 Establish foundation and floor elevations.
- .8 Establish lines and levels for mechanical and electrical work.

1.8 Existing Services

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Consultant of findings. The Contractor is responsible for coordination of all utility locates.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut off points as directed by Consultant.
- .3 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.
- .4 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.
- .5 Install temporary drain plugs to prevent construction debris from blocking pipes downstream of the work.
- .6 All existing concrete floor slabs shall be scanned prior to any cutting or breaking of concrete. Employ a qualified concrete scanning company or inspection and testing agency to scan and map floor slabs for reinforcing, plastic and metal conduit, piping, grounding cables, embedment and the like. Map all slabs and provide copies to the Owner and Consultant.

1.9 Location of Services, Equipment and Fixtures

- .1 Location of services, equipment, fixtures and outlets indicated on drawings or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety,

access and maintenance. Include existing equipment which affects or will be affected by the work.

- .3 Inform Consultant of impending installation and obtain approval for actual location.
- .4 Location of site services where required, is approximate and is based on information provided by the Owner. Undertake all locates to determine exact locations of existing services and lay out new services to avoid any conflicts with new building elements, including site improvements, building foundations and other new or existing services.
- .5 Submit field drawings and interference drawings to indicate relative position of various services and equipment. Refer to requirements for interference drawings specified elsewhere.
- .6 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the spaces provided.
- .7 Prepare drawings to indicate coordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus and connections are coordinated.
- .8 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance and access are indicated and maintained.
- .9 Submit interference drawings to Owner and Consultant in accordance with Section 01 33 00.
- .10 Unless specifically indicated by the Consultant, interference drawings will be received for information only and will not be reviewed.

1.10 Records

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

1.11 Subsurface Conditions

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

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit written request and obtain Consultant's approval in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather exposed or moisture resistant elements.
 - .3 Efficiency, maintenance, or safety of any operational element.
 - .4 Visual qualities of sight exposed elements
- .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 .Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of Owner or separate contractor.
 - .7 Date and time work will be executed.

1.3 Materials

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

1.4 Definitions

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

PART 2 PRODUCTS

2.1 Materials

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

provide a match acceptable to Consultant for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 Preparation

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

3.2 General

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

existing building elements created by removal of existing services or equipment.

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

3.3 Cutting and Patching

- .1 General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- .2 Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- .3 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- .4 Temporary Support: Provide temporary support of work to be cut.
- .5 Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- .6 Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 - Summary of Work.
- .7 Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- .8 Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - .1 In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - .2 Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - .3 Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - .4 Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - .5 Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - .6 Proceed with patching after construction operations requiring cutting are complete.
- .9 Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - .1 Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

- .2 Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - .1 Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - .2 Restore damaged pipe covering to its original condition.
 - .3 Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, colour, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .1 Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - .4 Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - .5 Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- .10 Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.4 Subfloor Levelling

- .1 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove all flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Clean, patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer's instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.
- .2 Where new flooring is to be installed on new concrete slab or on framed floors, subfloor shall be levelled in accordance with flooring manufacturer's specifications and tolerances and with ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

3.5 Fire Barrier Seals

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

End of Section

PART 1 GENERAL

1.1 Section Includes

- .1 Progressive Cleaning
- .2 Final Cleaning

1.2 References

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA 241-22 Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.3 Project Cleanliness

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

PART 2 PRODUCTS

2.1 Products

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

PART 3 EXECUTION

3.1 Final Cleaning

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, floors and ceilings.
- .6 Clean lighting reflectors, lenses, and other lighting surfaces. Clean and/or replace lamps, light fixtures, grilles and lenses.
- .7 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .8 Thoroughly vacuum clean interior of electrical equipment.
- .9 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .10 Clean and seal concrete floor surfaces with non-skid matte sealer.
- .11 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .12 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .13 Broom clean and wash exterior paved areas, walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs. Clear all drains, scuppers, gutters and downspouts.
- .16 Remove debris and surplus materials from crawl spaces and other accessible concealed spaces.
- .17 Remove snow and ice from access to building.
- .18 Under direction of Consultant, aim adjustable luminaires.

3.2 Waste Management and Disposal

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

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 Materials Source Separation Program
- .8 Disposal of Wastes
- .9 Scheduling
- .10 Storage, Handling and Protection
- .11 Application
- .12 Diversion of Materials

1.2 References

- .1 O. Reg. 102/94 Waste Audits and Waste Reduction Work Plans.
- .2 O. Reg. 278/05 Occupational Health and Safety Act

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit a completed Waste Management Plan (WMP) prior to project start-up.

1.4 Definitions

- .1 Waste Management Plan (WMP): Contractor's approved overall strategy for waste management including waste reduction workplan and materials source separation program.
- .2 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.
- .3 Separate Condition: Refers to waste sorted into individual types.

1.5 Waste Management Goals for the Project

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

1.6 Waste Management Plan

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

1.7 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.

1.8 Disposal of Wastes

- .1 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .2 Provide appropriate on-site containers for collection of waste materials and debris. Containers for volatile wastes shall be closed containers and shall be removed from site daily.
- .3 Provide and use clearly marked separate bins for recycling.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Consultant. Do not burn waste materials on site.
- .5 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .6 Do not permit waste to accumulate onsite.

- .7 Burying of rubbish and waste materials is prohibited.
- .8 Disposal of waste into waterways, storm or sanitary sewers is prohibited.

1.9 Scheduling

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

1.10 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.
- .2 On-site sale of materials is not permitted.

End of Section

PART 1 GENERAL

1.1 Section Includes

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

1.2 References

- .1 Canadian Construction Documents Committee
 - .1 CCDC 2-2020 Stipulated Price Contract including Supplementary Conditions.
- .2 OAA/OGCA Document 100 - Recommended Procedures Regarding Substantial Performance of Construction Contracts and Completion Takeover of Projects.
- .3 The Construction Act.

1.3 Review and Takeover Procedures

- .1 In accordance with OAA/OGCA Document 100, latest edition, except where specified otherwise.
- .2 In OAA/OGCA Document 100, where the term "Architect" is used, substitute the term "Consultant", and where the term "inspection" is used in relation to the Consultant's assessment of the Work, substitute the term "review".
- .3 Arrange and pay for review by local authorities to obtain permission to occupy/occupancy permit (where applicable) prior to applying for Ready-for-Takeover.

1.4 Inspection and Declaration

- .1 Contractor's Inspection: The Contractor shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. Submit duplicate copies of the deficiency list to the Owner and Consultant.
 - .1 Notify Consultant in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
 - .2 Request Consultant's review.
- .2 Consultant's Review: Consultant and Contractor will perform review of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
- .3 Completion: submit written certificate that following have been performed:
 - .1 Work has been completed and inspected for compliance with Contract Documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - .4 Certificates required by Boiler Inspection Branch, Fire Commissioner, Utility companies, TSSA, ESA 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 Payment of Holdback 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 5.5 – Final Payment 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 5.4 - Substantial Performance of Work and Payment of Holdback.

PART 2 PRODUCTS

2.1 Not Used

- .1 Not used

PART 3 EXECUTION

3.1 Not Used

- .1 Not used

End of Section

PART 1 GENERAL

1.1 Submittals

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

1.2 Operating and Maintenance Manuals

- .1 Collect reviewed submittals and assemble documents executed by Subcontractors, suppliers, and manufacturers including red-lined as-builts.
- .2 Minimum two 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 Bind contents in a three ring, hard covered, black plastic jacketed binder, with labelling pocket on spine and with 'D' type rings. Size for 8-1/2" x 11" size paper, enclose title sheet labelled "Operating and Maintenance Data Manual", project name, date and list of contents. Organize contents into applicable sections of work to parallel project specification breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .4 Include following information as applicable, plus data specified elsewhere:
 - .1 operational information on equipment, cleaning and lubrication schedules, filters, overhaul and adjustment schedules and similar maintenance information; copy of building permit.
 - .2 copy of final inspection certificate by Electrical Safety Authority.
 - .3 Copy of fire alarm verification certificate.
 - .4 Copy of sprinkler test verification certificate.
 - .5 Copy of certificates issued by other utilities.
 - .6 Copies of field tests.
 - .7 Copies of all inspection and testing reports.
 - .8 Maintenance instructions for finished surface and materials.
 - .9 Copy of hardware and paint schedules.
 - .10 Description, operation and maintenance instructions for equipment and systems, including complete list of equipment and parts list.
 - .11 Indicate nameplate information such as make, size, capacity, serial number.
 - .12 Names, addresses and phone numbers of Contractor, Subcontractors and Suppliers, including local source of supplies and replacement parts.
 - .13 Manufacturer's product guarantees and warranties, executed in the name of the Owner, showing name and address of project and guaranty/warranty commencement date and duration of guaranty/warranty, and clear indication of what is being guaranteed and what remedial action will be taken under guaranty/warranty.
 - .1 Separate each warranty or guarantee with index keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer with name, address, and telephone number of responsible principal.
 - .3 Co-execute submittals when required.
 - .14 Additional material used in project listed under various sections showing name of manufacturer and source of supply.
 - .15 A letter on company letterhead clearly stating and verifying that no materials or products containing more than 0.1 per cent asbestos by dry weight has been applied or installed on the project.
- .5 For Mechanical and Electrical include:

- .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 troubleshooting; 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. Include maintenance and testing schedule.
 - .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.
-
- .6 Neatly type lists and notes. Use clear drawings, diagrams or manufacturers' literature.
 - .7 Manuals shall include complete set of reviewed shop drawings and product data sheets, indicating corrections and changes made during fabrication and installation.
 - .8 Create electronic copies of manuals, in their entirety in a searchable PDF file format saved to USB flash-drive.
 - .9 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.
 - .10 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.
- 1.3 Project Record Documents
- .1 After award of Contract, the Contractor will be provided with electronic copies of the Contract Documents. Contractor will use these to maintain current as-built drawings and specifications by recording deviations caused by site conditions and changes ordered by the Consultant and/or the Owner.
 - .2 Record locations of:
 - .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 or structure.
 - .4 Concealed components of mechanical and electrical services;
 - .5 Field changes of dimension and detail.
 - .6 Changes made by Change Order, Change Directive or Site Instruction.
 - .7 Details not on original Contract Drawings.
 - .8 References to related shop drawings and modifications.
- .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .4 Record information on set of drawings, provided by Consultant. Record changes using a different colour of felt tip pen markers for each major system.
- .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, Change Order, Change Directive or Site Instruction.
- .6 Photos of concealed components must be taken and tagged to their locations labelled on the record drawings. Save photos to a USB flash-drive and submit with Contract close-out package.
- .7 Identify all copies of the drawings and specifications as "Project As-built Copy". Maintain in new condition and make available for review on site by Consultant/Owner. At construction completion, neatly and accurately transfer notations to a second set of hard-copy drawings and specifications. Once completed, create electronic copies of both. As-built drawings to be generated in AutoCAD and PDF file formats. As-built specifications to be generated in PDF file format.
- .8 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.
- .9 Minimum 2 weeks prior to application for final payment, submit one (1) electronic copy of the Project Record Documents to Owner via the Consultant.

1.4 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.

1.5 Maintenance Materials and Spare Parts

- .1 Where supply of maintenance materials and spare parts are specified, deliver to Owner as follows:
- .1 Use unbroken cartons, or if not supplied in cartons, they shall be strongly packaged. Supply maintenance materials and spare parts in quantities specified in individual specification sections.
 - .2 Provide only new materials as maintenance materials and spare parts, of the same manufacture, type and quality as incorporated into the Work.
 - .3 If applicable, give colour, room number, or area where material used.
 - .4 Ensure maintenance materials and spare parts provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work

1.6 Special Tools

- .1 Where supply of special tools is specified, deliver to Owner in quantities specified as follows:
- .1 Provide items with tags identifying their associated function and equipment.
 - .2 Special tools are to be delivered to the Owner prior to the application for Substantial Performance.
 - .3 Receive and catalogue items. Submit inventory listing to Consultant. Include approved listings in Maintenance Manual.
 - .4 Ensure spare parts provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

1.7 Storage, Handling and Protection

- .1 Store spare parts, maintenance materials and special tools in manner to prevent damage or deterioration and as follows:
- .1 Store in original and undamaged condition with manufacturer's seal and labels intact.
 - .2 Store components subject to damage from weather in weatherproof enclosures.
 - .3 Store paints and freezable materials in a heated and ventilated room.
 - .4 Remove and replace damaged products at own expense and to satisfaction of Consultant.
 - .5 Clearly mark containers as to content.
 - .6 Obtain receipt from Owner upon delivery of materials.

1.8 Final Site Survey Certificate

- .1 Provide 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.

1.9 Independent Specialty Engineers Sign-Off

- .1 Provide paper and electronic 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.

1.10 Electronic Documents

- .1 Any electronic documentation submitted must be in the formats described above.
- .2 Any electronic documentation submitted must be compatible with Consultant's computers or the documentation will be returned for re-submission.
- .3 To ensure that the documents are able to be read on a computer different than the Contractor's, enable the "close the disc upon completion" option in the disc authorizing application.

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 References

- .1 The National Building Code of Canada 2020, Part 8-Safety Measures on Construction and Demolition Sites.
- .2 CSA Group (CSA)
 - .1 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures
- .3 ASTM International (ASTM)
 - .1 ASTM F710-22 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- .4 Ontario Provincial Regulations
 - .1 Ontario Regulation 102/94 Waste Audits and Waste Reduction Work Plans.
 - .2 Ontario Regulation 103/94 Environmental Protection Act.
 - .3 Ontario Regulation 213/07 The Fire Code.
 - .4 Ontario Regulation 232/98 Landfilling Sites.
 - .5 Ontario Regulation 278/05 Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations.
 - .6 Ontario Regulation 347 Environmental Protection Act, General — Waste Management.
 - .7 Ontario Regulation 332/12 The Building Code.
- .5 The Workplace Health and Safety Act, and Regulations for Construction Projects.
- .6 The Contractors Health and Safety Policy.
- .7 Laws, rules and regulations of other authorities having jurisdiction.

1.3 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit detailed written schedule, methodology and proposed procedures for demolition, including a Safe Work Plan for review prior to commencement of demolition.
- .3 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.
- .4 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.
- .5 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

1.4 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.

1.5 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 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.
- .5 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.
- .6 Remove: Remove and legally dispose of items, except those identified for use in recycling, re-use, and salvage programs.
- .7 Reuse: The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.
- .8 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.

1.6 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.

1.7 Project Conditions

- .1 Construct safety barriers, barricades, fencing and hoarding to separate public from work areas as described in Section 01 56 00.
- .2 The Owner assumes no responsibility for the actual condition of the structures to be demolished.
- .3 Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. Variations within the structures may occur by the Owner's salvage operations prior to start of demolition.

1.8 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.

PART 2 PRODUCTS

2.1 Materials

- .1 Provide all materials necessary for temporary shoring. On completion, remove temporary materials from site.
- .2 All building materials removed from the building shall become the property of the Contractor unless specified otherwise and shall be reused in new construction or removed from the Site.
- .3 All concrete, masonry, asphalt and similar materials shall be crushed prior to disposal.

2.2 Salvage

- .1 All items of salvageable value must be salvaged.
- .2 Provide a schedule of items to be salvaged and clearly indicate which items are to be retained by Owner. Clearly identify and tag each salvageable item.
- .3 Transport salvaged items from the site as they are removed.
- .4 Items of salvageable value to the Contractor may be removed from the structure as the work progresses, if such items are not claimed by the Owner.

2.3 Reuse

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

2.4 Recycle

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

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 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 Assess potential effect of removal of any part or parts on the remainder of structure before such part(s) are removed.
 - .3 Assess effects of demolition at adjacent structures and consider need for underpinning, shoring and/or bracing.
 - .4 Investigate for following conditions:
 - .1 load bearing walls and floors
 - .2 structure suspended from another
 - .3 presence of designated substances and hazardous materials.
- .5 After determining demolition methods, determine area of possible vibration. Carefully inspect beyond those adjacent areas. List potential damage areas and photograph each for record purposes before starting work.

3.2 Preparation

- .1 Erect and maintain dustproof and weatherproof partitions as required to prevent spread of dust, fumes and smoke to other parts of building. Maintain fire exits. On completion, remove partitions and make good surfaces to match adjacent surfaces of building.
- .2 Provide all shoring and bracing required for the execution of the work.
- .3 Ensure all sedimentation controls as required are in place prior to commencement of demolition activities.
- .4 Before commencing demolition, verify that existing water, gas, electrical and other services in areas being demolished are cut off, capped diverted or removed as required. Post warning signs on electrical lines and equipment which must remain energized to serve adjacent areas during period of demolition.

3.3 Protection

- .1 Erect and maintain temporary protection where required by authorities having jurisdiction.

- .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 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.
- .4 Keep dust from entering existing facilities and areas of building not affected by the Work. Comply with Ministry of Health requirements regarding debris control.
- .5 If Owner considers additional bracing and shoring necessary to safeguard and prevent such movement or settlement, install bracing or shoring upon Owner's orders.
- .6 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger new work or existing premises.
- .7 Protect existing adjacent work against damages which might occur from falling debris or other causes due to work of this Section.
- .8 Protect from weather, parts of adjoining structures not previously exposed.
- .9 Protect interiors of building parts not to be demolished from exterior elements at all times.
- .10 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 Temporary Ventilation

- .1 Provide all required temporary ventilation for demolition work.

3.5 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 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.
- .3 Noise Control: Perform demolition operations to minimize noise.
- .4 Salvage, Re-Use, and Recycling Procedures:
 - .1 Develop and implement procedures to re-use, salvage, and recycle demolition materials.
 - .2 Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.
 - .3 Source-separate clean and uncontaminated demolition materials including, but not limited to the following types:
 - .1 Concrete, Concrete Block, Concrete Masonry Units (CMU), Brick.
 - .2 Metal (ferrous and non-ferrous).
 - .3 Wood.
 - .4 Glass.
 - .5 Plastics and Insulation.
 - .6 Gypsum Board.

- .7 Porcelain Plumbing Fixtures.
- .8 Fluorescent Light Tubes.
- .9 Paper: Bond, Newsprint, Cardboard, Paper, Packaging Materials.
- .10 Other materials as appropriate.

3.6 Performance

- .1 Ensure demolition work is supervised by competent foreman at all times.
- .2 Maintain and preserve active utilities traversing premises.
- .3 Maintain safety of site by shoring below-grade-structures and excavations resulting from demolition against collapse.

3.7 Selective Demolition

- .1 Carefully dismantle and remove all items in as shown and as necessary to complete the work.
- .2 Salvage items scheduled for reuse or to be handed over to the Owner.
- .3 Particular attention shall be paid to prevention of fire and elimination of fire hazards which would endanger the existing buildings.
- .4 Where existing flooring is to be removed from floor slabs to remain, including ceramic tile flooring, carefully remove flooring, grout, adhesives, waterproofing membranes and the like down to the base slab. Patch and repair slab where damaged with concrete or acceptable leveling compound in accordance with new flooring manufacturer's instructions and ASTM F710. Refer to original building drawings and remove and replace existing concrete floor toppings as necessary and where required.
- .5 Return areas to condition existing prior to the start of the work unless indicated otherwise.
- .6 At exterior and interior bearing walls to be removed, include breaking out and removal of existing concrete foundations to a minimum of 200 mm below new finished floor level.

3.8 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.

3.9 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 Reinstall 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 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 347R-14 Guide to Formwork for Concrete
 - .3 ACI SP-4-14 Formwork for Concrete
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA B111-1974 (R2003) Wire Nails, Spikes and Staples
 - .3 CSA O86:19 Engineering Design in Wood
 - .4 CSA O121-2017 (R2022) Douglas Fir Plywood
 - .5 CSA O141:23 Canadian Standard Lumber
 - .6 CSA S269.1-16 (R2021) Falsework and Formwork
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 41-GP-35M Polyvinyl Chloride Waterstop.
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1204 Material Specification for Polyvinyl Chloride Waterstops

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.
 - .4 Coordinate with other Divisions prior to submittal.
 - .5 Do not commence placing sleeves, conduits, or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.
 - .6 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.
- .3 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 Quality Assurance

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

- .2 Design of Formwork: Assume full responsibility for complete structural design and construction of formwork in accordance with CSA S269.1 and CSA O86, as applicable.
 - .1 The design and engineering of the formwork, as well as its' construction, shall be the responsibility of the Contractor.
- .3 Formwork shall be designed for the loads and lateral pressures outlined in the ACI publication "SP-4 Formwork for Concrete" and wind pressures and allowable stresses as set down in the National Building Code and in accordance with CSA A23.1 and A23.2. Formwork shall be of sufficient strength and rigidity to support all concrete and construction loads, taking into account proposed rate and method of pouring concrete so that the resultant finished concrete shall conform to the shapes, lines and dimensions of the members shown on the drawings.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

- .1 All materials shall be new, in accordance with referenced standards.
- .2 Plywood: Douglas Fir, conforming to CSA O121. Sound undamaged sheets finished one side, fabricated especially for use as concrete form panels, with sealed edges. Minimum 17mm thickness.
- .3 Lumber: Conforming to CSA O141, with grade stamp clearly visible.
- .4 Chamfers: Cut from 19mm x 19mm wood, smooth with no open defects.
- .5 Form Ties: snap ties, with spreader washer and 25mm break back.
- .6 Joint Tape: non-staining, water impermeable, self-release.
- .7 Nails, Spikes and Staples: Galvanized, conforming to CSA B111.
- .8 Waterstops: PVC Waterstop to CGSB 41-GP-35M, types 2 and 3 and OPSS 1204:
 - .1 Construction Joints, Internal Waterstop. 150 mm wide, ribbed, centre bulb style tapered thickness varying from 9.5 mm minimum near centre to 6.4 mm minimum near edge.
 - .1 Wirestop PVC Waterstop type CR-6380, with steel wire fastening loops, by Paul Murphy Plastics Company.
 - .2 Vinylex PVC Waterstop type RB6-38 ribbed with centre bulb, by Gamco Inc.
 - .3 Durajoint PVC Waterstop type 5, by Durajoint Concrete Accessories.
 - .4 PVC Waterstop Type 6380, by W. R. Meadows of Canada Ltd.
- .9 Form Release Agent: Colourless mineral oil which will not stain concrete.

- .10 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 Waterstops:
 - .1 Install waterstops to provide continuous water seal.
 - .2 Do not distort or pierce waterstop in way as to hamper performance.
 - .3 Do not displace reinforcement when installing waterstops.
 - .4 Use equipment to manufacturer's requirements to field splice waterstops.
 - .5 Tie waterstops rigidly in place.
 - .6 Use only straight heat sealed butt joints in field.
 - .7 Use factory welded corners and intersections unless otherwise approved by Consultant.
- .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 1800 mm of their supports.
 - .2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm square in any location.
- .5 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:
 - .1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.
- .6 Confirm that built-in items that penetrate surface waterproofing are installed to meet requirements of waterproofing trade.

3.4 Construction Joints

- .1 Form construction and expansion joints with bulkheads to ensure straight lines. Immediately before subsequent pour at construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.
- .2 Review with Consultant proposed location and details of construction joints in walls, columns, beams and slabs.
 - .1 Construction joints shall present appearance of normal form panel joint.
 - .2 Install continuous shear key in construction joints in walls and framed floors which are 152mm or more thick.
 - .3 Provide vertical construction joints in walls at not more than 20 metres centre to centre.
 - .4 Provide waterstops in accordance with manufacturer's instructions at construction joints in walls which retain earth. Waterstops shall be continuous.

3.5 Treatment of Formwork Surfaces

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

3.6 Stripping of Formwork

- .1 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations.
- .2 Do not remove plywood formwork by jerking loose or by metal pinch bars. Use wood wedges and gradually force panels loose. Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.
- .3 Take particular care not to damage external corners when stripping formwork.
- .4 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

3.7 Defective Work

- .1 Movement and displacement of formwork during construction, variations in excess of specified

tolerances, marked and disfigured surfaces, and failure of materials or workmanship to meet requirements of this specification, and which cannot be repaired by approved methods, will be considered defective work.

- .2 Replace defective work, as directed by Consultant.
- .3 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if work has proven to be deficient.
- .4 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost.

3.8 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 30 00 Cast-in-Place Concrete
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 22 00 Concrete Unit Masonry
- .5 Section 04 27 00 Multiple Wythe Unit Masonry

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A143/A143M-07(2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
- .2 American Concrete Institute (ACI)
 - .1 ACI SP-66 (04) ACI Detailing Manual
- .3 CSA Group (CSA)
 - .1 CSA A23.1:19/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
 - .3 CSA G30.18:21 Carbon Steel Bars for Concrete Reinforcement
 - .4 CSA G40.20-13/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .5 CSA W186:21 Welding of Reinforcing Bars in Reinforced Concrete Construction
- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC Reinforcing Steel Manual of Standard Practice

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings, including placing drawings and bar lists.
 - .2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, and the Reinforcing Steel Institute of Canada (RSIC) Reinforcing Steel Manual of Standard Practice 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 wall reinforcement.
 - .6 Show concrete cover to reinforcement.
 - .7 Show location of construction joints.
- .3 Inspection Reports: Inspection and Testing Company shall:
 - .1 Submit written reports of inspection and tests.
 - .2 Distribute reports as follows:
 - .1 Consultant.
 - .2 Contractor.

- .4 Quality Assurance Submittals:
 - .1 Mill Test Report: 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 Submit in writing proposed source of reinforcement material to be supplied.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Qualifications: Welding: Undertake welding of reinforcement only by a fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA W186.
- .3 Source Quality Control: Source Quality Control may be performed by an Inspection and Testing Company appointed by Consultant.
- .4 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
- .5 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.
- .6 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne or part thereof supplied for incorporation in Work.

1.6 Shipping, Handling and Storage

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

1.7 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

- .1 In accordance with reference standards.
- .2 Substitute different size bars only if permitted in writing by Consultant.
- .3 Bar Reinforcing Steel:
 - .1 Bars which are to be welded by arc-welding process: to CSA G30.18, Grade 400W.
 - .2 Other bars: to CSA G30.18, Grade 400R.
- .4 Plain round bars: to CSA G40.20-04/G40.21.
- .5 Cold-drawn annealed steel wire ties: to ASTM A497.
- .6 Chairs, bolsters, bar supports, spacers: to CSA A23.1.
- .7 Mechanical splices: subject to approval of Consultant.

2.2 Fabrication

- .1 Fabricate reinforcing steel only in permanent fabricating shop.
- .2 Fabricate reinforcing steel in accordance with shop drawings.
- .3 Tag reinforcing bars to indicate placement as designated on shop drawings.
- .4 Splices:
 - .1 Provide splices only where specifically indicated on Drawings.
 - .2 Stagger alternate mechanical splices 750 mm apart.
 - .3 Stagger alternate end bearing splices 750 mm apart.
 - .4 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which affects this work.
- .2 Examine formwork to verify that it has been completed, and adequately braced in place.
- .3 Notify the Consultant of any conditions which would prejudice proper completion of this work.
- .4 Commencement of work implies acceptance of existing conditions.

3.2 Installation

- .1 Place reinforcing steel in accordance with reviewed placing drawings, typical details, and CSA A23.3.
- .2 Adequately support reinforcing and secure against displacement within tolerances permitted.
- .3 Place reinforcing steel to provide minimum spacing and proper concrete cover as noted on drawings.
- .4 Do not cut reinforcement to incorporate other Work.
- .5 Relocate or rebend bars only on written instructions of Consultant.
- .6 Tie reinforcement in place. Do not weld.

3.3 Adjusting

- .1 Adjust and secure reinforcement in correct position immediately before concrete is placed.
- .2 Remove contaminants which lessen bond between concrete and reinforcement.

3.4 Field Quality Control

- .1 Provide competent supervisor, with at least three years of experience in reinforcement placement, to direct placement of reinforcement.
- .2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.

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

3.5 Defective Work

- .1 Incorrectly fabricated, misplaced or omitted reinforcement will be considered defective Work.
- .2 Replace or adjust defective reinforcement before concrete is placed as directed by Consultant.
- .3 Replace or strengthen concrete work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.
- .4 Pay for additional inspection and testing, redesign, corrective measures, and related expenses, if Work has proven to be deficient.

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 10 00 Concrete Forming and Accessories
- .2 Section 03 20 00 Concrete Reinforcing
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 22 00 Concrete Unit Masonry
- .5 Section 04 27 00 Multiple Wythe Unit Masonry
- .6 Section 05 31 00 Steel Deck
- .7 Section 07 92 00 Joint Sealants
- .8 Section 09 66 13 Portland Cement Terrazzo Flooring
- .9 Section 09 67 00 Epoxy Flooring

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C260/C260M-24 Standard Specification for Air-Entraining Admixtures for Concrete
 - .2 ASTM C295/C295M-19 Standard Guide for Petrographic Examination of Aggregates for Concrete
 - .3 ASTM C309-25 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - .4 ASTM C330/C330M-23 Standard Specification for Lightweight Aggregates for Structural Concrete
 - .5 ASTM C494/C494M-24 Standard Specification for Chemical Admixtures for Concrete
 - .6 ASTM C881/C881M-20a 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-20 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - .9 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .10 ASTM D570-22 Standard Test Method for Water Absorption of Plastics
 - .11 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - .12 ASTM D638-22 Standard Test Method for Tensile Properties of Plastics
 - .13 ASTM D1259-06(2025) Standard Test Methods for Nonvolatile Content of Resin Solutions
 - .14 ASTM D1751-23 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
 - .15 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness
 - .16 ASTM D5329-20 Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
- .2 American Concrete Institute (ACI)
 - .1 ACI 117-10 Specifications for Tolerances for Concrete Construction and Materials.
 - .2 ACI 232.1R-12 Report on the Use of Raw or Processed Natural Pozzolans in Concrete
- .3 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete.
 - .2 CSA A283:19 Qualification Code for Concrete Testing Laboratories.

- .3 CSA A3000-18 Cementitious Materials Compendium
- .4 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1010 Material Specification for Aggregates - Granular A, B, M and Select Subgrade Material.
 - .2 OPSS 1212 Material Specification for Hot-Poured Rubberized Asphalt Joint Sealing Compound.
- .5 Government of Canada Treasury Board Secretariat (TBS)
 - .1 Standard on Embodied Carbon in Construction

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Samples: Submit for inspection, material samples of specified mix designs.
- .3 Concrete Mix Designs:
 - .1 Submit concrete mix designs for review. Specify intended use for each mix design.
 - .2 Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.
 - .3 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CSA A23.1. Mix design shall be adjusted to prevent alkali aggregate reactivity problems.
 - .4 Provide certification that plant, equipment, and all materials to be used in concrete comply with the requirements of CSA A23.1.
 - .5 Submit written requests for use of admixtures not specified, for site mixing of concrete, and for use of bonding agents.
 - .6 Submit in writing, proposed method of in-situ strength testing.
- .4 Inspection Reports: Inspection and Testing Company shall:
 - .1 Submit written reports of inspection and tests.
 - .2 Distribute reports as follows:
 - .1 Consultant;
 - .2 Contractor.
 - .3 On concrete cylinder test reports, include:
 - .1 Specific location of concrete represented by sample
 - .2 Design strength.
 - .3 Unit weight of sample
 - .4 Class of exposure
 - .5 Aggregate size and mixtures incorporated
 - .6 Date, hour and temperature at time sample taken
 - .7 Percentage air content
 - .8 Test strength of cylinder
 - .9 Type of failure if test fails to meet specification.

1.5 Quality Assurance

- .1 Obtain a copy of CSA A23.1/A23.2 and maintain on site.
- .2 Pre-Construction Conference:
 - .1 At least 35 days prior to the start of concrete construction schedule, conduct a meeting to review proposed mix designs and to discuss detailed requirements of the proposed concrete operations. Review requirements for submittals, coordination, and availability of materials. Establish work progress and sequencing schedules and procedures for material testing, inspection and certifications.

- .3 Source Quality Control:
 - .1 Both source quality control, and field quality control specified in Article 1.5.4, may be performed by an Inspection and Testing Company appointed by Consultant.
 - .2 Review provided by Inspection and Testing Company does not relieve the Contractor of his sole responsibility for quality control over Work. Performance or non- performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.
 - .3 Inspection and Testing Company shall be certified under CSA A283, Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.
 - .4 Payment for specified Work performed by Inspection and Testing Company will be made from Cash Allowance.
 - .5 Payment for additional tests (including testing of structure and its performance and load testing) required by changes of materials or mix design requested by Contractor, and failure of completed Work to meet specified requirements, shall be made at Contractor's expense.
 - .6 Perform Work of source quality control in accordance with CSA A23.2 and to include:
 - .1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.
 - .2 Review of proposed concrete mix designs.
 - .3 Sampling, inspection, and testing of materials as may be required.
- .4 Field Quality Control:
 - .1 Inspection and Testing Company, when appointed as specified for Source Quality Control, shall perform sampling, inspection and testing of concrete work at site.
 - .2 Perform sampling, inspection and testing in accordance with CSA A23.2, and to include:
 - .1 Making of standard slump tests.
 - .2 Obtaining of three standard specimens for strength tests from each 100 m of concrete, or fraction thereof, of each mix design of concrete placed in any one day. In addition, for slabs-on-grade, obtain beam specimens for determination of modulus of rupture.
 - .3 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.
 - .4 Making compression tests of each set of three specimens, one at 7 days and two at 28 days; modulus of rupture tests at 90 days.
 - .5 Verification of air content of air-entrained concrete.
 - .1 For Class of exposure F-1, and C-2, test at frequency in accordance with CSA A23.1.
 - .2 Make first test before placing any concrete.
 - .3 After stable air content has been established, frequency of tests will be determined by Consultant.
 - .4 For other Classes of exposure, test at time of obtaining strength test specimens.
 - .3 Inspection for Tolerances:
 - .1 Confirm that concrete work meets specified tolerance requirements.
 - .2 Use the elevation survey records of elevations of finished concrete surfaces specified in Section 03 10 00 and this section as basis for judging compliance.
 - .3 Use approved aluminum straightedge to judge compliance with specified slab tolerances, except use dipstick equipment where F-number tolerance is specified.
 - .4 Slabs-on-Grade:
 - .1 Observe application of curing compound to sample slab, recording rate of application.
 - .2 Monitor on a random basis acceptable to the Consultant, that slab is being saw cut before slab temperature starts to fall.
 - .3 Qualifications: Floor finishing shall be undertaken only by contractors with at least 10 years of experience.
 - .4 Sample of Finish Flooring:
 - .1 Finish an area of floor slab where directed by Consultant to provide sample of finish for approval.

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

1.6 Tolerances

- .1 In accordance with ACI 117 and CSA A23.1.
- .2 Difference between elevation of high point and low point in specified area not to exceed:
 - .1 In any bay up to 100 m²: 12 mm.
 - .2 In any bay up to 400 m²: 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 Shipping, Handling and Storage

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

1.8 Job Conditions

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

1.9 Project Records

- .1 Maintain record of all concrete pour related to time, date, delivery slip serial number and location of each concrete pour and identify related test cylinders. Keep records on site until project is completed.
- .2 Delivery Records: File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, Project, Class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.
- .3 Record Drawings:
 - .1 Record on a set of Drawings:
 - .1 founding elevations of all footings
 - .2 variations of foundation Work from that indicated on Drawings.
 - .2 Make record drawings available for Consultant's inspection at all times.

1.10 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

- .1 To meet specified requirements of referenced Standards.
- .2 Cement:
 - .1 Portland Cement: to CSA A3000.
 - .2 Cementitious Hydraulic Slag: to ACI 232.1R
- .3 Fine Aggregate: For slabs-on-grade, fineness modulus of fine aggregate to be between 2.7 and 3.1.
- .4 Coarse Aggregates:
 - .1 20 mm to 5 mm (No. 4 sieve) except as specified below.
 - .2 For slabs-on-grade 125 mm and thicker: 40 mm to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 5 Group II of CSA A23.1, one of which is to be 40 mm, to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.
 - .3 For slabs-on-grade: Abrasion loss not to exceed 35%. Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295.
 - .4 For toppings 50 mm thick and less and for slabs over open web steel joists: 12 mm to 5 mm (No. 4 sieve).
- .5 Curing-Sealing Compound: Membrane curing-sealing compound formulated from chlorinated rubber resins, or acrylic emulsion, solvent free for use in occupied buildings, to ASTM C309, type 1.
 - .1 Basis-of-Design Product: Euclid Chemical Company; Diamond Clear 350 or a comparable product by one of the following:
 - .1 BASF Corporation - Construction Systems.
 - .2 Sika Corporation
 - .3 W.R. Meadows

- .6 Bonding Agent: To ASTM C881, 100% reactive, 2 component, low viscosity, high modulus bonding adhesive.
- .7 Saw Cut Filler: Semi-rigid epoxy or polyurea in accordance with ACI 302.1R for joint fillers used in control and construction joints.
 - .1 Basis of Design Euco 700 or Euco QWIKjoint UVR by Euclid Chemical.
- .8 Premoulded Joint Fillers: Bituminous impregnated fiber board: to ASTM D1751.
- .9 Sealant: Refer to Section 07 92 00 – Joint Sealants
- .10 Mechanical Anchors: 'Kwik' Bolts, 'Cinch' Anchors or Parabolts.

2.2 Concrete Mixes

- .1 Ready Mix, with 28 day compressive strength as indicated on Drawings.
- .2 Design concrete mix in conformance with CSA A23.1, Tables 1, 2, 5 (Alternative 1) and 17, and as follows. Provide concrete meeting water/cementing materials ratio and air content of Table 14 in accordance with Class of exposure specified in following sub-paragraphs, and minimum strength specified on Drawings. Note that concrete designed in accordance with water/cementing materials ratio of Table 14 may yield strength exceeding minimum strength specified on Drawings.
 - .1 Slabs-on-Grade:
 - .1 Use type 20 Portland cement, or replace 35 percent Portland cement with cementitious hydraulic slag.
 - .2 When mean daily temperature exceeds 25 ° C at time of placement, replace 25 percent of type 20 cement, or 50 percent of type 10 cement, with cementitious hydraulic slag.
 - .3 Use water/cementing materials ratio 0.45 maximum.
 - .4 Use aggregates specified in paragraphs 2.1.3.
 - .5 Cementing materials content 325 kg/m.
 - .6 Modulus of rupture 3.5 MPa average, 3.0 MPa minimum.
 - .7 Slump at delivery, before addition of superplasticizer, 50 mm; add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.
 - .2 Interior Concrete, other than specified above, and not exposed to freezing and thawing or the application of deicing chemicals: select water/cementing materials ratio and cementing materials content on basis of strength, workability, and finishing requirements.
- .3 Submit evidence, and material samples, if requested, acceptable to the Inspection and Testing Company, to verify that the proposed concrete mix design will produce specified quality of concrete.
- .4 List all proposed admixtures in mix design submission. Do not change or add admixtures to approved design mixes without Consultants approval.
- .5 Concrete Weight: Air dry unit weight: minimum 2,300 kg/m; adjusted proportionally for maximum air content listed in CSA A23.1, Clause 15, Table 10.
- .6 Concrete supplier to provide documentation indicating the requirements of TBS Standard on Embodied Carbon in Construction have been met.

2.3 Admixtures

- .1 Chemical Admixture: To ASTM C494. Incorporate water-reducing admixture, type WN, in all concrete.
- .2 Air Entraining Agent: To ASTM C260. Incorporate air-entraining agent in addition to chemical admixture in concrete of relevant Class of exposure, in accordance with CSA A23.1, Clause 15, Table 10.
- .3 Chloride: Do not use calcium chloride or admixtures containing chloride in concrete.

2.4 Concrete Toppings

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

2.5 Premixed Grout

- .1 Non-Shrink Metallic: Non-catalyzed metallic grout to ASTM C1107, Compressive strength at 28 days: 48 MPa.
- .2 Non-Shrink, Non Stain, Non-Metallic: to ASTM C1107. Compressive strength at 28 days: 59 MPa.
- .3 Flowable Grout: High-tolerance Non-shrink, Non-metallic shrinkage compensating grout to ASTM C1107. Compressive strength at 28 days: 59 MPa.

PART 3 EXECUTION

3.1 Examination

- .1 Before starting this work, examine work done by others which effects this work.
- .2 Notify Consultant of any condition which would prejudice proper completion of this work.
- .3 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.
- .4 Confirm that reinforcement, dowels, control joints, inserts and all other built in work are in place and secured.
- .5 Commencement of work implies acceptance of existing conditions.

3.2 Treatment of Formed Surfaces

- .1 Conform to the requirements of CSA A23.1, and as additionally specified herein.
- .2 Treat concrete surfaces which will be exposed or painted in the completed building to provide a "Smooth Rubbed Finish" in accordance with CSA A23.1, uniform in colour and texture.
- .3 Plugs at Recessed Ties:
 - .1 Clean tie holes to remove all foreign matter.
 - .2 Coat plugs by dipping in adhesive and insert in hole.
 - .3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.

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

3.3 Placing Concrete

- .1 Place concrete in accordance with requirements CSA A23.1/A23.2.
- .2 Notify Consultant and inspection and testing firm at least 24 hours prior to commencement of concrete placing operation and 24 hours before wall forms are closed in.
- .3 Obtain Geotechnical Engineer's confirmation that thickness, elevation and compaction of sub-grade meets specifications before placing concrete.
- .4 Do not place concrete in water or open frozen surfaces.
- .5 Remove contaminants which lessen concrete bond to reinforcement before concrete is placed.
- .6 Maintain accurate records of cast in place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- .7 Ensure that reinforcement, inserts, embedded items, formed expansion joints and the like, are not disturbed during concrete placement.
- .8 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Consultant.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation, construction and expansion joints as indicated.
 - .4 Install joint filler.
 - .5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.
- .9 Provide construction joint as indicated on the drawings. Ensure dowels are adequately anchored and placed at right angles to the joint before placing concrete.
- .10 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.

3.4 Finishing Concrete

- .1 Perform finishing operations on plastic concrete surfaces in accordance with CSA A23.1, and as specified herein.
- .2 Refer to the drawings for floor finishes and coverings.
- .3 Screed the top of rough floor slabs to an even level or sloping surface at the proper elevation to receive the finish or topping specified on the drawings and in finish schedule.
- .4 Provide a smooth steel trowel finish on all areas scheduled to receive a covering, or painted finish.

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

3.5 Curing

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

3.6 Grouting

- .1 Mix prepackaged grout with water in accordance with manufacturer's printed instructions.
- .2 Dampen concrete surfaces immediately before installing grout.
- .3 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.
- .4 Slope grout beyond edge of plate at 45 degrees.
- .5 Provide same environmental protection and curing as specified for concrete.

3.7 Joint Sealant

- .1 Apply sealant specified in Section 07 92 00 to thoroughly dry surfaces only, at ambient air temperatures above 5 ° C.
- .2 Provide sealant on top of joint filler with a polyethylene bond breaker between joint filler and joint sealant applied in accordance with manufacturer's direction.
- .3 Confirm that preformed joint filler and backer rod are compatible with sealant.
- .4 Caulk joints in accordance with the following:
 - .1 Do not commence joint preparation until concrete is at least 28 days old.
 - .2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.
 - .3 Blow clean with compressed air with oil trap on line, or vacuum clean.
 - .4 Install backer rod of diameter 25 percent greater than joint width, and type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm.
 - .5 Prime joint if required, as recommended by sealant manufacturer.

3.8 Defective Work

- .1 Variations in excess of specified tolerances and marked and disfigured surfaces that cannot be repaired by approved methods will be considered defective work.
- .2 Replace or modify concrete that is out of place or does not conform to lines, detail or grade as directed by the Consultant.
- .3 Replace or repair defectively placed or finished concrete as directed by the Consultant.
- .4 Testing and Replacement of Deficient Concrete in Place:
 - .1 Pay for additional testing and related expenses if concrete has proven to be deficient.

- .2 Replace or strengthen deficient concrete work as directed by the Consultant and pay for all testing and related expenses for replaced work until approved by the Consultant.

3.9 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clear away from the building site excess and waste materials and debris resulting from Work of this Section.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 04 27 00 Multiple Wythe Unit Masonry
- .3 Section 05 12 23 Structural Steel

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A153/A153M-23 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .2 CSA S304-14 (R2019) Design of Masonry Structures.
 - .3 CAN/CSA A371-14 (R2019) Masonry Construction for Buildings.
 - .4 CSA G30.3-M1983 (R1998) Cold-Drawn Steel Wire for Concrete Reinforcement.
 - .5 CSA G30.18-09 (R2014) Carbon Steel Bars for Concrete Reinforcement
 - .6 CSA W186-M1990 (R2016) Welding of Reinforcing Bars in Reinforced Concrete Construction
- .3 American Concrete Institute (ACI)
 - .1 Detailing Manual
- .4 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 of each type of masonry reinforcing and connector specified.
- .3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.
- .4 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.

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 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 Wire Reinforcement: To CSA A371 and CSA G30.3.
 - .1 Masonry Veneer Walls: To CSA A370, hot dipped galvanized to ASTM A153, Class B2, 4.76 mm wire diameter, to suit overall wall thickness. BL-42 Ladder Reinforcement and System 2000 Seismic Adjustable Tie by Blok-Lok Ltd.
 - .2 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
- .4 Equivalent products as manufactured by the following manufacturer's may be used subject to submission and acceptance by the Consultant of technical data:
 - .1 Hohmann and Barnard Inc.
- .5 Epoxy Adhesive: Hilti HIT-HY 2270 Adhesive anchor.

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 reinforcement, connectors and anchors in accordance with CSA A371, CSA A23.1 and CSA 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 600 mm 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 Bond walls of two or more wythes using seismic connectors and ladder type reinforcement in accordance with CSA S304, CSA A371 and as indicated.
- .2 Tie masonry veneer to backing in accordance with CSA S304, CSA A371 and as indicated.
- .3 Masonry ties shall be installed as per the requirements of CSA A371 with maximum spacing of 400 mm vertically and 400 mm horizontally.

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.

3.5 Metal Anchors

- .1 Do metal anchors as indicated.

3.6 Lateral Support and Anchorage

- .1 Do lateral support and anchorage in accordance with CSA S304 and as indicated.
- .2 Anchor new masonry to existing with steel dowels as indicated. Drill into existing masonry and set reinforcing bars in epoxy adhesive in accordance with manufacturer's instructions.

3.7 Control Joints

- .1 Terminate reinforcement 25 mm short of each side of control joints unless otherwise indicated.
- .2 Control joints shall be stepped to avoid cutting lintel beams. Under no circumstance shall the control joints be placed to compromise 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 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 27 00 Multiple Wythe Unit Masonry
- .6 Section 05 12 23 Structural Steel
- .7 Section 05 50 00 Metal Fabrications

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C90-22 Standard Specification for Loadbearing Concrete Masonry Units
 - .2 ASTM C129-22 Standard Specification for Nonloadbearing Concrete Masonry Units
 - .3 ASTM C150/C150M-22 Standard Specification for Portland Cement
 - .4 ASTM C207-18 Standard Specification for Hydrated Lime for Masonry Purposes.
 - .5 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness.
 - .6 ASTM D5249-10(2021) Standard Specification for Backer Material for Use with Cold and Hot Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints.
- .2 CSA Group (CSA)
 - .1 CSA A23.1-14/A23.2:19 Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete.
 - .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 S304-14 (R2019) Design of Masonry Structures.
- .3 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.

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 Certificates: submit product certificates signed by manufacturer certifying materials comply with

specified performance characteristics and criteria and physical requirements.

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

1.5 Quality Assurance

- .1 The masonry sub-contractor shall have a minimum of five 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 Pre-installation meeting: conduct pre-installation meeting to verify project requirements manufacturer's instructions and manufacturer's warranty requirements.
- .3 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
 - .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.

1.6 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 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 CSA A23.1.
- .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 Owner.

1.7 Project Conditions

- .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 ° C and 50 ° C until batch is used.
- .4 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.
- .5 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

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 Masonry Units: Concrete Block: Modular, conforming to CCMPA requirements and 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 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.
 - .4 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.
- .2 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. Flexible 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: Conforming to CSA A179.
 - .1 Use same brand of material and source of aggregate for entire project.
 - .2 Aggregate: CSA A179, fine grain aggregates.
 - .3 Cement: normal Portland to ASTM C150, 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.
 - .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 CSA A179, Table 3: Premixed, non-shrink non-metallic grout.
- .7 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 CSA A179. Do not use re-tempered mortars.
- .3 Take representative samples for testing consistency of strength and colour according to CSA A179.

2.3 Accessories

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

PART 3 EXECUTION

3.1 Examination

- .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 CSA A371 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.
- .4 Unless otherwise indicated on the drawings, all interior masonry partitions shall extend from floor level to the underside of floor or roof structures above.

3.3 Installation

- .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. Fill all reinforced cores solid with grout as indicated. Provide cleanout port at bottom of each grouted core when required by Consultant.

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 CSA A371 apply.

3.6 Reinforcement

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

3.7 Loose Steel Lintels

- .1 Install loose steel lintels. Centre over opening width.
- .2 Lintels supplied under Section 05 50 00 – Metal Fabrications.

3.8 Control Joints

- .1 Provide continuous joints as indicated 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.

3.9 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 CSA A179 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.

3.10 Lateral Support and Anchorage

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

3.11 Grouting

- .1 Grout masonry in accordance with CSA S304.1 and as indicated.

3.12 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

3.13 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.

3.14 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.

3.15 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 20 00 Concrete Reinforcing
- .2 Section 03 30 00 Cast-in Place Concrete
- .3 Section 04 05 19 Masonry Anchorage and Reinforcing
- .4 Section 04 22 00 Concrete Unit Masonry
- .5 Section 06 10 00 Rough Carpentry
- .6 Section 07 21 13 Building Insulation
- .7 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .8 Section 07 84 00 Firestopping
- .9 Section 07 92 00 Joint Sealants
- .10 Section 08 11 00 Metal Doors and Frames

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C90-24a Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units
 - .2 ASTM C129-25 Standard Specification for Dry-Cast Nonloadbearing Concrete Masonry Units
 - .3 ASTM C150/C150M-24 Standard Specification for Portland Cement
 - .4 ASTM C207-24 Standard Specification for Hydrated Lime for Masonry Purposes
 - .5 ASTM D2240-15(2021) Standard Test Method for Rubber Property-Durometer Hardness
 - .6 ASTM D5249-10(2021) Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
- .2 American Concrete Institute (ACI)
 - .1 ACI 530.1-05/ASCE 6-05/TMS 602-05 Specification for Masonry Structures.
- .3 CSA Group (CSA)
 - .1 CSA A165 Series-14 (R2019) CSA Standards on Concrete Masonry Units.
 - .2 CSA A179-14 (R2019) Mortar and Grout for Unit Masonry
 - .3 CSA A370-14 (R2018) Connectors for Masonry
 - .4 CSA A3000-18 Cementitious Materials Compendium
 - .5 CSA A371-14 (R2019) Masonry Construction for Buildings.
 - .6 CSA S304-14 (R2019) Design of Masonry Structures
- .4 Canadian Concrete Masonry Producers Association (CCMPA) Quality Assurance Program.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit full range of manufacturer's standard colour samples of coloured mortar for selection of colours by the Consultant.
- .3 Product Data: Submit manufacturer's printed product literature, specifications and data sheets.
- .4 Submit the following samples:
 - .1 Two of each type of concrete masonry units and two concrete masonry units specified.
 - .2 Two of each type of masonry accessory specified.

1.5 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.

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 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.
- .6 Exposed units which become stained or chipped, surface marked or scratched, and materials which are affected by inadequate protection shall be replaced.
- .7 Masonry units shall be delivered to site in protective film and shall be stored without contact with ground or ground water.

1.7 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 °C and 50 °C until batch is used.

1.8 Hot Weather Requirements

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

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 Concrete Masonry Units:
 - .1 Concrete Block: Modular, conforming to CCMPA requirements and CSA A165.
 - .2 H/20/A/M concrete masonry units to be used at all multiple wythe exterior walls.
 - .3 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.

- .4 Exposed block shall all be made by one manufacturer and shall be uniform in colour, shade and texture.
- .2 Facebrick: Concrete brick to CSA A165
 - .1 Brick: Brampton Brick, Dorset Cored Concrete Brick
 - .2 Size: Premier Plus (PRP)
 - .1 Length 257 mm
 - .2 Height 79 mm
 - .3 Depth 90 mm
 - .3 Colour to be selected from full range of manufacturer's standards.
- .3 Masonry Reinforcement and Connectors: Bar Reinforcement, wire reinforcement, connectors and ties: as specified in Section 04 05 19.
- .4 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: Sealtight Cera-Rod by W. R. Meadows Canada Limited.
- .5 Pre-manufactured Masonry Control Joint: Pre-manufactured polyvinyl chloride control joints may be used in lieu of the specified Built-up type of joint. Control joints as manufactured by the following are acceptable:
 - .1 Wall-Tite by Blok-Lok Limited
 - .2 Rapid Control Joint- Wide Flange by Dur-O-Wall Limited
 - .3 Flexible PVC Masonry Control Joint by Greenstreak
- .6 Mortar and Grout:
 - .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 shall be grey.
 - .10 Admixtures of any kind are not allowed except as specified for coloured mortar.
 - .11 Grout: to CSA A179, Table 3.
 - .12 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.
- .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. Mix proprietary mortars in strict accordance with manufacturer's instructions to produce the specified mortar types in accordance with CSA A179. Do not use retempered mortars.
- .2 Admixtures: in accordance with manufacturer's printed directions.
- .3 Use mortar within 2 hours after mixing at temperatures of 26 °C, or 2-1/2 hours at temperatures under 10 °C.
- .4 Take representative samples for testing consistency of strength and colour according to CSA A179.

2.3 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.

2.4 Accessories

- .1 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.
- .2 Cell vents: polypropylene plastic, honeycomb design.
 - .1 Size: to suit.
 - .2 Colour: as selected by Consultant.
- .3 Mortar diverters: shaped and sized to suit cavity spaces.
 - .1 Manufactured from recycled material.
- .4 Mechanical Fasteners: As recommended by manufacturer of material to be fastened, and in accordance with the reference standards, corrosion resistant.
- .5 Packing Insulation: loose glass fibre insulation or mineral wool with minimum density of 17.6 kg/m³.

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 or as noted on drawings.
- .3 Concrete fill for lintels shall be 20 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 CSA A371 except where specified otherwise.
- .2 Refer to structural drawings for additional requirements for load bearing masonry walls.
- .3 Build masonry plumb, level and true to line, with vertical joints in alignment.
- .4 Lay out coursing and bond to achieve correct coursing heights and continuity of bond above and below openings, with minimum cutting.
- .5 Chipped, cracked or stained, and unsatisfactory material or workmanship of all masonry work shall be replaced with undamaged units.
- .6 Co-ordinate work of this Section with others such as, field welding of anchors to steel work, insulation application, installation of conduit and the like. Prepare all items to built-in as the work proceeds, either supplied and installed by other trades or installed under this Section.
- .7 Walls shall be constructed as true planes and when tested with a 3 metre straight edge placed anywhere on the wall in any direction shall be true within 3 mm.
- .8 Variation in the Sizes of Wall Openings: A 6 mm maximum variation is allowed from the actual designated size of wall openings.
- .9 Buttering corners of units, throwing mortar droppings into joints, deep or excessive furrowing of bed joints, will not be 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. Bed and vertical joints shall be evenly and solidly filled with mortar.
- .10 All mortar shall be used and placed in final position within 2 hours of mixing. Mortar not used within this time limit shall be discarded.
- .11 Lay all joints 10 mm thick (uniform) unless otherwise specified or otherwise indicated on drawings. All joints shall be full of mortar except where specifically designated to be left open.
- .12 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.
- .13 Coordinate with Electrical and Mechanical trades and set smooth faced block at locations of all outlets, boxes, switches, thermostats and other devices.

3.3 Blockwork

- .1 Provide special shapes and sizes as required such as halves, jambs, lintels, solids, corners, bullnoses and double bullnoses, semi-solids, ashlar, etc.
- .2 Lay block with webs to align plumb over each other with thick ends of webs up.
- .3 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.
- .4 Do not wet concrete masonry before or during laying in wall.
- .5 Fill all vertical and bed joints, including plain end faces, through the entire wall thickness solidly with mortar.
- .6 Bond intersecting block walls in alternate courses.
- .7 Provide bullnose block at all exposed masonry corners.
- .8 Provide reinforced bond beams where indicated on structural drawings.
- .9 Provide vertical reinforcement as indicated on structural drawings.
- .10 Where walls are pierced by structural members, ducts, pipes, fill voids with mortar to within 20 mm of such members.
- .11 All exposed interior block corners shall be bullnose.

3.4 Exterior Walls

- .1 Exterior wall construction shall be erected as shown on the drawings of exterior concrete brick veneer and concrete block back-up with a nominal 125 mm cavity and 100 mm polyurethane insulation.
- .2 Veneer in double wythe masonry wall construction shall be tied to block backup together with adjustable truss type masonry reinforcing as specified in Section 04 05 19.
- .3 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 built into the first horizontal block joint or bonded to sheathing with adhesive, unless otherwise indicated. Lap all joints 150 mm and seal with adhesive.
- .4 Jointing: allow joints to dry just enough to remove excess water, then tool with round jointer to provide smooth, compressed, uniformly concave joints.

3.5 Air Barriers and Rigid Insulation

- .1 Apply air barriers and rigid polyurethane insulation over exterior face of concrete block inner wythe as specified in Sections 07 21 29 and 07 27 13. Do not proceed with veneer application until sprayed insulation has been inspected and approved.

3.6 Placement – Veneer Wythe

- .1 Use full-size brick units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying. Install cut units with cut surfaces concealed.

- .2 Mixing and Blending: mix masonry units within each pallet and with other pallets to ensure uniform blend of colour, size and texture.
- .3 Comply with tolerances in ACI 530.1-05/ASCE 6-05/TMS 602-05.
- .4 Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.
- .5 Avoid using less-than-half-size units, particularly at corners, jambs, and where possible, at other locations.
- .6 Bond Pattern: Unless otherwise indicated, lay masonry in running bond, do not use units with less than nominal 100 mm horizontal face dimensions at corners or jambs.

3.7 Moisture Control

- .1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.
- .2 Mortar diverters: install purpose made diverters in cavities where indicated and as directed, size and shape to suit purpose and function.

3.8 Reinforcement

- .1 Refer to Section 04 05 19 and structural drawings.

3.9 Connectors

- .1 Refer to Section 04 05 19.

3.10 Control Joints

- .1 Provide continuous joints as indicated.
- .2 Joints shall be full height and thickness of wall and shall be 10 mm wide.
- .3 Break vertical mortar bond with extruded neoprene gasket or building paper.
- .4 Prime control joint to prevent drying out of caulking material.

3.11 Concrete Masonry Lintels

- .1 Install reinforced concrete block lintels over openings in masonry walls where steel or reinforced concrete lintels are not indicated.
- .2 End bearing: not less than 200 mm.
- .3 Refer to Section 04 05 19 and drawings.

3.12 Loose Steel Lintels

- .1 Install loose steel lintels. Centre over opening width. Lintel sizes indicated on structural drawings and supplied under Section 05 50 00.

3.13 Grouting

- .1 Grout masonry in accordance with CSA S304 and as indicated.

3.14 Support of Loads

- .1 Use 20 MPa concrete unless specified otherwise on the Drawings, where concrete fill is used in lieu of solid units. Refer to structural drawings.
- .2 Use grout to CSA A179 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.

3.15 Lateral Support and Anchorage

- .1 Refer to Section 04 05 19.

3.16 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. Bracing of all masonry walls during construction and prior to completion of supporting structures is a mandatory requirement.

3.17 Built-Ins

- .1 Build in items provided by other Sections, including bearing plates, door frames, anchor bolts, sleeves, inserts and loose steel lintels. Build in items to present a neat, rigid, true and plumb installation. Leave wall openings required for ducts, grilles, pipes and other items.
- .2 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.
- .3 Set wall plates on masonry in non-shrink grout in accordance with manufacturer's instructions.
- .4 Do all cutting, fitting, drilling, patching and making good for other trades in masonry work.

3.18 Protection

- .1 Keep masonry dry using secure waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from 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.
- .3 Protect masonry units from damage resulting from subsequent construction operations.
- .4 Use protection materials and methods which will not stain or damage masonry units.
- .5 Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

3.19 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Obtain and follow material manufacturer's written instructions for Cleaning. Test sample area, 3.0 m x 3.0 m, to judge effectiveness of cleaning procedures.
- .3 Keep wall clean and free of mortar stains during laying.
- .4 Protect windows, trim and metal.
- .5 Remove mortar with wood paddles and scrapers before wetting. Saturate masonry with clean water and flush off loose mortar and dirt. Clean masonry work using water, scrubbing brushes and wood paddles only.
- .6 Remove mortar from concrete floor slabs and finished surfaces.
- .7 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 05 31 00 Steel Deck
- .4 Section 05 50 00 Metal Fabrications

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-23 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-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .6 ASTM A1011/A1011M-23 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 G40.20/G40.21-13 (R2018) General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
 - .2 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16:19 Design of Steel Structures.
 - .4 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members
 - .5 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
 - .6 CSA-W48.1-M1991 (R1998) Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
 - .7 CSA-W55.3-08 (R2013) Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-18 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 Anchor Bolts: To CSA-G40.20/G40.21, Grade 300W.
- .5 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.
- .6 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 applied. 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.
 - .5 Do not paint surfaces to receive cementitious fireproofing.
 - .6 Prime steel members to receive Intumescent Fireproofing in accordance with fireproofing manufacturer's recommendations. Refer to Section 07 81 23.
- .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 05 12 23 Structural Steel
- .3 Section 05 21 00 Steel Joists
- .4 Section 05 50 00 Metal Fabrications
- .5 Section 06 10 00 Rough Carpentry
- .6 Section 07 81 16 Cementitious Fireproofing.

1.3 References

- .1 ASTM International, (ASTM)
 - .1 ASTM A653/A653M-25a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- .2 CSA Group (CSA)
 - .1 CSA S16:19 Design of Steel Structures
 - .2 CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members, Includes Update No. 1 (2009), Update No. 2 (2010)
 - .3 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W48:23 Filler Metals and Allied Materials for Metal Arc Welding
 - .5 CSA W55.3-08 Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .6 CSA W59-18 Welded Steel Construction (Metal Arc Welding)
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.181-99 Ready-Mixed Organic Zinc-Rich Coating
- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 10M Standard for Steel Roof Deck.
 - .2 CSSBI 12M Standard for Composite Steel Deck.
 - .3 CSSBI SSF 16-14 Acoustic Properties of Perforated Steel Deck

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Ontario, Canada. Each submission of the shop drawings shall bear the seal of the Engineer.
 - .1 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.
 - .2 Indicate details of temporary shoring of steel deck.
- .3 Submit design calculations if requested by Consultant.

1.5 Design Requirements

- .1 Design steel deck using limit states design in accordance with CSA S136 and CSSBI 10M.

- .2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, and uplift as indicated.
- .3 Deflection under specified live load not to exceed 1/240 of span, except that when gypsum board ceilings are hung directly from deck, live load deflection not to exceed 1/360 of span.
- .4 Design composite deck sections in accordance with the National Building Code of Canada for concrete strength indicated on drawings.
- .5 Where vibration effects are to be controlled as indicated, dynamic characteristics of decking system to be designed to be in accordance with CSA S16.

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 Sheet Steel: ASTM A653 minimum Grade 230 with a base steel design thickness or 0.76 mm or greater and a minimum zinc-iron alloy coating designation of ZF75.
- .2 Closures: in accordance with manufacturer's recommendations.
- .3 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm. Metallic coating same as deck material.
- .4 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 Types of Decking

- .1 Deck shall conform to the depths noted on the drawings.
- .2 Steel roof deck: to CSSBI 10M non-cellular, interlocking side laps. Base steel thickness, depth & profile as shown on the drawings.
- .3 Composite steel floor deck: to CSSBI 12M non-cellular, upright embossed fluted profile, interlocking side lap, base steel thickness, depth & profile as shown on the drawings. Flat sheet for cellular deck, 0.76 mm minimum base steel thickness or as noted on drawings.

PART 3 EXECUTION

3.1 General

- .1 Structural steel work: in accordance with CSA S136 and CSSBI 10M.
- .2 Welding: in accordance with CSA W59, except where specified otherwise.

- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.2 Erection

- .1 Erect steel deck as indicated and in accordance with CSA S136, CSSBI 10M, CSSBI 12M and with reviewed erection drawings.
- .2 Lap ends: to 50 mm minimum.
- .3 Place and support reinforcing steel as indicated.
- .4 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.
- .5 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mil scale and other foreign matter.
- .6 Temporary shoring, if required, to be designed to support construction loads, wet concrete and other construction equipment. Do not remove temporary shoring until concrete attains 75% of its specified 28 day compression strength.

3.3 Closures

- .1 Install closures in accordance with approved details.

3.4 Openings and Areas of Concentrated Loads

- .1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.
- .2 Frame deck openings with any one dimension between 150 to 300 mm as recommended by manufacturer, except as otherwise indicated.
- .3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.5 Connections

- .1 Install connections in accordance with CSSBI recommendations as indicated.

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 07 21 13 Building Insulation
- .2 Section 07 26 00 Vapour Retarders
- .3 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .4 Section 07 46 13 Preformed Metal Siding
- .5 Section 07 46 60 Preformed Metal Soffits

1.3 References

- .1 The National Building Code of Canada.
- .2 The Ontario Building Code.
- .3 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-22 Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - .3 ASTM A879/A879M-22 Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
 - .4 ASTM A1003/A1003M-15 Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members
 - .5 ASTM C955-18e1 Standard Specification for Cold-Formed Steel Structural Framing Members
 - .6 ASTM C1007-20 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories
- .4 American National Standards Institute (ANSI)
 - .1 ANSI/AWSD1.3 Structural Welding Code-Sheet Steel.
- .5 CSA Group (CSA)
 - .1 CSA G164-18 Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .2 CSA S16.1:19 Design of Steel Structures.
 - .3 CSA S136:16 North American Specification for the Design of Cold-Formed Steel Structural Members
 - .4 CSA W47.1:19 Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA W59-18 Welded Steel Construction (Metal-Arc Welding).
 - .6 CSA W178.1-18 Certification of Welding Inspection Organizations
 - .7 CSA W178.2-18 Certification of Welding Inspectors
- .6 Canadian General Services Board (CGSB)
 - .1 CGSB 1-GP-181M Standard for Coating, Zinc Rich, Organic Ready Mix.
- .7 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 51-06 Lightweight Steel Framing Design Manual
 - .2 CSSBI S6-90 Guide Specification for Lightweight Steel Framing

1.4 Submittals

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

- .2 Submit shop drawings indicating layout and details of fabrication and erection. Indicate member sizes and gauges of materials, framing, method of fastenings, spacing of all members, bridging and bracing. Indicate design loads.
- .3 Indicate all framing systems including exterior and interior framing and soffits.
- .4 Lightweight steel framing systems shall be designed by, and each shop drawing shall bear the stamp of a registered Professional Engineer licensed to practice in the Province of Ontario. Each submission of the shop drawings shall bear the seal of the Engineer.
- .5 Submit engineering design calculations or data verifying the capacity of the members and the ability of the assemblies to meet the design requirements.
- .6 Detail welded connections using standards symbols for welded joints as published in current CISC Handbook of Steel Construction.
- .7 Submit field review reports specified in Section 3.7 within 3 working days of each inspection. Reports shall be submitted directly from the Design Engineer to the Consultant.
- .8 Submit mill test reports covering chemical and mechanical properties of steel, and coating designation.
- .9 Inspection Reports: Inspection and Testing company shall:
 - .1 Submit reports at least weekly when the work of this Section is in progress.
 - .2 Distribute inspection reports as follows:
 - .1 General Contractor.
 - .2 Consultant.
 - .3 Owner.
 - .4 Lightweight Steel Framing fabricator.
 - .3 Sign report by inspector who performs inspection, describing progress of work, deficiencies observed and corrective action taken.
 - .4 Include deficiency list of outstanding items from previous reports, and comment on status.

1.5 Qualifications

- .1 Contractor undertaking work of this Section shall have a minimum of 5 years of experience in lightweight steel framing.
- .2 Design of lightweight steel framing shall be by a Professional Engineer licensed in the Province of Ontario, experienced in lightweight steel framing design.
 - .1 Lightweight steel framing design engineer shall be insured against 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.
- .3 Consultant will review lightweight steel framing to verify general conformance with overall design concept of the structure.
- .4 Companies engaged in welding shall be certified by the Canadian Welding Bureau to CSA Standard W47.1. Companies shall have welding procedures approved and welders qualified for the base material types and thicknesses that are to be welded.
- .5 Undertake welding only by fabricators certified by Canadian Welding Bureau under Division 1 or 2.1. Use welders qualified for the base material types and thicknesses that are to be welded.

1.6 Design

- .1 Design shall be based on Limit States Design Principles using factored loads and resistances.
- .2 Loads and load factors shall be in accordance with the National Building Code of Canada.
- .3 Resistances and resistance factors shall be determined in accordance with the National Building Code and CSA S136.
- .4 Maximum allowable deflection of metal studs under specified loads shall be $L/240$.
- .5 Design bridging as necessary to align members during erection, and to provide necessary structural integrity during construction and in the completed structure. Design bridging to prevent member rotation and translation perpendicular to the minor axis.
- .6 Design lintels over all openings in accordance with the National Building Code.
- .7 Design components or assemblies to accommodate specified erection tolerances.
- .8 Member spacing shall not exceed the spacing indicated on the drawings.
- .9 Allow for movement of the structure. Design wind bearing stud end connections to accommodate floor/roof deflections such that the studs are not loaded axially.
- .10 Connections between lightweight steel framing members shall be by bolts, welding or sheet metal screws.
- .11 Resistances for sheet metal screws shall be based on the manufacturer's lower bound test values multiplied by the appropriate resistance factor, ϕ_c , given in CSA S136.
- .12 Provide bridging at spacing to satisfy structural requirements, but not at greater than the following: at the lesser of 1500 mm or $1/4$ of span, for joists and rafters.
- .13 Neglect contribution of sheathing to restrain member rotation and translation perpendicular to the minor axis.
- .14 Design bracing system to limit lateral deflections of building components under wind or seismic load to $height/500$.
- .15 Use bolts, welding or sheet metal screws to make connections between lightweight framing members.
- .16 Determine sheet metal screw capacities in accordance with CSA S136.

1.7 Protection

- .1 Provide and maintain adequate temporary bracing for all work of this Section until permanent lateral support is in place.

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 Metal Stud Framing

- .1 Steel to ASTM A1003 Minimum grade, Grade 'D', 50 ksi yield, galvanized Z180 coating.
- .2 Thickness, exclusive of coating: not less than 1.22 mm. Use thicker material where required by Engineered design to satisfy structural requirements. Comply with thickness tolerance requirements of CSA S136. Material thicknesses shall be greater than or equal to the specified thicknesses with underruns not to exceed the tolerance requirements of CSA S136.
- .1 Thicknesses of framing members specified or indicated on drawings is exclusive of galvanized coating.
- .3 Stud sizes as indicated on the drawings.
- .4 Provide all necessary tracks, bridging, fasteners, hardware and other accessories as required for a complete installation.
- .5 Provide double or triple stud arrangements at locations where support of interior or exterior fixtures, fittings and accessories is required.
- .6 Zinc Rich Paint: zinc rich, organic, ready mix to CAN/CGSB 1.181. Low VOC type.

2.2 Fastenings

- .1 Sheet Metal Screws: self-tapping with a minimum coating thickness of 0.008 microns of zinc or cadmium. Screws shall have low profile heads where covered by sheathing.
- .2 Welding Electrodes: to CSA W59, 480 mPa minimum tensile strength series.
- .3 Anchors: appropriate anchors sized to suit loads, substrate material, and edge distances, manufactured by Hilti Canada or Confast, installed as per manufacturer's recommendations.

PART 3 EXECUTION

3.1 General

- .1 Fabrication and erection shall conform to the reviewed shop drawings. Modifications required to accommodate as-built conditions (other than minor dimensional changes) shall be submitted for review.
- .2 Provide Lightweight Steel Framing systems at exterior soffit locations where indicated.

3.2 Welding

- .1 Welds shall conform to CSA W59.

- .2 For metal less than 3.0 mm thick, shop drawings may show nominal weld leg sizes. For such material, the effective throats of welds shall not be less than the thickness of the thinnest connected part.

- .3 Touch-up welds with zinc rich paint.

3.3 Screws

- .1 Steel screws shall equal or exceed the minimum diameter indicated on the shop drawings.
- .2 Penetration beyond joined materials shall be not less than 3 exposed threads.

3.4 Fabrication

- .1 Where specified, provide cut-outs centred in the webs of members to accommodate services. Unreinforced cut-outs shall be limited to the dimensions in CSSBI 51-06. The effect of cut-outs on the strength and stiffness of the member shall be considered.
- .2 Fabrication tolerances for members shall conform CSSBI 51.
- .3 The steel thickness exclusive of coating shall be marked on each member by embossing, stamping with indelible ink or by colour coding.

3.5 Erection

- .1 Comply with requirements of ASTM C1007.
- .2 Lightweight steel framing shall be erected true and plumb within the specified tolerances.
- .3 Temporary bracing shall be employed wherever necessary to withstand all loads to which the structure may be subject during erection and subsequent construction. Temporary bracing shall be left in place as long as required for the safety and integrity of the structure. Ensure that during erection, a margin of safety consistent with the requirements of the National Building Code and CSA S136 exists in the uncompleted structure.
- .4 Erection Tolerances:
 - .1 For the purposes of this Section, camber is defined as the deviation from straightness of a member or any portion of a member with respect to its major axis, and sweep is defined as the deviation from straightness of a member or any portion of a member with respect to its minor axis.
 - .2 For axial load bearing studs, out of plumbness and out of straightness (camber and sweep) shall not exceed 1/1000th of the member length.
 - .3 For wind bearing studs, out of plumbness shall not exceed 1/500th of the member length.
 - .4 For track, camber shall not exceed 1/1000th of the member length.
 - .5 Studs shall seat into top and bottom tracks. The gap between the end of the stud and the web of the track shall not exceed 1.6mm for axial load bearing studs or 5 mm for wind bearing studs.
 - .6 Spacing of studs shall not be more than 3.0mm from the design spacing. The cumulative error in spacing shall not exceed the requirements of the finishing materials.
- .5 Make all field measurements necessary to insure the proper fit of all members.
- .6 Cutting of members may be by saw or shear. Torch cutting is not permitted.

- .7 Holes that are field cut into lightweight steel framing members shall conform to the requirements of CSSBI 51.
- .8 Splicing of axial load bearing members is not permitted.
- .9 Thoroughly inspect installation prior to application of covering materials and touch up all scratched or otherwise damaged surfaces with a heavy coating of zinc rich paint.

3.6 Inspection

- .1 The lightweight steel framing Design Engineer, responsible for the production of the shop drawings, shall provide periodic field review during construction and shall submit reports in accordance with Section 1.4.
 - .1 The cost of this field review shall be paid for by the Contractor.

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 05 19 Masonry Anchorage and Reinforcing
- .3 Section 04 22 00 Concrete Unit Masonry
- .4 Section 04 27 00 Multiple Wythe Unit Masonry
- .5 Section 06 10 00 Rough Carpentry
- .6 Section 09 21 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A53/A53M-22 Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.
 - .2 ASTM A307-21 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .3 ASTM A1008/A1008M-23e1 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High Strength Low Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
 - .4 ASTM C1107/C1107M-20 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - .5 ASTM D1187/D1187M-97(2018) Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
 - .6 ASTM F3125/F3125M-23 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-S16.1-M Limit States Design of Steel Structures.
 - .3 CSA S136-12 Cold Formed Steel Structural Members.
 - .4 CSA W47.1-09 (R2014) Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA W59-18 Welded Steel Construction
 - .6 CSA W178.1-18 Certification of Welding Inspection Organizations
 - .7 CSA W178.2-18 Certification of Welding Inspectors
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer
- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .5 Steel Structures Painting Council, Systems and Specifications Manual.
 - .1 CISC/CPMA 1-73a-1975 A Quick drying One-coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA 2-75-1975 A Quick Drying Primer for Use on Structural Steel.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit Shop and Erection Drawings for review.

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

1.5 Qualifications

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

1.6 Design Requirements

- .1 Elevator pit access ladders shall meet requirements of the elevator supplier and TSSA.

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.
- .4 Protect architecturally exposed materials during fabrication, delivery, handling, storage and erection to prevent marring of surfaces exposed to view, by marking, bending, denting or coarse grinding.

1.9 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

- .1 Structural Steel Sections and Steel Plate: CSA G40.20-13/G40.21-13, Grade 350W.
- .2 Architectural and Miscellaneous Mild Steel: CSA G40.20-13/G40.21-13, Grade 300W.
- .3 High Strength Bolts and Nuts: ASTM F3125. Dimensions, sizes, thread, strength, quality and type of items shall be designed for the work intended. Exposed fasteners and anchors shall be same material, colour and finish as the metal to which they are applied.
- .4 Steel Pipe: ASTM A53 Schedule 40, Grade B.
- .5 Welding Materials: CSA W59.
- .6 Welding Electrodes: CSA W48 Series.
- .7 Grout: non-shrink, non-metallic, non-stain, flowable, to ASTM C1107, 15 MPa at 24 hours.
- .8 Isolation Coating: Alkali resistant bituminous paint to ASTM D1187.
- .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 Primers: All primers for metal fabrications are to be factory applied under the requirements of this Section. Refer to Finish Schedules in Section 09 91 23 for types of primers required for each application. Colour to be grey.

PART 3 EXECUTION

3.1 Fabrication

- .1 Fabricate to reviewed shop drawings and in general to details, sizes and materials indicated on drawings and specified herein.
- .2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .3 Fabricate work complete with all components required for anchoring; bolting or welding to structural frame; standing free or resting in frames or sockets; in a safe and sure manner.
- .4 Where possible fit and shop assemble various sections of the work and deliver to site in largest practicable sections. Where shop fabricating is not possible, make trial assembly in shop.
- .5 Ensure exposed welds are continuous for length of each joint.
- .6 Grind and fill all welds after inspection and acceptance and leave ready for prime painting.
- .7 Fill all open joints, depressions, seams with metallic paste filler or by continuous brazing or welding and grind smooth to true sharp arises and profiles.

- .8 Fit joints and intersecting members accurately. Make work in true planes with adequate fastenings.
- .9 Supply all fastenings, anchors, accessories required for fabrication and erection of work of this Section. Make thread dimensions such that nuts and bolts will fit without re-threading or chasing threads.
- .10 Welding shall be done by the shielded metal-arc method in accordance with the requirements CSA W59. The welding operators shall be currently certified under CSA W47.1 for the work they are performing.
- .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 Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter. Where weld material is deposited in two 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.
- .13 Appearance, quality of welds made, methods of correcting defective work shall be in accordance with CSA W59.

3.2 Shop Painting

- .1 Cleaning Steel:
 - .1 Clean steel, whether it is to be painted or not, to the degree required by CISC/CPMA 1-73a, except as specified below.
 - .2 Steel to receive a shop or field paint finish shall be cleaned in accordance with Sections 09 91 23 or SSPC SP6, whichever produces a surface which has less rust and mill scale.
 - .3 Clean steel which is specified to be painted to CISC/CPMA 2-75 in accordance with that Standard.
 - .4 Clean welds by wire brushing and wash down with clean water, to remove the chemical residues left by the electrodes, prior to painting.
- .2 The following surfaces shall not be painted:
 - .1 Surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 50 mm on all sides of the joint, to ensure proper fusion of the metal.
 - .2 The contact surfaces of friction type connections assembled by high strength bolts.
 - .3 Portions of steel members which are to be encased in or in contact with concrete or masonry.
- .3 Preparation and priming of all metal work which will be exposed to view and which is scheduled to be finish painted, shall be in accordance with the requirements of Section 09 91 23.
- .4 All other concealed or unpainted ferrous metal work shall be given one prime paint coat type CGSB 1.40 and in accordance with CISC/CPMA 2-75. Work paint into all corners and all joints. Metal parts in contact shall be primed before shop assembly. Priming damaged during erection or through lack of protection shall be cleaned and touched up.
- .5 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 ° C.
- .6 Metals in contact with other dissimilar metals, concrete or masonry materials shall be insulated or separated from one another to prevent corrosion, staining or electrolysis by use of bituminous

paint.

3.3 Angle Lintels

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

3.4 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 Interior ladders shall be prime painted.
 - .5 Elevator pit access ladder shall meet all requirements of the elevator supplier and TSSA. Rungs shall have knurled rungs or non-slip paint finish.

3.5 Miscellaneous Steel Trim

- .1 Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- .2 Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - .1 Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

3.6 Installation

- .1 Supervise the setting of bases, anchor bolts, and other steel to concrete connections. Cutting of base plates to accommodate anchor bolts is cause for rejection of base plates.
- .2 Provide all bracing and shoring required to support the work of this Section during installation.
- .3 Work shall be fabricated and erected square, plumb and true, straight, level and accurately fitted to size detailed on reviewed Shop Drawings. All joints shall be welded unless otherwise indicated. Exposed welds shall be ground smooth and/or flush. Exposed work shall be finished smooth and even, close joints and neat connections. Exposed welds continuous for full length of joints.

- .4 Where anchors or fastenings, sleeves, have to be built in by other trades, supply all necessary templates, instructions and supervision to ensure satisfactory installation.
- .5 Do all drilling, cutting and fitting necessary to attach this work to adjoining work and make it complete.
- .6 Provide all components required for anchoring. Make anchoring in concealed manner where possible. Exposed anchors shall be approved by the Consultant, shall be neat, and of the same material, colour, texture and finish of base metal on which they occur. Exposed fastenings shall be evenly spaced.
- .7 Grind all field welds smooth.
- .8 Touch up shop coat of prime paint where damaged by field erection.

3.7 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.
- .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.

3.8 Schedule

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

interferences with the work of other Sections will occur.

3.9 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 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 06 20 00 Finish Carpentry
- .6 Section 07 21 13 Building Insulation
- .7 Section 07 46 13 Preformed Metal Siding
- .8 Section 07 52 00 Modified Bituminous Roofing
- .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-23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) 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 F1667-21a 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 O86:24 Engineering Design in Wood
 - .6 CSA O121-17 Douglas Fir Plywood.
 - .7 CSA O141:23 Canadian Standard 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 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.
- 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.
 - .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 Wood Preservative to CSA O80 SERIES.
 - .9 Adhesive: Contractors gun grade cartridge loaded wood adhesive, general purpose, to ASTM D2559.

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

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 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.
- .4 Backing
 - .1 Backing in Metal Stud Assemblies - coordinate installation and locations with Drawings and in accordance with the following:
 - .1 Install 19 mm CSP G1S plywood between metal stud assemblies on all walls receiving wall-mounted equipment
 - .2 Minimum 2 stud spaces or 1220-mm wide x 1200-mm long panels
 - .3 Fit plywood between metal studs
 - .4 Kerf front of plywood panels to fit plywood face flush with front face of metal studs.
- .5 Roof Blocking, Curbs and Copings:
 - .1 Provide and install framing, blocking, curbs and copings as indicated on the drawings. Anchor blocking securely in permanent manner.
 - .2 Provide minimum 10 mm Douglas Fir plywood copings on all built-up wood copings and curbs as detailed.
 - .3 All wood curbs shall be filled with fibrous insulation specified in Section 07 21 13.
 - .4 Provide shims and blocking necessary for levelling of roof hatches and equipment curbs.

3.1 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 21 13 Building Insulation
- .3 Section 07 92 00 Joint Sealants
- .4 Section 33 46 13 Foundation Drainage

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C836/C836M-18(2022) Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
 - .2 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
 - .3 ASTM D570-22 Standard Test Method for Water Absorption of Plastics
 - .4 ASTM D882-18 Standard Test Method for Tensile Properties of Thin Plastic Sheet
 - .5 ASTM D903-98(2017) Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - .6 ASTM D1876-08(2023) Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
 - .7 ASTM D1970/D1970M-21 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - .8 ASTM D3767-03(2020) Standard Practice for Rubber - Measurement of Dimensions
 - .9 ASTM D5385/D5385M-20 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
 - .10 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
 - .11 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

1.4 Submittals

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

1.5 Quality Assurance

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

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

1.6 Shipping, Handling and Storage

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

1.7 Project Conditions

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

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet Membrane Waterproofing: BITUTHENE 3000 Membrane/Low Temperature Membrane as manufactured by GCP Applied Technologies; self-adhesive, cold-applied composite sheet consisting of a thickness of 1.4 mm of rubberized asphalt and 0.1 mm of cross-laminated, high density polyethylene film. Provide rubberized asphalt membrane covered with a release sheet,

which is removed during installation and no special adhesive or heat shall be required to form laps.
Provide membrane with the following physical properties:

.2 Physical Properties:

Property	Test Method	Typical Value
Colour		Dark gray-black
Thickness	ASTM D3767 Method A	1.5 mm nominal
Flexibility, 180° bend over 25 mm mandrel at -32°C	ASTM D1970	Unaffected
Tensile Strength, Membrane Die C	ASTM D4121	2240 kPa minimum
Tensile Strength, Film	ASTM D8821	34.5 MPa minimum
Elongation, Ultimate Failure of Rubberized Asphalt	ASTM D4121	300% minimum
Crack Cycling at -32°C, 100 Cycles	ASTM C836	Unaffected
Lap Shear	ASTM D10022	89 N minimum
Peel Strength	ASTM D903	1576 N/m minimum
Puncture Resistance, Membrane	ASTM E154	222 N minimum
Resistance to Hydrostatic Head	ASTM D5385	>70 m of water
Permeance	ASTM E 96, Section 12 – Water Method	<0.1 perms
Water Absorption	ASTM D570	0.1% maximum

.3 Products which meet the referenced requirements and are manufactured by the following are acceptable subject to acceptance by the Consultant of manufacturer's material data sheets, specifications and installation instructions:

- .1 Bakor
- .2 Soprema

2.2 Accessories

- .1 Drainage Sheet: as specified in Section 33 46 13.
- .2 Asphalt Hardboard: Premoulded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two layers of 3 mm thick hardboard or one layer of 6 mm thick hardboard.
- .3 Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

PART 3 EXECUTION

3.1 Examination

- .1 Examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 Preparation of Substrates

- .1 Prepare substrates in accordance with manufacturer's recommendations. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.
- .2 Cast-In-Place Concrete Substrates:
 - .1 Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
 - .2 Fill form tie rod holes with concrete and finish flush with surrounding surface.
 - .3 Repair bugholes over 13 mm in length and 6 mm deep and finish flush with surrounding surface.
 - .4 Remove scaling to sound, unaffected concrete and repair exposed area.
 - .5 Grind irregular construction joints to suitable flush surface.

3.3 Installation

- .1 Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:
 - .1 Apply primer at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
 - .2 Delay application of membrane until primer is completely dry. Dry time will vary with weather conditions.
 - .3 Seal daily terminations with troweled bead of mastic.
 - .4 Apply protection board and related materials in accordance with manufacturer's

3.4 Protection

- .1 Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.
- .2 Inspect for damage just prior to installation of subsequent construction activities and make repairs in accordance with manufacturer's recommendation.

3.5 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.

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 06 10 00 Rough Carpentry
- .4 Section 07 13 25 Self-Adhered Sheet Waterproofing
- .5 Section 07 26 00 Vapour Retarders
- .6 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .7 Section 07 46 13 Preformed Metal Siding
- .8 Section 07 52 00 Modified Bituminous Roofing
- .9 Section 07 92 00 Joint Sealants
- .10 Section 08 11 00 Metal Doors and Frames
- .11 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C578-22 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - .2 ASTM C612-14(2019) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
 - .3 ASTM C1620-16(2023) Standard Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants
 - .4 ASTM D1621-16(2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - .5 ASTM D1623-17(2023) Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
 - .6 ASTM E1677-19 Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls
 - .7 ASTM E84-26 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 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.
- .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 Minimum 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 Rigid Cavity Wall Insulation
 - .1 To ASTM C578 – Standard Specification for Rigid Cellular Polystyrene Thermal Insulation and ULC 701.1 Type 3, Insulation shall have a minimum compressive strength of 103 KPa, RSI value of not less than 0.88/25 mm and a moisture absorption rate of not more than 0.3% by volume. Insulation boards shall be thickness as detailed, 600 x 2400 mm with butt edges.
 - .2 DuPont Styrofoam Cavitymate Extruded Polystyrene Insulation.

2.2 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 Thermafiber Ultrabatt
 - .3 Roxul Batt Insulation.

2.3 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.

2.4 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 Adhesives: As recommended by material manufacturer, compatible with insulation and substrate membrane, waterproof,
- .5 Joint Tape: Joint tape suitable for use with foil facers. Ensure compatibility prior to use by field testing.
- .6 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 Underslab Insulation

- .1 Under slab application: Following backfilling and prior to placement of underslab vapour barriers, install horizontal insulation. Install rigid insulation for extent as indicated. Lay boards on level compacted fill. Tightly butt joints. Stagger joints in multiple layers as indicated.
- .2 Extend boards as indicated on Drawings, and as follows:
 - .1 Lay boards on level compacted fill.
 - .2 Protect top surface of horizontal insulation from damage during concrete work.
- .3 Load Bearing Insulation: Install in accordance with manufacturer's instructions. Install board insulation horizontally having a minimum compressive strength of [275 kPa][410 kPa][690 kPa][on level compacted fill][within driveway ramps][to locations indicated on Drawings]
- .4 Tape joints of underslab insulation and fill with 2 lb spray insulation.

3.4 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.

3.5 Cavity Wall Insulation

- .1 Install polystyrene insulation boards on outer surface of inner wythe of wall cavity on bed of adhesive.

3.6 Batt Insulation

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces. Ensure that insulation is kept dry and not compressed.
- .2 Install insulation in spaces as shown on drawings.
- .3 Install batt insulation in built up wood roof curbs where detailed.
- .4 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.
- .5 Pack loose insulation into voids around mechanical and electrical pipes and ducts where they pass through walls and slabs.

3.7 Spray Foam Insulation

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

3.8 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 07 21 13 Building Insulation
- .3 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E96/E96M-22ae1 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(2023) 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 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 for Below Concrete Slabs on Grade

- .1 Vapour retarder membrane shall be manufactured from virgin polyolefin resins, and when tested according to all requirements of ASTM E1745, shall meet the following minimum performance requirements:
 - .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.
 - .2 Puncture Resistance (ASTM D1709): >3,200 grams.
 - .3 Tensile Strength ASTM E154, Section 9: 72 Lb. Force/Inch
 - .4 Acceptable product:
 - .1 Perminator 15 mil, as manufactured by W.R. Meadows
 - .2 Stego Wrap Vapor Barrier by Stego Industries LLC.
- .2 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm.
 - .1 Perminator Tape by W.R. Meadows
 - .2 Stego Tape by Stego Industries LLC.
- .3 Pipe Collars: Construct pipe collars from vapour retarder material and pressure sensitive tape per manufacturer's instructions.
- .4 Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 100 mm.
 - .1 Perminator Tape by W.R. Meadows

- .2 Stego Tape by Stego Industries LLC.
- .5 Pipe Collars: Construct pipe collars from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 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 03 30 00 Cast-in-Place Concrete
- .2 Section 09 65 19 Resilient Tile Flooring

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C78/C78M-22 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
 - .2 ASTM C109/C109M-21 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
 - .3 ASTM C1583/C1583M-20 Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
 - .4 ASTM D1308-20 Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems
 - .5 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
 - .6 ASTM F710-22 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 - .7 ASTM F2170-19a Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Test Results: submit moisture vapour emission test data.
- .3 Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

1.5 Quality Assurance

- .1 Installation of the products must be completed by a manufacturer's certified applicator.
- .2 Manufacturer Experience: Provide products of this section by companies which have successfully specialized in production of this type of work for not less than 5 years.

1.6 Project Conditions

- .1 Do not install material below 10 °C surface and air temperatures. These temperatures must also be maintained during and for 48 hours after the installation of products included in this section.

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 products in original packaging, labeled with product identification, manufacturer, batch number and shelf life.
- .4 Store products in a dry area with temperature maintained between 10 ° and 29 °C and protect from direct sunlight.
- .5 Handle products in accordance with manufacturers printed recommendations.

1.8 Waste Management and Disposal

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

1.9 Warranty

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

PART 2 PRODUCTS

2.1 Topical Moisture Mitigation System

- .1 Two-Coat Moisture Control System for Concrete:
 - .1 Acceptable Products: ARDEX MC PLUS; Manufactured by ARDEX Engineered Cements: 400 Ardex Park Drive, Aliquippa, Pa 15001 USA 724-203-5000
 - .2 Performance and Physical Properties: Meet or exceed the following values for material cured at 21° C+/-3°C and 50% +/-5% relative humidity:
 - .1 Application: Roller
 - .2 Permeability: 0.12 perms (<.10 perms with sand in 2nd Coat), ASTM E96
 - .3 14 pH solution: No effect, ASTM D1308
 - .4 VOC: 0g/l, calculated SCAQMD 1168

2.2 Hydraulic Cement Underlayment

- .1 Hydraulic Cement-based Self-Leveling Underlayment
 - .1 Acceptable Products:
 - .1 ARDEX K 15; Manufactured by ARDEX Engineered Cements: 400 Ardex Park Drive, Aliquippa, Pa 15001 USA, (724) 203-5000, www.ardex.com
 - .1 Primer: No additional primer required
 - .2 ARDEX K 55, Manufactured by ARDEX Engineered Cements: 400 Ardex Park Drive, Aliquippa, Pa 15001 USA, (724) 203-5000, www.ardex.com
 - .1 Primer: No additional primer required
 - .2 Performance and Physical Properties: Meet or exceed the following values for material cured at 21° C+/-3°C and 50% +/-5% relative humidity:
 - .1 Application: Barrel Mix or Pump
 - .2 Flow Time: 10 minutes

- .3 Initial Set: Approx. 30 minutes
- .4 Final Set: Approx. 90 minutes
- .5 Compressive Strength: Minimum 4100 psi at 28 days, ASTM C109M.
- .6 Flexural Strength: 1000 psi at 28 days, ASTM C78.
- .7 VOC: 0 g/l, calculated SCAQMD 1168

2.3 Water

- .1 Water shall be clean, potable, and sufficiently cool (not warmer than 20 °C).

PART 3 EXECUTION

3.1 Preparation

- .1 Concrete Subfloors: Prepare substrate in accordance with manufacturer's instructions and ASTM F710. All concrete subfloors must be sound, solid, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bond breaker before application.
 - .1 Mechanical preparation of the surface is required to obtain a minimum ICRI concrete surface profile of 3 (CSP 3). This substrate preparation must be by mechanical means, such as shot blasting.
 - .2 The concrete must have a minimum tensile strength of at least 200 psi when tested in accordance with ASTM C1583. The concrete surface must be free of standing water.
 - .3 Prior to beginning the installation, measure the relative humidity within the concrete (ASTM F2170). Alternatively, measure the surface relative humidity in accordance with ASTM F2420. For these relative humidity methods, the RH shall not exceed 100%.
 - .4 If the concrete substrate is too uneven to provide a uniform film thickness of the moisture control system (typically CSP 6 or higher), the substrate shall be pre-smoothed using self-leveling exterior concrete topping or moisture resistant patch.
- .2 Joint Preparation
 - .1 Moving Joints: honour all expansion and isolation joints up through the moisture mitigation system and underlayment.
 - .2 Saw Cuts and Control Joints – fill all non-moving joints with joint filler as recommended by the manufacturer.

3.2 Application

- .1 Examine substrates and conditions under which materials will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.
- .2 Coordinate installation with adjacent work to ensure proper sequence of construction. Protect adjacent areas from contact due to mixing and handling of materials.
- .3 Mix and apply primer and sealer in accordance with manufacturer's written instructions.

3.3 Field Quality Control

- .1 Where specified, field sampling is to be done by taking an entire unopened bag/unit of the product being installed to an independent testing facility to perform testing. There is no in-situ test method applicable for this system.

3.4 Cleaning

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

3.5 Protection

- .1 Prior to the installation of the finish flooring, the surface of the underlayment shall be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 27 00 Multiple Wythe Unit Masonry
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 21 13 Building Insulation
- .4 Section 07 46 13 Preformed Metal Siding
- .5 Section 07 52 00 Modified Bituminous Roofing
- .6 Section 07 62 00 Sheet Metal Flashing and Trim
- .7 Section 07 92 00 Joint Sealants

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .2 ASTM D624-00(2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
 - .3 ASTM D4541-22 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - .4 ASTM E96/E96M-22ae1 Standard Test Methods for Water Vapor Transmission of Materials
 - .5 ASTM E330/E330M-14(2021) Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 - .6 ASTM E783-02(2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 - .7 ASTM E1186-22 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 - .8 ASTM E2178-21a Standard Test Method for Air Permeance of Building Materials
 - .9 ASTM E2357-18 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-56M, Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing
- .3 National Air Barrier Association (NABA)
 - .1 National Air Barrier Association's (NABA) Quality Assurance Program (QAP)

1.4 Submittals

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

1.5 Performance Requirements

- .1 Select and install wall components and assemblies to resist air leakage caused by static air pressure across exterior wall assemblies, including windows, glass, doors, and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.01 L/s.m² when subjected to pressure differential of 75 Pa as measured in accordance with ASTM E783, and ASTM E330.
- .2 Select and install wall components and assemblies to resist air leakage caused by dynamic air pressure across exterior wall assemblies, including windows, glass, doors and other interruptions to integrity of wall systems; to maximum air leakage rate of 0.013 L/s.m² when subjected to hourly wind design loads in accordance with NBC, using 1 in 10 year probability, as measured in accordance with ASTM E783 and ASTM E330.
- .3 If ongoing testing is required throughout air barrier system installation, perform qualitative testing methods in accordance with ASTM E1186 and ASTM D4541.
- .4 Provide continuity of air barrier materials and assemblies in conjunction with materials described in other Sections.

1.6 Quality Assurance

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

be cut through to separate the material attached to the disc from the surrounding material. Perform test after curing period recommended by the material manufacturer. Record mode of failure and area where the material failed in accordance with ASTM D4541. When the material manufacturer has established a minimum adhesion level for the product on the substrate, the inspection report shall indicate whether this requirement has been met. Where the material manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.

1.7 Sequencing

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

1.8 Shipping, Handling and Storage

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

1.9 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Material

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

2.2 Membranes

- .1 Self-adhered air barrier membrane shall SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film, and having the following physical properties:
 - .1 Thickness: 1.0 mm minimum.
 - .2 Air leakage: <0.01 L/s.m² @ 75 Pa to ASTM E283
 - .3 Vapour permeance: 1.6 ng/Pa.m².s to ASTM E96
 - .4 Low temperature flexibility: -30° C to CGSB 37-GP-56M
 - .5 Elongation: 200% to ASTM D412.
- .2 Acceptable Products:
 - .1 Blueskin SA by Henry Company.
 - .2 Perm-A-Barrier by W.R. Grace & Co.
 - .3 Air Shield by W.R. Meadows
 - .4 ExoAir 110 by Tremco
 - .5 Sopraseal Stick 1100T by Soprema

2.3 Adhesives and Primers

- .1 As recommended by manufacturer.

2.4 Mastics and Termination Sealants

- .1 As recommended by manufacturer.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 General

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

3.3 Examination

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

3.4 Preparation

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

3.5 Installation

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

- .5 Cut sheet membrane into manageable sizes, position membrane for alignment prior to removing protective film.
- .6 Install membrane horizontally, in a shingle fashion starting at lowest point. Position membrane and remove protective film and press firmly into place. Ensure minimum 50 mm overlap at all end and side laps. Promptly roll the membrane surface and all laps with a countertop roller to ensure proper surface bond and effect the seal.
- .7 Tie-in to window frames, door frames, roofing systems, cladding, concrete walls, and at the interface of dissimilar materials as indicated or as necessary to achieve a continuous air seal throughout the building envelope. Seal with air barrier tape. Refer to manufacturer's standard details.
- .8 All joints, interconnections, and penetrations of the air barrier components including lighting fixtures shall be indicated on manufacturer's standard details.
- .9 Ensure all projections are properly sealed with a trowel or caulk application of specified sealant.

3.6 Inspection and Repair

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

3.7 Cleaning and Protection

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 41 00 Structural Metal Stud Framing
- .2 Section 05 50 00 Metal Fabrications
- .3 Section 06 10 00 Rough Carpentry
- .4 Section 07 21 13 Building Insulation
- .5 Section 07 27 13 Modified Bituminous Sheet Air Barriers.
- .6 Section 07 52 00 Modified Bituminous Roofing
- .7 Section 07 62 00 Sheet Metal Flashing and Trim
- .8 Section 07 92 00 Joint Sealants

1.3 References

- .1 The National Building Code of Canada.
- .2 ASTM International (ASTM)
 - .1 ASTM A653/A653M-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 Wall Panel:
 - .1 Vicwest AD300-R. 300 mm x 38 mm deep.
 - .2 C.N.T. 0.76 mm.
 - .3 Zinc Coating Designation Z275.
 - .4 Zinc Coating Designation Z275.
- .3 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.
- .4 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.cascadiaclick.com.
 - .4 Ensure thermal spacer type is selected to accommodate orientation of vertical and horizontal sub-framing.
- .5 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.

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 thermal spacers, girts, trim, flashings, insulation and metal cladding as indicated.
- .6 Fasten sub-framing to backup with self-tapping screws or masonry anchors of sufficient length to penetrate a minimum of 19 mm into the structure. Locate sub framing at maximum 1200 mm centres but not more than required to support applied wind loads.
- .7 Apply a continuous bead of caulking on faces of all supports and at top, bottom and ends of cladding to provide a complete seal.

- .8 On lapped joints, caulk continuously between laps to provide a complete water seal.
- .9 Bed all flashings, closures and corner pieces in sealant to provide a weather tight installation.
- .10 Caulk all openings, joints and around perimeter to provide a weathertight installation.
- .11 Complete all air seals between metal cladding and other systems or materials as detailed. Air barrier membranes are specified under Section 07 27 13.
- .12 Provide expansion joints required by shop drawings complete with metal closures, flashings, trim and caulking, to provide a weather tight installation.
- .13 Provide all matching trim, fasteners and accessories to make building weathertight.
- .14 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 07 46 13 Preformed Metal Siding
- .2 Section 07 62 00 Sheet Metal Flashing and Trim
- .3 Section 07 92 00 Joint Sealants

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM F1667/F1667M-21a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
- .2 Canadian General Services Board (CGSB)
 - .1 CAN/CGSB-93.2-M Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use.
 - .2 CGSB 93-GP-5M Installation of Metal Residential Siding, Soffits and Fascia.
- .3 ASME International (ASME)
 - .1 ASME B18.6.4 Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws, Inch Series

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate 600 mm long samples of soffit and fascia material of colour and profile specified.
- .3 Submit manufacturer's standard colour chart.

1.5 Shipping, Handling and Storage

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

1.6 Waste Management and Disposal

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

1.7 Warranty

- .1 Warrant the work of this Section against defects of workmanship and material, for a period of one year from the date of Substantial Performance and agree to make good promptly any defects which occur or become apparent within the warranty period.
- .2 Provide manufacturer's standard 40 year limited warrantee for all pre-finished aluminum materials.

PART 2 PRODUCTS

2.1 Products

- .1 Aluminum metal shall be AA3000 alloy or equivalent, minimum ultimate strength of 172 Mpa and minimum yield strength of 152 Mpa.
- .2 Finish to be thermoset polymer cured at 233 °C to total thickness of 20-22 microns. Colour to be selected by the Consultant from full range of manufacturer's standard colours. Low Gloss Finish.
- .3 Aluminum Soffit and Fascia: Minimum 0.68 mm base thickness, pre-painted aluminum panels.
- .4 Soffit: To CAN/CGSB-93.2-M, Type B, Class 1. Of exterior flat sheet, "V" crimped for stiffness width to suit. Ventilated with pre-punched holes and elongated slits.
- .5 Accessories: Exposed trim, closures, cap pieces, corners, etc. preformed, of same material and colour as siding.
- .6 Fasteners: Nails: to ASTM F1667, hot dipped galvanized coated steel. Screws: to ANSI B18.6.4. All fasteners shall be concealed.
- .7 Sealants: as specified in Section 07 92 00. Colour matched to prefinished materials.

PART 3 EXECUTION

3.1 Installation

- .1 Install soffit in accordance with manufacturer's instructions and CGSB 93-GP-5M.
- .2 Maintain joints true to line, tight fitting.
- .3 Attach components in a manner not restricting thermal movement.
- .4 Caulk junctions with adjoining work with colour matched sealant as specified in Section 07 92 00.

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 31 10 Steel Deck
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .4 Section 07 62 00 Sheet Metal Flashing and Trim
- .5 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 A231.1:19/A231.2:19 (R2024) Precast Concrete Paving Slabs/Precast Concrete Pavers
 - .2 CSA A123.3-05 (R2015) Asphalt Saturated Organic Roofing Felt.
 - .3 CSA A123.4-04 (R2018) Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
 - .4 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 Submit Wind Uplift Roof System Analysis Report in accordance with CSA A123.21
- .5 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 Performance Requirements

- .1 General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- .2 Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- .3 Roofing System: to CSA A123.21 for wind uplift resistance.

1.6 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 CSA A123.21 Standard Test Method for The Dynamic Wind Uplift Resistance of Membrane-Roofing Systems.

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.
 - .1 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.
- .2 Manufacturer's Warranty: Provide OIRCA and manufacturers extended twenty (20) year NDL Pro-rated system warrantee to cover repair or replacement costs for Labour, Materials and Workmanship required to restore roof or system to watertight condition, after a leak has occurred, due to defective materials or system related failures. Warranty shall be Non Pro Rated and must be covered to the original installation cost for the full twenty years from the date of Substantial Performance.

PART 2 PRODUCTS

2.1 Manufacturer

- .1 Approved Roofing Manufacturers:
 - .1 Soprema
 - .2 Johns Manville
 - .3 IKO
 - .4 Tremco
 - .5 Approved equivalents.
- .2 When a particular trade name or performance standard is specified it shall be indicative of a standard required.
- .3 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 and un-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.
- .3 Where indicated, cutting and patching of existing roofs shall match existing construction.

2.3 Materials

- .1 Gypsum Board Underlayment: To ASTM C1396/C1396M, Type M/R with water resistant core, 12.7 mm thick. Joint tape as recommended by manufacturer.
- .2 Vapour Retardant: Sheet air/vapour barrier membrane shall be an SBS modified bitumen, self-adhering sheet membrane complete with a blue engineered thermoplastic film. Membrane shall have the following physical properties:
 - .1 ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies,
 - .2 Air leakage: <0.0001 CFM/ft² @0.76 kPa to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 0.5 kPa for 1 hour and gust wind load pressure of 3.0 kPa for 10 seconds when tested at 0.76 kPa to ASTM E331,
 - .3 Vapour permeance: 0.03 perms to ASTM E96 (Desiccant Method),
 - .4 Vapour permeance: 0.08 perms to ASTM E96 (Wet Cup Method),
 - .5 Membrane Thickness: 1 mm,
 - .6 Low temperature flexibility: -30 ° C to CGSB 37-GP-56M,
 - .7 Elongation: 200% to ASTM D412-modified,
 - .8 Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements
 - .9 Primer: as recommended by the vapour retardant manufacturer and suitable for the specified substrates.
- .3 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. 76 mm each.
 - .2 Base layer 1220 x 2440 mm boards.
 - .3 Top layer 1220 x 1220 boards.
 - .4 Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1.
- .4 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.
 - .1 Approved tapered insulation manufacturers:
 - .1 Accu-plane.
 - .2 Posislope.
 - .3 Soprema.
- .5 Fasteners: Corrosion resistant screw and plate fastener as recommended by roof membrane manufacturer and tested with specified insulation.
 - .1 Factory Mutual Tested and Approved with 76 mm coated disc for I-90 rating, length required to penetrate metal deck 25 mm.
- .6 Protection board: 6.4 mm thick high density fibreboard. Board size 1220 mm x 1524 mm.
- .7 Asphalt: ASTM D312, Type III Steep Asphalt.

- .8 Fiber Cant and Tapered Edge Strips: torchable, preformed rigid insulation units of sizes/shapes indicated. Matching insulation board or of perlite or organic fiberboard.
- .9 SBS Modified Bitumen Base Sheet and Base Sheet Flashing: 120 mil thickness modified bitumen membrane with fiberglass reinforcement sandwiched between SBS rubber in a high penetrating index asphalt mixture, minimum tensile strength 17.5 kN/m, minimum tear strength 480 N and low temperature flexibility -28 ° C. Zero VOC adhesive.
- .10 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. Zero VOC adhesive. Membrane performance requirements, CSA A123.15 Type C Grade 1, and ASTM D6162, Type III. Sanded bottom surface and white granulated top surface.
- .11 Mastics: Asphalt mastic conforming ASTM D312/D312M-15.
- .12 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.
- .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 Precast Concrete Splash Pads: to CSA A231.1-14/A231.2:
 - .1 Fabricated for exterior use with textured non-slip finish.
 - .2 460 x 460 x 50 mm thick.
 - .3 Colour: Grey.
 - .4 Extruded polystyrene rigid insulation installed between roofing membrane and pavers.
 - .1 FOAMULAR 250 as manufactured by Owens Corning. Size and thickness to suit site conditions.

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 Substrate Board

- .1 Install gypsum board substrate over metal deck using adhesive as recommended by manufacturer. Tape all joints.

3.5 Vapour Retarder

- .1 Apply adhesive to substrate 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.

3.6 Insulation

- .1 Keep insulation dry at all times. Insulation showing evidence of having been dampened since its manufacture or separation of laminations shall not be used. Lay insulation panels with all joints staggered. Insulation shall be laid with the longest side parallel to the flutes unless the

manufacturer stipulates otherwise. Lay board in tight contact to prevent gaps and resulting loss of thermal insulation value. Cut boards to fit neatly around projections through roof.

.2 Attachment of Base Layer with Mechanical Fasteners (Metal Deck):

- .1 Base layer of insulation board shall be fully attached to the metal deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer's recommendation for ULC Class A classification.
- .2 Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than 0.4 m².
- .3 Spacing pattern of fasteners shall be as per manufacturer's recommendations and reviewed shop drawings, to meet the specified requirements. Placement of any fastener from edge of insulation board shall be a minimum of 76 mm, and a maximum of 152 mm.
- .4 Minimum penetration into deck shall be as recommended by the fastener manufacturer but not less than 25mm.
- .5 Install secondary layer to primary layer in full mopping of hot asphalt in accordance with manufacturer's instructions

.3 At scupper drains and roof 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.

3.7 Cant Strip

- .1 Install cant strip at junction with vertical surfaces in accordance with manufacturer's instructions.

3.8 Protection Board

- .1 Stagger coverboard joints with insulation joints.
- .2 Apply adhesive in continuous ribbons of 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.

3.9 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 m². 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.

3.10 Base Sheet Stripping (Flashing)

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

3.11 Cap Sheet

- .1 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).
- .2 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.
- .3 Base sheet and cap sheet seams shall be offset a minimum of 300 mm.
- .4 Cap sheet must have side laps of 90 mm and end laps 150 mm.
- .5 After installation of the cap sheet, inspect all lap seams on the cap sheet for full adhesion and evidence of bleed out.
- .6 Cap sheet is to extend to the top of the cant at all vertical to horizontal transitions.

3.12 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.
- .3 Using a torch and round-nosed roofing trowel, embed the surface granules into the heated and soft bitumen, from the chalk line to the edge of the cap sheet.
- .4 Cap sheet stripping shall be torch-welded directly on its base sheet, proceeding from bottom to top. Torching shall soften the two membranes to ensure a uniform weld.
- .5 Cap sheet stripping shall be applied to extend down the outside face of exterior edge, across top of parapet, down interior vertical surface and on to flat roof a distance of 230 mm, to the extent of area of embedded granules. Cut roll into required lengths and use width of roll down length of roof, maintaining specified 90 mm side laps.

3.13 End Laps

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

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 Splash Pads

- .1 Install extruded polystyrene rigid insulation on the roof membrane cut to size to bear the full area of the pavers.
- .2 Install pavers accurately aligning and maintaining uniform spacing, with straight joints from end to end. Seat the edges of the slab paver tightly against the spacing rib of the pedestal in accordance with manufacturer's recommendations and architectural layout.
- .3 Install pavers accurately aligning and maintaining uniform spacing, with straight joints from end to end.

3.16 Metal Flashing

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

3.17 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 a minimum 50 mm beyond damaged area in all directions.
- .2 Independent Inspection and testing shall be performed as specified under Section 01 45 00 – Quality Control and shall be paid from the Cash Allowances. Provide necessary facilities and cooperate with designated inspection and testing agency.

3.18 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 46 13 Preformed Metal Siding
- .4 Section 07 46 60 Preformed Metal Soffits
- .5 Section 07 52 00 Modified Bituminous Roofing
- .6 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 ASTM D523-14(2018) Standard Test Method for Specular Gloss
- .2 CSA Group (CSA)
 - .1 CSA B111 Wire Nails, Spikes and Staples
 - .2 CSA S136-16 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.
- .6 Sheet Metal and Air Conditioning Contractors National Association Inc. (SMACNA)
 - .1 SMACNA Architectural Sheet Metal Manual, latest edition.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit sheet metal shop drawings with Engineer's stamp, outlining metal dimensions, profiles, and securement methods (including fastener types, spacing, locations, etc.).
- .3 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: 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.
 - .1 Minimum 24 gauge for sheet metal flashings and minimum 22 gauge for metal starter strips/securement cleats.

- .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.
 - .1 Colour matched, hex head screw type fasteners with neoprene (rubber) backed washers shall be utilized where exterior, exposed, fasteners are required to be installed through sheet metal flashings.
- .7 Underlay: Bituminous based self-adhered membrane for underlayment membrane below sheet metal flashing layers, where new roof membrane flashings are not present. Ensure membrane is compatible with roof membrane flashing materials.
- .8 Cleats: Of same material, and temper as sheet metal, minimum 50 mm wide. 24 gauge,

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 Exposed fasteners shall be strictly limited wherever possible, and colour match, hex head screw type fasteners with neoprene (rubber) backed washers be utilized where exterior, exposed, fasteners are required to be installed through sheet metal flashings.
- .10 Secure metal flashings in reglets at 610 mm centres and further secure metal to vertical surfaces at locks as required.
- .11 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.
- .12 Imperfections in metal flashing work such as holes, dents, creases, or oil-canning will not be accepted.
- .13 Fabricate and install scuppers as detailed and in accordance with CRCA detailing requirements, and formed out of copper or aluminum metal, with fully soldered/welded seams, in-filled corners, and continuous flange for tie-in to roof membrane layer(s)/flashing layer(s).

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 05 12 23 Structural Steel
- .2 Section 05 31 00 Steel Deck
- .3 Section 07 84 00 Firestopping

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E84-26 Standard Test Method for Surface Burning Characteristics of Building Materials
 - .2 ASTM E119-22 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .3 ASTM E605/E605M-19 Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
 - .4 ASTM E736/E736M-19(2023) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
 - .5 ASTM E759/E759M-92(2023) Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
 - .6 ASTM E760/E760M-92(2020) Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
 - .7 ASTM E761/E761M-92(2020) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
 - .8 ASTM E859/E859M-23 Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
 - .9 ASTM E937/E937M-93(2020) Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
 - .10 ASTM G21-15(2021)e1 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- .2 Underwriters Laboratories Inc. (ULC)
 - .1 Fire Resistance Directory (Latest Edition)
 - .2 ULC 101 2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - .3 ULC 102 2018 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .3 Uniform Building Code (UBC)
 - .1 UBC Standard No. 7-6 – Thickness and Density Determination for Spray Applied Fireproofing
 - .2 UBC Standard No. 7-7 – Methods for Calculating Fire Resistance of Steel, Concrete and Wood Construction
- .4 Association of the Wall and Ceiling Industry (AWCI)
 - .1 AWCI Technical Manual 12-A: Standard Practice for the Testing and Inspection of Spray Applied Fire-Resistive Materials.
 - .2 AWCI Technical Manual 12: Design Selection Utilizing Spray Applied Fire-Resistive Materials.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's instructions for proper application of aggregate slurry fireproofing.
- .3 Fire Testing: Submit evidence that the aggregate slurry fireproofing has been subjected to full-scale UL 263/ASTM E119 fire testing at Underwriters Laboratories Inc., or another accredited laboratory, by the manufacturer.
- .4 Submit test results in accordance with ULC 101 for fire endurance and ULC 102 for surface burning characteristics.
- .5 Test Data: Independent laboratory test results for fireproofing shall be submitted for the following performance criteria:
 - .1 Compressive Strength per ASTM E761
 - .2 Bond Strength per ASTM E736
 - .3 Deflection per ASTM E759
 - .4 Bond Impact per ASTM E760
 - .5 Air Erosion per ASTM E859
 - .6 Corrosion Resistance per ASTM E937
 - .7 Abrasion Resistance
 - .8 Impact Penetration
 - .9 High Speed Air Erosion per ASTM E859
 - .10 Surface Burning Characteristics per ASTM E84
 - .11 Combustibility per ASTM E1354 Cone Calorimeter
 - .12 Mould Resistance per ASTM G21
- .6 Thickness Schedule: Provide schedule indicating material to be used, structural elements to be protected with spray applied fireproofing, hourly rating and material thickness provided and appropriate references.
- .7 For assemblies not tested and rated, submit engineered proposals based on related designs using accepted fireproofing design criteria. Criteria must include statement that building structures and structural elements have been reviewed, and are included in the design of the proposed fire proofing. Proposals shall be prepared by an Engineer registered in the province of Ontario.

1.5 Quality Control

- .1 Refer to Section 01 45 00- Quality Control.
- .2 Cooperate with inspection and testing agency and repair or restore all areas of fireproofing removed by the agency for laboratory analysis.
- .3 Testing will be in accordance with AWCI Publication: Inspection Procedure for Field Applied Sprayed Fire Protection Materials and ASTM E605

1.6 Qualifications of Applicator

- .1 Licensed by manufacturer of fireproofing materials.

1.7 Quality Assurance

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

1.8 Shipping, Handling and Storage

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

1.9 Protection

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

1.10 Project Conditions

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

1.11 Waste Management and Disposal

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

1.12 Warranty

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

PART 2 PRODUCTS

2.1 Systems

- .1 Cementitious fireproofing shall be aggregate slurry mixture Monokote MK-6/HY or MK-10HB as manufactured by GCP Applied Technologies Inc.
- .2 ULC labelled and listed cementitious fireproofing, asbestos free, qualified for use in specified standards as manufactured by one of the following is acceptable subject to submission and review of proposed materials, technical data and application procedures:
 - .1 Cafco Industries Inc./Isolatek
 - .2 A/D Fire Protection Systems

2.2 Materials

- .1 Fireproofing material shall meet the following physical performance standards:
 - .1 Dry Density: The field density shall be measured in accordance with ASTM Standard E605. Minimum average density shall be that required by the manufacturer, or as listed in the UL Fire Resistance Directory for each rating indicated, or as required by the authority having jurisdiction, or a minimum average 240 kg/m³ whichever is greater.
 - .2 Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.
 - .3 Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.
 - .4 Bond Strength: Fireproofing, when tested in accordance with ASTM E736, shall have a minimum average bond strength of 9.6 kN/m² and a minimum individual bond strength of 7.2 kN/m².
 - .5 Air Erosion: Maximum allowable total weight loss of the fireproofing material shall be 0.00 g/m² when tested in accordance with ASTM E859. Sample surface shall be “as applied” (not pre-purged) and the total reported weight loss shall be the total weight loss over a 24 hour period from the beginning of the test.

- .6 High Speed Air Erosion: Materials to be used in plenums or ducts shall exhibit no continued erosion after 4 hours at an air speed of 12.7 m/s when tested per ASTM E859.
 - .7 Compressive Strength: The fireproofing shall not deform more than 10% when subjected to compressive forces of 71 kPa when tested in accordance with ASTM E761.
 - .8 Abrasion Resistance: No more than 15 cm³ shall be abraded or removed from the fireproofing substrate when tested in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
 - .9 Impact Penetration: The fireproofing material shall not show a loss of more than 6 cm³ when subjected to impact penetration tests in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection.
 - .10 Surface Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
 - .1 Flame Spread 0
 - .2 Smoke Development 0
 - .11 Corrosion Resistance: Fireproofing applied to steel shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.
 - .12 Resistance to Mould: The fireproofing material shall be formulated with a mould inhibitor. Fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mould growth for a period of 28 days for general use.
 - .13 Combustibility: Material shall have a maximum total heat release of 20 MJ/m² and a maximum 125 kw/m² peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E1354 at a radiant heat flux of 75 kw/m² with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.
 - .14 Fire Resistance Classification: The spray applied fireproofing material shall have been tested and reported by Underwriters Laboratories of Canada, or another accredited laboratory, in accordance with the procedures of ANSI/ASTM E119 and shall be listed in the Underwriters Laboratories Fire Resistance Directory.
- .2 Mixing water shall be clean, fresh, potable and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material. Provide water with sufficient pressure and volume to meet the fireproofing application schedule.

2.3 Accessories

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

PART 3 EXECUTION

3.1 Inspection

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

3.2 Preparation

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

3.3 Application

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

3.4 Tests and Inspections

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

3.5 Patching

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

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 04 22 00 Concrete Unit Masonry
- .2 Section 05 31 00 Steel Deck
- .3 Section 07 92 00 Joint Sealants

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM E84-25 Standard Test Method for Surface Burning Characteristics of Building Materials
 - .2 ASTM E119-20 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .3 ASTM E136-19a Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750° C
 - .4 ASTM E814-13a (2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
 - .5 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
 - .6 ASTM E2307-20 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC 101-2014 Standard Methods of Fire Endurance Tests of Building Construction and Materials
 - .2 ULC 102.2-2018 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies
 - .3 ULC 115-2018 Standard Method of Fire Tests of Firestop Systems
- .3 National Fire Protection Association (NFPA)
 - .1 NFPA 252 Standard Methods of Fire Test and Door Assemblies
- .4 South Coast Air Quality Management District (SCAQMD) California State
 - .1 SCAQMD Rule 1168-03: Adhesives and Sealants.
- .5 Ontario Building Code

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings: Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.
- .4 Samples: Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.
- .5 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Test reports: in accordance with ULC 101 for fire endurance and ULC 102 for surface burning

characteristics.

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

1.5 Definitions

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

1.6 Quality Assurance

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

- .2 Notify Consultant one week in advance of the dates and times when mockups will be erected.
- .3 Obtain Consultant's acceptance of mockups before start of final unit of Work.
- .4 Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work.
- .5 Accepted mockups in an undisturbed condition at time of Substantial Performance may become part of completed unit of Work.

1.7 Sustainable Requirements

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

1.8 Project Conditions

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

1.9 Shipping, Handling and Storage

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

1.10 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

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

- .5 Fire stopping and smoke seal systems: ULC listed in accordance with ULC 115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of ULC 115 and not to exceed opening sizes for which they are intended.
- .6 Service penetration assemblies: ULC listed systems tested to ULC 115.
- .7 Service penetration fire stop components: ULC listed and certified by test laboratory to ULC 115.
- .8 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .9 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .10 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .11 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .12 Water: potable, clean and free from injurious amounts of deleterious substances.
- .13 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.
- .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. Sealants for vertical joints: non-sagging.
- .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.
 - .2 Temporary forming materials.
 - .3 Substrate primers.
 - .4 Collars.
 - .5 Steel sleeves.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Preparation

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

3.3 Installation

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing and as necessary to maintain fire resistance ratings of floor and wall assemblies.
- .2 Provide fire stopping for all disciplines.

- .3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .4 Fill spaces between openings, ducts, pipes and unused sleeves passing through fire separations with firestop material and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .6 Tool or trowel exposed surfaces to neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.

3.4 Sequences of Operation

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

3.5 Field Quality Control

- .1 Inspections: notify Consultant when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.
- .2 Employ a ULC accredited Designated Responsible Individual (DRI) to inspect and label all fire stop applications on site.
- .3 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Article 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 Article 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 partitions and walls.
 - .2 Perimeter 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 cm²: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
 - .8 All electrical 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 04 22 00 Concrete Unit Masonry
- .3 Section 04 27 00 Multiple Wythe Unit Masonry
- .4 Section 06 10 00 Rough Carpentry
- .5 Section 07 21 13 Building Insulation
- .6 Section 07 27 13 Modified Bituminous Sheet Air Barriers
- .7 Section 07 46 13 Preformed Metal Siding
- .8 Section 07 46 60 Preformed Metal Soffits
- .9 Section 07 52 00 Modified Bituminous Roofing
- .10 Section 07 62 00 Sheet Metal Flashing and Trim
- .11 Section 07 84 00 Firestopping
- .12 Section 08 11 00 Metal Doors and Frames
- .13 Section 08 80 05 Glazing

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C510-16(2022) Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
 - .2 ASTM C661-15(2022) Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
 - .3 ASTM C679-15(2022) Standard Test Method for Tack-Free Time of Elastomeric Sealants
 - .4 ASTM C719-22 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)
 - .5 ASTM C793-05(2017) Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
 - .6 ASTM C794-18(2022) Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - .7 ASTM C834-17 Standard Specification for Latex Sealants
 - .8 ASTM C919-22 Standard Practice for Use of Sealants in Acoustical Applications
 - .9 ASTM C920-18 Standard Specification for Elastomeric Joint Sealants
 - .10 ASTM C1087-23 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
 - .11 ASTM C1183/C1183M-13(2018) Standard Test Method for Extrusion Rate of Elastomeric Sealants
 - .12 ASTM C1193-16 Standard Guide for Use of Joint Sealants
 - .13 ASTM C1246-17(2022) Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
 - .14 ASTM C1247-20 Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids
 - .15 ASTM C1248-22 Standard Test Method for Staining of Porous Substrate by Joint Sealants
 - .16 ASTM C1311-22 Standard Specification for Solvent Release Sealants
 - .17 ASTM C1330-23 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

- .18 ASTM D412-16(2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- .19 ASTM D2203-01(2023) Standard Test Method for Staining from Sealants
- .20 ASTM E84-25 Standard Test Method for Surface Burning Characteristics of Building Materials
- .21 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 U. S. Environmental Protection Agency (EPA)
 - .1 EPA 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.
- .4 South Coast Air Quality Management District (SCAQMD) California State
 - .1 SCAQMD Rule 1168-03: Adhesives and Sealants.

1.4 Submittals

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

1.5 Quality Assurance

- .1 Installer Qualifications: Company with minimum of three years of experience specializing in work of this section, employing applicators trained for application of joint sealants required for this project, with record of successful completion of projects of similar scope, and approved by manufacturer.
- .2 Single Source Responsibility: Provide joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.
- .3 Caulking work shall be carried out in strict accordance with manufacturer's printed directions.
- .4 Adhesion: Use ASTM C719 and ASTM C794 to determine requirements for joint preparation, including cleaning and priming.
- .5 Compatibility: Use ASTM C1087 to determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant colour

1.6 Shipping, Handling and Storage

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

1.7 Project Conditions

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

1.8 Scheduling

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

1.9 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Manufacturer

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

2.2 Materials – General

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

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

2.3 Silicone Joint Sealants

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

2.4 Urethane Joint Sealants

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

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

2.5 Latex Joint Sealants

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

2.6 Solvent Release-Curing Sealants

- .1 BJS#1: Butyl-Rubber-Based Joint Sealant: ASTM C1311.
- .1 Basis of Design Product: Tremco Tremco Butyl Sealant.
 - .2 Volatile Organic Compound (VOC) Content: 250 g/L maximum.
 - .3 Colour: As selected by Consultant from manufacturer's standard colours.

2.7 Acoustical Sealants

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

2.8 Joint Sealant Accessories

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

- .5 Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.1 Examination

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

3.2 Preparation

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

3.3 Application

- .1 Sealant and Primer Installation Standard: Comply with ASTM C1193 and manufacturer's written instructions.
- .2 Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.
 - .1 Install joint backing to maintain the following joint ratios:
 - .1 Joints up to 13 mm wide: 1:1 width to depth ratio.
 - .2 Joints greater than 13 mm wide: 2:1 width to depth ratio; maximum 13 mm joint depth.
 - .2 Install bond breaker tape over substrates when sealant backings are not used.
- .3 Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- .4 Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- .5 Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.
 - .1 Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
 - .2 Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
 - .3 Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.

- .6 Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C919 and with manufacturer's written recommendations.

3.4 Field Quality Control

- .1 Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C1193, Method A. .1 Perform 5 tests for the first 300 m of joint length for each kind of sealant and joint substrate, and one test for each 300 m of joint length thereafter or 1 test per each floor per building elevation, minimum.
 - .1 For sealant applied between dissimilar materials, test both sides of joint.
- .2 Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.
- .3 Submit report of field adhesion testing to Consultant indicating tests, locations, dates, results, and remedial actions taken.

3.5 Exterior Joint Sealant Schedule

- .1 Exterior concealed transition joints in air barrier.
 - .1 UJS#1: Single-component non-sag urethane sealant.
 - .2 Compatibility: Compatible with air barrier components specified in Section 07 27 13.
- .2 Exterior construction joints in cast-in-place concrete.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .3 Exterior movement joints in brick masonry.
 - .1 SJS#1: Single-component neutral-curing non-staining silicone sealant.
- .4 Exterior exposed joints in metal panel cladding systems.
 - .1 SJS#1: Single-component neutral-curing non-staining silicone sealant.
- .5 Exterior joints between different materials listed above.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .6 Exterior perimeter joints at frames of doors.
 - .1 SJS#1: Single-component neutral-curing non-staining silicone sealant.
- .7 All other exterior non-traffic joints.
 - .1 UJS#1 Single-component non-sag urethane sealant.

3.6 Interior Joint Sealant Schedule

- .1 Interior movement joints in interior unit masonry.
 - .1 UJS#1: Single-component non-sag urethane sealant.
- .2 Interior perimeter joints of interior frames.
 - .1 UJS#2: Single-component non-sag urethane sealant.
- .3 Interior sanitary joints between plumbing fixtures and casework and adjacent walls, floors, and counters.

- .1 SJS#2: Mildew-Resistant, Single-Component, nonsag, acid-curing silicone joint sealant.
- .4 Interior traffic joints in floor and between floor and wall construction.
 - .1 UJS#3: Single-component pourable urethane sealant.
- .5 Interior non-moving joints between interior painted surfaces and adjacent materials.
 - .1 LJS#1: Siliconized acrylic latex
 - .2 Joint-Sealant Colour: Paintable.
- .6 Interior concealed sealants at thresholds and sills.
 - .1 BJS#1: Butyl-rubber-based joint sealant.
- .7 Interior exposed and non-exposed acoustical applications.
 - .1 AJS#1: Acoustical joint sealant.

3.7 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 21 13 Brick Masonry
- .3 Section 04 22 00 Concrete Unit Masonry
- .4 Section 07 46 13 Preformed Metal Siding
- .5 Section 07 92 00 Joint Sealants

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM A36/A36M-14 Standard Specification for Carbon Structural Steel
 - .2 ASTM A283/A283M-18 Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
 - .3 ASTM A786/A786M-15 Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
 - .4 ASTM B209-14 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - .5 ASTM B221-14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - .6 ASTM D412-16 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - .7 ASTM D2000-18 Standard Classification System for Rubber Products in Automotive Applications
 - .8 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
 - .9 ASTM D2628-91(2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
- .2 Aluminum Association (AA).
 - .1 DAF-45, Designation System for Aluminum Finishes.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit detailed shop drawings of each component specified showing fabrication and installation requirements. Indicate lengths, fasteners, accessories, anchors, seals, butt joints and locations, finishes and profiles required for each condition.
- .3 Submit manufacturer's specifications and technical data, including installation instructions, and as required, catalog cuts and templates to explain construction and to provide for incorporation of the product into the project.
- .4 Submit 150 mm long samples of each type and finish of expansion joint cover assemblies.

1.5 Definitions

- .1 Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

- .2 Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- .3 Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.
- .4 Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.6 Design Requirements

- .1 Joint movement: design to permit unrestricted lateral movement of up to +/-50% of joint width without disengagement of cover.
- .2 Allowable load on floor joint cover plate shall be 4.8 kN/m² uniform load and 136 kilogram concentrated load with maximum 82.7 mN/m² stress (6063-T5 aluminum extrusions) at full open position. Deflection shall be 3 mm at neutral position.
- .3 Centering Bars shall have nylon spheres which fully engage in the base members' tracks.
- .4 Design exterior expansion joint cover assemblies to accommodate joint movements within service temperature range of -35 ° C to 65 ° C.

1.7 Quality Assurance

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Submit certificates, copies of independent test reports, or research reports showing compliance with specified performance requirements.

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 Aluminum: ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 6061-T6, sheet and plate.
- .2 Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
- .3 Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

- .4 Moisture Barrier: 7-ply laminate reinforced Polyethylene.
- .5 Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapour seals and filler materials, drain tubes, adhesive and other accessories compatible with material in contact, as indicated or required for complete installations.

2.2 Architectural Joint Systems- General

- .1 General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
- .2 Design architectural joint systems for the following size and movement characteristics:
 - .1 Nominal Joint Width: As indicated on Drawings
 - .2 Maximum Joint Width: As indicated on Drawings
 - .3 Minimum Joint Width: As indicated on Drawings
 - .4 Lateral Shear Movement Capability: +50%

2.3 Architectural Joint Systems for Building Exteriors

- .1 Architectural Joint Systems:
 - .1 Basis-of-Design Products: Construction Specialties, Inc.
- .2 Floors:
 - .1 APF floor to floor. Mill finish.
 - .2 APFW floor to wall. Mill finish.
- .3 Ceiling: SMC-100N. Clear anodized finish.
- .4 Walls: Wall cover systems comprising of a flush Santoprene primary gasket and a secondary PVC gasket positioned in continuous extruded aluminium side frames.
 - .1 SF-200. Clear anodized finish.
 - .2 FWFC-200M. Clear anodized finish.

2.4 Fabrication

- .1 Fabricate components in longest practical lengths.
- .2 Prefabricate transition pieces and corner fittings as required.
- .3 Miter and weld joints as applicable.
- .4 Resilient filler strip shall be key-locked or bonded to aluminum retainers.
- .5 Provide necessary and related parts, devices, water barrier, anchors, form clips, and other items required for water-resistant installations.
- .6 Provide corners, tees, transitions, curb risers, etc. assembled with connection mitered and secured to ensure proper fit and alignment as applicable.
- .7 Cover plates shall have serrated exposed surface.
- .8 Shop assemble components and package with anchors and fittings. Provide components in single lengths where possible; minimize site splicing.

2.5 Finishes

- .1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- .2 Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- .3 Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

- .1 Comply with manufacturer's instructions and recommendations for all phases of work, including preparation of substrate, applying materials, and protection of installed units.

3.2 Examination

- .1 Make a thorough examination of all surfaces receiving the work of this Section and before starting the installation, notify the Consultant, in writing, of any defect which would affect the satisfactory completion of the work of this section.

3.3 Preparation

- .1 Examine the Contract Drawings and specifications in order to insure the completeness of the work required under this Section.
- .2 Verify all measurements and dimensions at the job site and cooperate in the coordination and scheduling of the work of this Section with the work of related trades, with particular attention given to the installation of items embedded in concrete and masonry so as not to delay job progress.
- .3 Provide all templates as required to related trade for location of all support and anchorage items.

3.4 Installation

- .1 Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
- .2 Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
 - .1 Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - .2 Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Consultant where discrepancies occur that will affect proper joint installation and performance.
 - .3 Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - .4 Locate in continuous contact with adjacent surfaces.
 - .5 Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.
 - .6 Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.

- .7 Locate anchors at interval recommended by manufacturer, but not less than 76 mm from each end and not more than 610 mm o.c.
 - .3 Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - .1 Provide in continuous lengths for straight sections.
 - .2 Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 - .3 Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
 - .4 Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.
 - .5 Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
 - .6 Water Barrier: Provide water barrier at exterior joints. Provide drainage fittings.
- 3.5 Adjusting
- .1 Adjust joint cover to freely accommodate joint movement.
- 3.6 Protection
- .1 Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
 - .2 Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Performance of the Work.
- 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 04 22 00 Concrete Unit Masonry
- .2 Section 06 10 00 Rough Carpentry
- .3 Section 07 92 00 Joint Sealants
- .4 Section 08 71 10 Door Hardware
- .5 Section 09 91 13 Exterior Painting
- .6 Section 09 91 23 Interior Painting

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 ASTM A924/A924M-25a Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - .3 ASTM C177-19e1 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
 - .4 ASTM C518-21 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - .5 ASTM C553-13(2019) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - .6 ASTM C591-22 Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - .7 ASTM C1289-22a Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
 - .8 ASTM D6386-22 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
 - .9 ASTM D7396-14(2020) Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting
 - .10 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - .11 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 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 80-22 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 Performance Requirements

- .1 Design exterior frame assembly to accommodate expansion and contraction when subjected to minimum and maximum surface temperature of -35° C to 35° C.
- .2 Maximum air leakage rate for exterior door assemblies shall not exceed 5.1 L/s.m2 at a pressure of 75 Pa as determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
- .3 Maximum air leakage rate for exterior glazed screen assemblies shall not exceed 1.0 L/s.m2 at a pressure of 75 Pa as determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
- .4 Maximum overall U-factor for exterior door assemblies shall not exceed 2.84 W/m2.K as determined in accordance with CAN/CSA-A440.2
- .5 Maximum overall U-factor for exterior glazed steel frame assemblies shall not exceed 3.07 W/m2.K as determined in accordance with CAN/CSA-A440.2
- .6 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.

- .7 Product quality shall meet the standards established by the Canadian Steel Door Manufacturer's Association.
- .8 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.
- .9 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.

1.6 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 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 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: Tension levelled steel to ASTM A924. Galvanized to ASTM A653, CS, Type B, Coating Designation ZF75 minimum.
- .3 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653, ZF75.
- .4 Door Core Materials
 - .1 Stiffened: face sheets laminated insulated core.
 - .2 Polyurethane: to CAN/ULC-S704 rigid, modified polyisocyanurate, closed cell board. Density 32 kg/m³.
- .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 Door silencers: single stud rubber/neoprene type.
- .4 Fiberglass: to ULC 702, loose batt type, minimum density of 24 kg/m³.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 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 Interior frame product shall be 16 gauge. Interior frames shall be profile welded type construction.
 - .4 Exterior frame product shall be 16 gauge profile welded type construction, thermally broken.

- .5 Corner joints shall be profile welded (PW)(continuously welded on the inside of the profiles faces, rabbets, returns, and soffit intersections with exposed faces filled and ground to a uniform, seamless surface).
- .6 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.
- .7 Prepare frames to receive electrical conduit for door operators where indicated and required.
- .8 Protect mortised cutouts with steel guard boxes.
- .9 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.
- .10 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" except as follows:
 - .1 Mullions: fabricated with continuous 20 gauge Galvanneal steel internal reinforcing clips.
 - .2 Hinge, pivot and angle reinforcements shall be 10 gauge steel minimum reinforcing. High frequency type.
 - .3 Strike reinforcements shall be 16 gauge minimum.
 - .4 Reinforcements for surface mounted hardware, concealed door closers and holders shall be 12 gauge minimum.
 - .5 Mortised cut outs shall be protected with 22 gauge steel minimum guard.
- .11 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.
- .12 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .13 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.

2.5 Fabrication - Doors

- .1 General
 - .1 Interior Doors: steel stiffened construction.
 - .2 Exterior Doors: steel stiffened construction with polyurethane core.
 - .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. Seams shall be tack welded every 2000 mm.
- .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 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 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 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.
- .14 Adjust operable parts for correct clearances and function.
- .15 Install 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 08 11 00 Metal Doors and Frames

1.3 References

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/DHI A115.1G-1994 Installation Guide for Doors and Hardware
 - .2 ANSI/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 A156.16-2013 Auxiliary Hardware.
 - .14 ANSI/BHMA A156.18-2012 Materials and Finishes.
 - .15 ANSI/BHMA A156.19-2013 Power Assist and Low Energy Power - Operated Doors.
 - .16 ANSI/BHMA A156.21-2014 Thresholds.
 - .17 ANSI/BHMA 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 referenced accessibility standards and 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).
- .5 The supply and installation cost of all brass construction cores and permanent lock cores is a separate Cash Allowance and is not to be included in the supply cost for finish hardware.

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

Section 08 71 01 Door Hardware Schedule

Heading #1

1 Single door B01, Exterior From Vest. B01

LHR

965 x 2150 x 45 - HM DR x HM FR

3	Standard Hinge	CB199NRP (5" x 4 1/2")	US32D
1	Exit Device	16-8804 US32D C/W Cylinders - LHR	US15/US32D
1	Door Pull	GSH 1181-2 C32D CONC. TB	US32D
1	Electric Strike	F9600-630	630
1	Auto. Door Operator	HA8 Series	
2	36" Long Push Plate	CM-7536/4	
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D
1	Kick Plate	K10A x 200 x 2" LDW	US32D
1	Weatherstripping	W-50S-CA x Opening Height (2 x H, 1xW)	CA
1	Threshold	CT-45 x Opening Width	
1	Door Sweep	W-13S x Opening Width	CA

NOTE: 120VDC is required at the head of the door for all handicap door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor.

Note : Aiphone Intercom - By Others

Heading #2

1 Single door B02, Vest. B01 To Elect. Machine Rm B02

LH

965 x 2150 x 45 - HM DR x HM FR - 45 MIN

3	Standard Hinge	CB179 5" x 4 1/2"	US26D
1	Lockset	11G04 LL US26D - LH	US26D
1	Surface Closer	4040XP REGARM 689 45	689
1	Kick Plate	K10A x 200 x 2" LDW	US32D
1	Wall Door Stop	GSH 250	US32D

Heading #3

1 Pair of doors B04A, Ex. Corridor B04 From Corridor

LHRA/RHRA

840, 840 x 2150 x 45 - HM DR x HM FR - 45 MIN

6	Standard Hinge	NRP-CB168 (4 1/2" x 4)	US26D
1	Exit Device	12-8815 ETL US26D/US32D - LHR	US26D/US32D
1	Exit Device	12-8815 ETL US26D/US32D - RHR	US26D/US32D
2	Removable Mullion	12-980 USP	USP
2	Surface Closer	4040XP EDA 689	689
2	Kick Plate	K10A x 200 x 2" LDW	US32D
2	Weatherstripping	W-22 x Opening Size (2xH, 1xW)	BL
2	Electro-Magnetic Holder	EM-504-24120 689	689
		Mag. Holder To Release Upon Fire Alarm.	

Heading #4

1 Pair of doors B04B, Ex. Corridor B04 From Corridor

LHRA/RHRA

1 Pair of doors B05, Corridor From Ex. Corridor B05

LHRA/RHRA

1 Pair of doors 101A, Corridor From Ex. Corridor 101A

LHRA/RHRA

1 Pair of doors 200A, Corridor From Ex. Corridor 200A

LHRA/RHRA

915, 915 x 2150 x 45 - HM DR x HM FR - 45 MIN

24	Standard Hinge	NRP-CB168 (4 1/2" x 4)	US26D
4	Exit Device	12-8815 ETL US26D/US32D - LHR	US26D/US32D
4	Exit Device	12-8815 ETL US26D/US32D - RHR	US26D/US32D
8	Removable Mullion	12-980 USP	USP
8	Surface Closer	4040XP EDA 689	689
8	Kick Plate	K10A x 200 x 2" LDW	US32D
8	Weatherstripping	W-22 x Opening Size (2xH, 1xW)	BL
8	Electro-Magnetic Holder	EM-504-24120 689	689
		Mag. Holder To Release Upon Fire Alarm.	

Heading #5

1 Pair of doors B04C, Corridor From Ex. Corridor B04

LHRA/RHRA

915, 915 x ___ x ___ - EX DR x EX FR

EXISTING DOOR

1	Exit Device	12-8815 ETL US26D/US32D - LHR	US26D/US32D
1	Exit Device	12-8815 ETL US26D/US32D - RHR	US26D/US32D
2	Surface Closer	4040XP EDA 689	689
2	Electro-Magnetic Holder	EM-504-24120 689	689
		Mag. Holder To Release Upon Fire Alarm.	
2	Kick Plate	K10A x 200 x 2" LDW	US32D

BALANCE OF EXISTING HARDWARE TO REMAIN.

Heading #6

1 Single door 101D, Ex. Corridor 101A To Universal W/Rm 101D

LH

965 x 2150 x 45 - HM DR x HM FR

Universal W/Rm

3	Standard Hinge	CB168 (5" x 4 1/2")	US26D
1	Lockset	11G04 LL US26D - LH	US26D
1	Electric Strike	1006-630 E-630	630
1	Auto. Door Operator	HA8 Series	
1	BFWR Controller	IL06KT-ON-Push to Lock Kit x EM Call	
1	Indicator	972-L-EF-MO x 32D Occupied When Lit.	32D
1	Kick Plate	K10A x 200 x 2" LDW	US32D
1	Overhead Door Stop Concealed	1020 SL to Suit Opening Size	US32D

NOTE: Operators only supply and install. 120VDC is required at the head of the door for all Barrier-free door operators, 15A dedicated circuit. Wall/Frame must be reinforced for automatic operator mounting, all conduit and back boxes with pull cords are to be provided by the electrical contractor.

NOTE: Washroom Controller kit complete with 1 Controller, 2 Push Button CM-7536/4, 1 Push to Lock button, 1 Emergency Call Button, 2 Audible/Visual Indicators, 1 Surface Applied Door Contact & 1 Emergency Call Sign

Heading #7

1 Pair of doors 102A, Ex. Corridor 102A From Ex. Corridor 103A

LHRA/RHRA

1 Pair of doors 102B, Ex. Corridor 102A From Ex. Corridor 103A

LHRA/RHRA

1 Pair of doors 103A, Ex. Corridor 103A From Corridor

LHRA/RHRA

915, 915 x ___ x ___ - EX DR x EX FR

EXISTING DOOR

6	Electro-Magnetic Holder	EM-504-24120 689 Mag. Holder To Release Upon Fire Alarm.	689
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BALANCE OF EXISTING HARDWARE TO REMAIN.

Heading #8

1 Single door 103B, Ex. Corridor 103A From Corridor

LHR

915 x ___ x ___ - EX DR x EX FR

EXISTING DOOR

1	Electro-Magnetic Holder	EM-504-24120 689	689
		Mag. Holder To Release Upon Fire Alarm.	

BALANCE OF EXISTING HARDWARE TO REMAIN.

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 88 13 Fire Resistant Glazing

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C162-23 Standard Terminology of Glass and Glass Products.
 - .2 ASTM C542-05(2024) Standard Specification for Lock-Strip Gaskets
 - .3 ASTM C1048-25 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
 - .4 ASTM C1135-19 Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants
 - .5 ASTM D790-17 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - .6 ASTM D2240-15e1 Standard Test Method for Rubber Property—Durometer Hardness
 - .7 ASTM E84-25 Standard Test Method for Surface Burning Characteristics of Building Materials
 - .8 ASTM E330/E330M-14 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
 - .9 ASTM 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 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-17 Safety Glazing
 - .2 CAN/CGSB-12.8-17 Insulating Glass Units
- .4 CSA Group (CSA)
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
- .5 Consumer Product Safety Commission
 - .1 CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
- .6 Environmental Choice Program (ECP).
 - .1 CCD-045-95 Sealants and Caulking.
- .7 Flat Glass Manufacturers Association (FGMA).
 - .1 FGMA Glazing Manual - 1997.
- .8 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).
- .9 South Coast Air Quality Management District, 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 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 Manufacturer's Instructions: Submit manufacturer's installation instructions.
- .7 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 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)

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.

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.

PART 2 PRODUCTS

2.1 Materials-Flat Glass

- .1 Wired Glass (GWG): 6 mm thick minimum, polished both sides, square wire mesh style.

2.2 Insulating Glass Units

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

2.1 Fire Rated Glass

- .1 Refer to Section 08 88 13

2.2 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 D2240, to suit glazing method, glass light weight and area.
- .3 Spacer shims: Neoprene 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.
- .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: 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.

3.7 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.

3.8 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 07 92 00 Joint Sealants
- .2 Section 08 11 00 Metal Doors and Frames
- .3 Section 08 80 05 Glazing

1.3 References

- .1 National Fire Protection Association (NFPA)
 - .1 NFPA 80 - 2022 Standard for Fire Doors and Other Opening Protectives
 - .2 NFPA 252 - 2022 Standard Methods of Fire Tests of Door Assemblies.
 - .3 NFPA 257 - 2022 Standard on Fire Test for Window and Glass Block Assemblies.
- .2 Underwriters Laboratories, Inc. (UL)
 - .1 UL 9 Fire Tests of Window Assemblies.
 - .2 UL 10B for Fire Tests of Door Assemblies.
 - .3 UL 10C Positive Pressure Fire Tests of Door Assemblies.
- .3 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC S104-15 Standard Method for Fire Tests of Door Assemblies
 - .2 CAN/ULC S106-15 Standard Method for Fire Tests of Window and Glass Block Assemblies
- .4 Consumer Products Safety Commission (CPSC)
 - .1 CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
- .5 Glass Association of North America (GANA)
 - .1 GANA – Glazing Manual
 - .2 FGMA – Sealant Manual

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings: Submit shop drawings showing layout, profiles and product components.
- .3 Samples: Submit 150 x 150 mm glass samples.
- .4 Product Data: Submit latest edition of manufacturer's product data.
- .5 Provide maintenance data for fire resistant glazing for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.

1.5 System Description

- .1 Performance Requirements: Provide a fire rating glazing manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.
 - .1 Fire Rating: Fire resistant glazing shall be fire rated from 20-180 minutes with hose stream and is impact safety rated to meet CPSC 16 CFR 1201 Category I and II.
 - .2 Fire resistant glazing shall be tested in accordance with NFPA 80, NFPA 252, NFPA 257, UL 9, UL 10B, UL 10C, ULC 104 and ULC 106.

.3 Testing Laboratory: Fire test shall be conducted by a nationally recognized independent testing laboratory.

.2 Listings and Labels: Fire rated glazing shall be under current follow-up service by a nationally recognized independent testing laboratory approved by OSHA and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

1.6 Project Conditions

.1 Field Measurements: Verify actual measurements for openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

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 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 Fire Rated Glazing

.1 Material:

.1 Fire protective impact safety rated laminated glass ceramic with hose stream, fire rating as indicated.

.2 Conforming to CAN/ULC S104 and CAN/ULC S106

.2 Product and Manufacturer:

.1 PYRAN Platinum L as manufactured by SCHOTT Technical Glass Solutions

.2 Keralite Select L as manufactured by VETROTECH SAINT-GOBAIN NORTH AMERICA INC

.3 Firelite Plus Premium as manufactured by Nippon Glass.

.3 Design Requirements:

.1 Thickness: 8 mm thick.

.2 Weight: 19.5 kg/m²

.3 Sound Transmission Rating: 36 STC.

.4 Appearance: Neutral colouration free of amber tints.

.5 Fire Rating: Fire rated from 20-180 minutes with hose stream.

.6 Impact Safety Rating: Meet CPSC 16 CFR 1201 Category I & II.

.7 Cradle to Cradle Certification: Must be C2C Silver Certified.

.8 Polished finish.

.9 ANZI Z97 Impact Safety Filmed and Laminated

.10 Environmental Impact: Manufacturing process and final composition free from toxins or hazardous heavy metals.

.4 Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory and fire rating.

2.2 Accessories

.1 Glazing Accessories: Manufacturer recommended fire rated glazing accessories as follows:

.1 Glazing tape: Closed cell polyvinyl chloride (PVC) foam, Pemko Manufacturing Company, FG3000S90 or Unifax Corporation Fiberfrax Alumino-Silicate fiber glazing tape.

.2 Setting blocks: Calcium silicate or hardwood.

.3 Cleaners, primers, sealers: Type recommended by manufacturer of glass and gaskets.

2.3 Related Products

.1 Glazing shall be installed in an equally rated framing system.

2.4 Source Quality

.1 Obtain fire rated glazing products from a single manufacturer.

.2 Fabrication Dimensions: Fabricate to required dimensions.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

.1 Comply with manufacturer's product data including product technical bulletins and installation instructions.

3.2 Examination

.1 Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer's instructions.

3.3 Installation

.1 Comply with referenced GANA manuals and instructions of manufacturers of glass, glazing sealants and glazing compounds.

.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and set aside pieces with edge damage that could affect performance.

.3 Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

.4 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

.5 Arrange two setting blocks located at quarter points of glass with edge block no more than 150 mm from corners.

- .6 Glaze vertically into labeled fire rated frames or fire rated walls with the same fire rating as the glass and push against tape for full contact at perimeter of pane or unit.
- .7 Place glazing tape on free perimeter of glazing in same manner described above.
- .8 Install removable stop and secure without displacing the tape.
- .9 Install so that appropriate markings remain permanently visible.
- .10 Field cutting or tampering is strictly prohibited.

3.4 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Protect glass from contact with contaminating substances resulting from construction operations. Remove such substances by method approved by manufacturer.
- .3 Wash glass on both faces not more than four days prior to date schedule for inspections intended to establish date of Substantial Performance. Wash glass by method recommended by glass manufacturer.
- .4 Remove temporary coverings and protection of adjacent work areas.
- .5 Remove construction debris from project site and legally dispose of debris.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 07 84 00 Firestopping
- .2 Section 07 92 00 Joint Sealants
- .3 Section 07 95 13 Expansion Joint Covers
- .4 Section 09 22 16 Non-Structural Metal Framing
- .5 Section 09 91 23 Interior Painting

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C475/C475M-17(2022) Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
 - .2 ASTM C514-04(2020) Standard Specification for Nails for the Application of Gypsum Board
 - .3 ASTM C840-20 Standard Specification for Application and Finishing of Gypsum Board
 - .4 ASTM C954-22 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
 - .5 ASTM C1002-22 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
 - .6 ASTM C1047-19 Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
 - .7 ASTM C1396/C1396M-24 Standard Specification for Gypsum Board
 - .8 ASTM C1629/C1629M-19 Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
 - .9 ASTM E90-09(2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - .10 ASTM E814-13a(2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
 - .11 ASTM E1966-15(2019) Standard Test Method for Fire-Resistive Joint Systems
 - .12 ASTM G21-15(2021)e1 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- .2 American National Standards Institute (ANSI)
 - .1 ANSI A118.9-1992 Test Methods and Specifications for Cementitious Backer Units.
- .3 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.
- .4 Gypsum Association (GA)
 - .1 GA-214-2022 Recommended Levels of Gypsum Board Finish.
 - .2 GA-216-2021 Application and Finishing of Gypsum Board.
- .5 Wall and Ceiling Bureau (WCB)
 - .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.

1.5 Quality Assurance

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

1.6 Design Requirements

- .1 Where indicated provide minimum sound transmission rating of installed partitions of STC 50 tested to ASTM E90.
- .2 Provide fire resistance rating of installed partitions as indicated and according to referenced ULC 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, Abuse Resistant: ASTM C1658/C1658M.
 - .1 Basis of Design: Gold Bond Building Products, LLC provided by National Gypsum Company:
 - .1 Gold Bond eXP Interior Extreme AR Gypsum Panel.
 - .2 Thickness: 15.9 mm.
 - .3 Core: Type X.
 - .4 Edges: Tapered.
 - .5 Sustainability: GREENGUARD [Gold] Certified.
 - .6 Mold/Mildew Resistance: ASTM D3273; Score of 10.
 - .7 Surface Abrasion: ASTM C1629/C1629M; Level 3.
 - .8 Indentation: ASTM C1629/C1629M; Level 1.
 - .9 Soft-Body Impact: ASTM C1629/C1629M; Level 2.
 - .10 Hard-Body Impact: ASTM C1629/C1629M; Level 1.
- .3 Mold, Mildew and Moisture Resistant Paper Faced Gypsum Board
 - .1 Gypsum Board, Regular Core, Mold, Mildew, Moisture Resistant: ASTM C1396/C1396M.
 - .1 Basis of Design: Gold Bond Building Products, LLC provided by National Gypsum Company:
 - .1 Gold Bond® XP Gypsum Board.
 - .2 Thickness: 1/2 inch (12.7 mm).
 - .3 Core: Regular.
 - .4 Edges: Tapered.
 - .2 Sustainability: GREENGUARD [Gold] Certified.
 - .3 Mold/Mildew Resistance: ASTM D3273; Score of 10.
 - .4 Mold/Mildew Resistance: ASTM G21, Score of 0

2.2 Fastening and Adhesives

- .1 Drywall Screws: To ASTM C954 or ASTM C1002 self-drilling, self-tapping, case hardened, length to suit board thickness and provide minimum 12 mm penetration into support.
- .2 Joint Tape: To ASTM C475, 50 mm perforated with preformed seam, mould and mildew resistant.
 - .1 Joint tape for abuse resistant gypsum board: CGC Mould Resistant Fiberglass Drywall Tape.
- .3 Joint Filler and Topping: To ASTM C475 vinyl or latex base, slow setting.
- .4 Laminating Compound: as recommended by manufacturer, asbestos-free.

2.3 Accessories

- .1 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated by hot-dip process 0.5 mm base thickness, perforated flanges, one piece length per location.
- .2 Insulating Strip: Rubberized, moisture resistant, 3.0 mm thick, 12 mm wide closed cell neoprene strip, with self-sticking permanent adhesive on one face; lengths as required.

- .3 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 Gypsum Board Application

- .1 Do application and finishing of gypsum board in accordance with ASTM C840 and/or GA-216 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 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.

3.3 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.

3.4 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.

3.5 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. Finish to GA-214 Level 5.
- .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.

3.6 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 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-23 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 C1002-22 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.

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 Thickness of materials shall be selected from manufacturer's standard span tables to suit total height requirements.
- .2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.
- .3 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .4 Tie Wire: 0.90 mm, galvanized, soft annealed, steel wire or clip as recommended by the manufacturer of furring channels.
- .5 Wind bearing light weight steel stud framing for exterior wall applications is specified in Section 05 41 00.

2.2 Metal Furring and Suspension Systems

- .1 Channel framing: to ASTM C645, stud size as indicated, roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board.
 - .1 Thickness of materials to conform to referenced standards unless noted otherwise.
- .1 Metal Furring Runners, Hangers, Tie Wires, Inserts, Anchors: to ASTM C645 , electro-zinc coated steel.
- .2 Runner Channels: 38 x 19 x 0.59 mm and 38 x 9.5 x 0.45 mm, hot dip or electro-galvanized sheet steel. Use of various sizes governed by applied loads and applicable spans.
- .3 Drywall Furring Channel: Channel shaped furring member for screw attachment of drywall with knurled face. For interior use. Furring masonry or concrete surfaces. Cross furring under steel joist or suspended metal channels in suspended ceiling systems: 70 x 22 x 0.9 mm with knurled face, hot dip or electro-galvanized sheet steel. Bailey D-1001.
- .4 Deflection Track: Bailey Multi-Slot Track MST 250, size to suit studs, and top deflection clips TDC 350 and TDC 587.
- .5 Horizontal Flange attachment: Bailey Horizontal Flange Attachment Clip (HFA Clip).
- .6 Hangers: minimum 4.1 mm diameter (or as required by ULC fire rating design requirements) mild

steel rods.

2.2 Fasteners

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

2.3 Accessories

- .1 Acoustic sealant: As specified in Section 07 92 00.
- .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.

Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

- .9 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .10 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
- .11 Install heavy thickness single jamb studs at openings.
- .12 Erect track at head of door/window openings and sills of window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .13 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .14 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .15 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .16 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks.
- .17 Install continuous insulating strips to isolate studs from un-insulated surfaces.
- .18 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 Wall Furring

- .1 Install wall furring for gypsum board wall finishes in accordance ASTM C754 and ASTM C841 except where specified otherwise and indicated on drawings.
- .2 Frame openings and around built-in equipment, cabinets, access panels, etc., on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.4 Suspended and Furred Ceilings and Bulkheads

- .1 Erect hanger and runner channels for suspended gypsum board 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.

3.5 Gypsum Board

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

3.6 Cleaning

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

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 03 30 00 Cast-in-Place Concrete
- .2 Section 04 20 00 Concrete Unit Masonry
- .3 Section 07 26 19 Topical Moisture Mitigation System
- .4 Section 07 92 00 Joint Sealants
- .5 Section 09 21 16 Gypsum Board

1.3 References

- .1 ASTM International (ASTM)
 - .1 ACTM C144-18 Standard Specification for Aggregate for Masonry Mortar
 - .2 ASTM C150/C150M-22 Standard Specification for Portland Cement
 - .3 ASTM C207-18 Standard Specification for Hydrated Lime for Masonry Purposes
 - .4 ASTM C627-18e1 Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems using the Robinson-Type Floor Tester
- .2 American National Standards Institute (ANSI)
 - .1 ANSI A108/A118/A136.1:2017 American National Specifications for the Installation of Ceramic Tile.
 - .2 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 2019-2021 Specifications Guide 09 30 00, Tile Installation Manual.
 - .2 TTMAC Hard Surface Maintenance Guide.

1.4 Submittals

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

- .5 Maintenance Data: Provide maintenance data for tile work, for incorporation into Maintenance Manuals specified under Section 01 78 00.

1.5 Quality Assurance

- .1 Do tile work in accordance with Installation Manual 200, Ceramic Tile, by Terrazzo, Tile and Marble Association of Canada (TTMAC), except where this specification is more stringent.
- .2 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.

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 Provide extra materials of acoustic units in accordance with Section 01 78 00 – Closeout Submittals.
- .2 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 Provide coves, corners, reveals, surf caps, inners and outers as required to complete the work.

2.2 Ceramic Tile

- .1 CT1: Ceramic Wall Tile: Olympia Colour & Dimension Collection, bright glazed, 102 x 305 mm. Up to four (4) colours will be selected from full range of manufacturer's standards. (80% field colour, 20% Accent colours).
- .2 PCT1: Porcelain Ceramic Floor Tile: Olympia Tile Rock Series, 305 x 610 mm. Colour will be selected from full range of manufacture's standards.

2.3 Mortar, Adhesives and Grout Material

- .1 Primer: Low VOC, low viscosity primer as recommended by manufacturer to suit substrate and site conditions; provide proof of bonding ability of setting systems where manufacturer recommends that a primer is not necessary to installation.
- .2 Surface Preparation Materials:
 - .1 Portland Cement Mortar: Scratch and bond coat, levelling bed containing the following:
 - .1 Portland Cement: Meeting or exceeding requirements of CSA A3000, Type GU.
 - .2 Hydrated Lime: Meeting or exceeding requirements of ASTM C207, Type N.
 - .3 Sand: Meeting or exceeding requirements of ASTM C144, passing 16 mesh.
 - .4 Water: Potable.
- .3 Wall Tile Systems:
 - .1 Thin Set Interior Installation: Dry set mortar meeting or exceeding requirements of ANSI A118.1 formulated for thin set applications, factory sanded mortar consisting of Portland cement, sand and additives requiring only addition of potable water for installation complete with bond enhancing latex additive.
- .4 Floor Tile Systems:

- .1 Thin Set Interior Installation: Latex-Portland cement mortar meeting or exceeding requirements of ANSI A118.1.
- .5 Adhesive Systems:
 - .1 Epoxy Adhesive: Thin set adhesive system using 100% solids epoxy resin and epoxy hardener meeting or exceeding requirements of ANSI A108.1; stain proof, chemical resistant and having high temperature resistance and water cleanable.
 - .2 Organic Adhesive: Thin set wall tile adhesive system using non-flammable, water resistant, latex adhesives for interior use meeting or exceeding requirements of ANSI A108.1, Type 1.
- .6 Tile Grout Systems:
 - .1 Unsanded Portland Cement Grout: factory blended dry-set stain resistant, latex modified Portland cement meeting or exceeding requirements of ANSI A118.6, specifically formulated for joints less than or equal to 3 mm in width.
 - .2 Sanded Portland Cement Grout: Factory blended dry-set stain resistant, latex modified Portland cement and graded silica sand meeting or exceeding requirements of ANSI A118.6, specifically formulated for joints greater than 3 mm in width.
 - .3 Polymer Modified Grout: factory blended stain resistant polymer modified Portland cement meeting or exceeding requirements of ANSI A118.7, specifically formulated for joints greater than 3 mm in width.
 - .4 Epoxy Grout: Water cleanable, chemical resistant, factory blended modified Portland cement compound with 100% epoxy adhesives and hardeners meeting or exceeding requirements of ANSI A118.3.

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.
- .3 Topical Moisture Mitigation System as specified in Section 07 26 19

2.5 Floor Sealer and Protective Coating

- .1 To tile and grout manufacturer's recommendations.

2.6 Accessories

- .1 Reducers, edge trim, and transition strips: Schluter Systems purpose made aluminum.
- .2 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.

.3 Sealant: as specified in Section 07 92 00.

2.7 Mixes

.1 Mix premanufactured mortars and grouts in accordance with referenced standards, and mortar and grout manufacturer's written instructions; mix site mixed materials as follows:

.1 Scratch Coat (by volume): Mix 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC detail.

PART 3 EXECUTION

3.1 Surface Conditions

- .1 Surfaces on which tile is to be applied, shall be thoroughly cleaned down.
- .2 Verify that concrete substrates have been allowed to cure for a minimum of 28 days in accordance with TTMAC requirements.
- .3 Verify that substrates for bonding tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and are within starting flatness tolerances as specified in Section 03 30 00 and are ready for application of levelling materials specified in this Section.
- .4 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.
- .5 Drywall surfaces on which wall and floor tile is to be applied, shall be free from dust, excess plaster and shall be plain and true without any irregularities. Prepare existing gypsum board surfaces as recommended by TTMAC and product manufacturer to support tile installation.
- .6 Existing painted masonry or concrete wall surfaces to receive ceramic tile shall be thoroughly cleaned of all paint down to concrete or concrete block surfaces using paint stripper. Prepare painted surfaces in accordance with manufacturer's instructions and TTMAC recommendations.
- .7 In the event of discrepancies, immediately notify the Consultant and do not proceed with installation in such areas until all such discrepancies have been fully resolved.
- .8 Check that conditions of temperature, humidity, traffic and usage are suitable as required by Installation Manual specifications. Minimum temperature to be not less than 10°C.
- .9 Check that surfaces ready to receive tiling are cured, level and/or graded, plumb, smooth, firm, free from loose particles, droppings, projection, grease, solvent, paint and other foreign matter and from other unsuitable conditions.
- .10 Install transition strips, reducers and edge trim at exposed edges of all tiled walls and floors in accordance with manufacturer's instructions.

3.2 Installation

- .1 Install tiling in accordance with requirements of TTMAC Tile Installation Manual and parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials, and to methods required for complete tile installation.

- .2 Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions:
 - .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - .2 Make cut edges smooth, even and free from chipping.
 - .3 Do not split tile.
- .3 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 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.
- .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 installed with chemical resistant mortars and grouts
 - .2 Tile 300 mm or larger in any direction
 - .3 Tile with raised or textured backs
 - .4 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 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.

- .9 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 following spacings:

Environment	Minimum	Maximum	Joint Width (minimum)
Interior/Shaded	4800 mm	6100 mm	6 mm

3.3 Grouting

- .1 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of TTMAC, and as follows:
 - .1 Allow proper setting time before application of grout.
 - .2 Pre-seal or wax tiles requiring protection from grout staining.
 - .3 Force grout into joints to a smooth, dense finish.
 - .4 Remove excess grout in accordance with manufacturer's written instructions and polish tile with clean cloths.
- .2 Grout all tile using specified grout in strict accordance with manufacturers written instructions all to give a flush, hard joint.
- .3 Joints in tile shall be filled solid and flush with grout.
- .4 Prepare joints and mix grout in accordance with manufacturer's printed instructions. Force maximum amount of grout into joints, avoiding air traps or voids.
- .5 Remove all excess grout by washing diagonally across the joints. Check for voids, air pockets and gaps and fill same. Remove all discoloured grout and replace with new.
- .6 Cure all joints.

3.4 Floor Sealer and Protective Coatings

- .1 Apply in accordance with manufacturer's instructions.

3.5 Cleaning and Protection

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Cleaning: Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completion of placement and grouting and as follows:
 - .1 Remove grout residue from tile as soon as possible.
 - .2 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation; protect

- metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.
- .3 Flush surface with clean water before and after cleaning.
 - .3 Protection: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies as follows:
 - .1 Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.
 - .2 Protect floor areas from traffic after grouting is completed in accordance with manufacturer's written instructions.
 - .3 Prevent foot and wheel traffic from floors for a minimum of 24 hours after completion of grouting.
 - .4 Provide protective covering until Substantial Performance of the Work.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 09 66 13 Portland Cement Terrazzo Flooring

1.3 References

- .1 Canadian Standards Association (CSA)
 - .1 CSA/ASC B651:23 Accessible Design for the Built Environment
 - .2 The Accessibility for Ontarians with Disabilities Act (AODA)
 - .3 Ontario Building Code

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: For each product. Include installation instructions for using setting materials and grouts.
- .3 Layout: Submit a layout for Tactile Warning Dome system in accordance with the Ontario Building Code as well as the Accessibility for Ontarians with Disabilities Act.
- .4 Installation Data: Manufacturer's special installation requirements.
- .5 Provide maintenance data for Tactile Warning Indicators for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00.

1.5 Regulatory Requirements

- .1 Conform to the following:
 - .1 Ontario Building Code OBC Section 3.8
 - .2 CSA-B651:23 Accessible Design for the Built Environment
 - .3 The Accessibility for Ontarians with Disabilities Act (AODA).

1.6 Quality Assurance

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- .2 Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.7 Shipping, Handling and Storage

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

1.8 Project Conditions

- .1 Do not install tile materials when ambient air temperature and substrate temperature is less than 12 °C and maintain a substrate temperature level of not less than 10 °C or greater than 20 °C for a minimum of 24 hours before, during and a minimum of 72 hours after installation.
- .2 After initial set maintain temperature above 5 °C for 21 days before exposure.

1.9 Waste Management and Disposal

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

1.10 Warranty

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

PART 2 PRODUCTS

2.1 Tactile Warning Dome System (TWS1)

- .1 Type: Tactile Domes: Surface Embedded With anchor/post leg.
- .2 Basis-of-Design Product: Advantage One Attention Indicator Dome by Advantage Tactile System Inc, or equivalent by Kinesik Engineering Products Inc.
- .3 Finish: stainless steel.
- .4 Layout: Provide a layout in accordance with Ontario Building Code and the AODA requirements.

2.2 Accessories

- .1 Provide adhesives and accessories in accordance with manufacturer's written recommendations

PART 3 EXECUTION

3.1 Examination

- .1 Verify existing conditions before starting work.
- .2 Verify exact location of area to receive tactile warning indicator installation.

3.2 Preparation

- .1 Provide templates and rough-in measurements as required.
- .2 Protect adjacent surfaces from damage during installation. Mask and cover adjacent surfaces, fixtures, and equipment.
- .3 Do not install tactile warning domes until terrazzo flooring has been finished true and smooth and to required profiles.

3.3 Installation

- .1 Install domes in accordance with manufacturer's written instructions at stair landings, ramps and where indicated.
- .2 Surface mount tile and dome systems on substrates indicated.
- .3 Install domes at 65 mm on centre.
- .4 Coordinate with installation of terrazzo flooring specified in Section 09 66 13.

3.4 Protection

- .1 Prevent traffic and loads on installed products until materials are cured and ready to accept loads. Provide protective barriers and devices.
- .2 Protect installation from excessive temperatures, freezing, and water immersion, for 48 hours after installation.

3.5 Cleaning

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

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 C423-23 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E84-26 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(2022) 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.
- .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.

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 Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
 - .1 Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 Classification.
- .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 A653 / A653M – 23 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - .4 ASTM A1011/A1011M-23 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - .5 ASTM C635/C635M-22 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay in Panel Ceilings.
 - .6 ASTM C636/C636M-19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - .7 ASTM E84-26 Standard Test Method for Surface Burning Characteristics of Building Materials
 - .8 ASTM E119-22 Standard Test Methods for Fire Tests of Building Construction and Materials
 - .9 ASTM E1264-22 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 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.
- .2 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 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 Where required, provide fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .4 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 three times design load, but not less than 2.06 mm thick.
- .10 Channel Framing and Fittings: Strut type metal framing and components 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
- .2 Section 07 92 00 Joint Sealants
- .3 Section 09 36 00 Tactile Warning Indicators

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C33/C33M-18 Standard Specification for Concrete Aggregates
 - .2 ASTM C171-20 Standard Specification for Sheet Materials for Curing Concrete
 - .3 ASTM C241/C241M-21 Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic
 - .4 ASTM C309-19 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 51.34-M86 Vapour Barrier, Polyethylene Sheet for Use in Building Construction
- .3 CSA Group (CSA)
 - .1 CSA-A23.1:19/A23.2:19 Concrete Materials and Methods of Concrete Construction/ Methods of Test Methods and Standard Practice for Concrete
 - .2 CSA A3000-18 Cementitious Materials Compendium
- .4 Terrazzo Tile and Marble Association of Canada (TTMAC)
 - .1 TTMAC 09 66 00 Terrazzo Installation Manual 2009/2010 Edition.
 - .2 TTMAC Colour Plates.

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings indicating the type, size, and layout of divider strips and control joint strips and colour of floor areas.
- .3 Submit product data for divider strips, control joint strips and expansion joints.
- .4 Samples
 - .1 Submit two samples 300 x 300 mm in size illustrating colour, chip size and variation, mortar colour, and ground top surface of divider strip. All samples shall be prepared to match existing terrazzo flooring.
- .5 Provide maintenance data for terrazzo for incorporation into Operation and Maintenance Manual specified in Section 01 78 00 – Closeout Submittals.
 - .1 Include procedures for stain removal, stripping, sealing and finishing in accordance with TTMAC Maintenance Guide.
 - .2 Include the latest edition of the TTMAC Maintenance Guide for inclusion in the Operations and Maintenance manuals specified in Section 01 78 00 – Closeout Submittals. Give specific

warning of any maintenance practice or materials that may damage or disfigure the finished work or alter the coefficient of friction (slip resistance) of the finished surface.

1.5 Quality Control

- .1 Provide mockup of one m² of terrazzo flooring and one lineal metre of base.
- .2 Install mock up in area designated by the Consultant.
- .3 When accepted, mock up shall demonstrate minimum standard for work of this Section. Accepted mock up may remain as part of the Work.

1.6 Quality Assurance

- .1 Installer: employ skilled mechanics/applicators, trained and experienced in terrazzo work with a minimum of three years proven experience. If requested by Consultant, submit a listing of at least three previously completed projects of similar size and scope.

1.7 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Materials shall be delivered in the manufacturer's unopened containers marked with the brand name. Materials shall be delivered, handled, and stored in accordance with manufacturer's instructions in a manner that will prevent deterioration and contamination.

1.8 Environmental Requirements

- .1 Areas to receive terrazzo shall be maintained at a temperature above 10 ° C.
- .2 Maintain this temperature range for 24 hours before, during and 72 hours after installation of terrazzo.

1.9 Waste Management and Disposal

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

1.10 Warranty

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

PART 2 PRODUCTS

2.1 General

- .1 Portland Cement: CSA A3000, Type 1, white colour for topping mix or as required to match selected TTMAC colour plate, grey colour for underbed, modified to higher compressive strength requirements of 27.5 MPa, obtained from single source.
- .2 Sand: Sand shall conform to ASTM C33 for fine aggregate.

- .3 Colourants shall be alkali-resistant and nonfading. Pigments shall be of colours required to match selected TTMAC colour plate.
- .4 Marble chips shall be of domestic origin of sizes and colours required to match TTMAC colour plate selected. Marble chips shall have an abrasive hardness of not less than 10 when tested in accordance with ASTM C241 shall contain no deleterious or foreign matter; and the dust content shall be less than one percent by weight.
- .5 Epoxy Bonding Agent: Two component epoxy, bond strength of 2 MPa to failure with 20 MPa concrete.
- .6 Water: Potable.

2.2 Accessories

- .1 Reinforcing Mesh: CSA G30.5 50 x 50 x 1.5 mm, galvanized.
- .2 Divider Strips: In accordance with TTMAC Guides, inverted T shape, zinc coated steel or stainless steel, depth to suit, with anchoring features. Colour and thickness to match existing.
- .3 Control Joint Strips: 3 mm nominal width, zinc top strips, zinc coated steel bottom strip, 3 mm wide neoprene filler strip between side strips, with anchoring features.
- .4 Base Caps, Base Divider Strips, and Separator Strips: Match divider strips.
- .5 Foam Filler: Closed cell urethane foam, capable of compression to 50% of its thickness with full recovery.
- .6 Curing material shall be either liquid membrane-forming compound, wet sand, polyethylene sheeting, or water. Liquid membrane-forming compound shall conform to ASTM C309, Type I. Polyethylene sheeting shall conform to ASTM C171.
- .7 Terrazzo Cleaner: TTMAC 1001, 1002, 1003, or 1104 as applicable. Terrazzo cleaner shall be biodegradable, phosphate free and shall have a pH factor between 7 and 10 and be of a type specially prepared for use on terrazzo. Submit maintenance instructions for bonded terrazzo.
- .8 Sealer: Colourless, liquid, penetrating type to completely seal cementitious matrix surface, specially prepared for use on terrazzo and not detrimental to terrazzo components. Sealer must be UL listed as slip resistant.

PART 3 EXECUTION

3.1 Inspection

- .1 Examine the areas in which the work of this Section is to be installed and verify that substrates are ready to receive terrazzo work.
- .2 Do not begin terrazzo work until concrete substrate has cured 28 days, minimum.
- .3 Do not proceed with installation of terrazzo topping until improper conditions have been corrected.

- .4 Protect work during installation and protect finished surfaces while other work is being executed in the area.
- .5 Check for appropriate heating facilities and required working conditions.

3.2 Terrazzo Proportions

- .1 Underbed shall be composed of one part Portland cement to 4 parts sand. Water shall be added to provide workability at as low a slump as possible. Spread to a level 13 mm below the finished floor, to a thickness of approximately 30 mm
- .2 Terrazzo Topping shall be composed of one 43 kg bag of Portland cement per 91 kg of marble chips and approximately 20 L of water. Colour pigment shall be added as needed but not to exceed 1 kg per bag of cement. Water shall be added in sufficient quantity to provide workability at as low a slump as possible.

3.3 Installation

- .1 Install terrazzo flooring, base and all accessories in accordance with TTMAC guidelines and recommendations.
- .2 Underbed Placement: Surfaces of concrete subfloor shall be cleaned and saturated with water in accordance with TTMAC Installation Manual. Do not treat concrete substrate to receive bonded terrazzo with curing agent or additives which would preclude bonding. Excess water shall be removed from the subfloor before slushing and brooming with neat cement paste. The underbed shall be placed on the concrete subfloor and shall be screeded to an elevation 13 mm below the finished floor. Divider strips shall be installed in the semi-plastic underbed. The underbed shall be firmly troweled along the edges to insure positive anchorage of the divider strips. Control joint strips shall be installed over subfloor expansion joints and shall extend the full depth of the underbed.
- .3 Set divider strips in accordance with layout indicated while underbed is still plastic. Set strips to straight lines and to the proper level to ensure that tops of strips will show uniformly after completing grinding and finishing operations. Fit joints and intersections tight. Where divisions in field work are not shown, divide field work into squares or rectangles of uniform size and not more than 1800 mm on a side. Divide borders by strips to coincide with the layout of division strips in the field of floors. Place edging strips at doorways between terrazzo and other types of flooring and along the edges of terrazzo borders adjoining other types of floor finishes or floor coverings. Place expansion strips over control joints, construction joints, and expansion joints.
- .4 Placing Terrazzo Topping: The underbed shall be slushed and broomed in accordance with TTMAC Installation Manual with neat cement paste of the same colour as required for the topping. The topping shall be placed in panels formed by divider strips and shall be troweled level with the top of the strips. The troweled surface shall be seeded with chips in the same colour proportions as contained in the terrazzo mix, troweled and rolled with heavy rollers until excess water has been extracted. The terrazzo shall be troweled to a uniform surface disclosing the lines of the divider strips.

3.4 Curing

- .1 The terrazzo shall be cured until the topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding. Keep the completed terrazzo continuously moist and free

of traffic during the curing period. Cure by covering with a liquid membrane-forming compound, sheet materials, wet sand, or sprinkling with water.

3.5 Finishing

- .1 Finish terrazzo to TTMAC instructions.
- .2 After curing the grout coat for a minimum of 72 hours, grind the floor using a No. 80 or finer grit stone. In the latter stages of grinding, use grit stones or other abrasive in the grinding machine of a grain or fineness that will give the surface a honed finish. Grind and rub by hand small areas, inaccessible portions, and corners that cannot be reached by the grinding machine. The honed surface of finished terrazzo shall show not less than 70 percent of the area as exposed aggregate evenly distributed, and shall conform in appearance to the approved samples. Finished thickness of terrazzo topping shall be a minimum of 13 mm.

3.6 Allowable Tolerances

- .1 Maximum Variation from Flat Surface: 3 mm in 1 m.
- .2 Maximum Variation from Level: 3 mm, in 3 m.

3.7 Rough Grinding

- .1 After topping has cured, the terrazzo shall be machine ground using the wet method, to a true even surface using No. 24 or finer grit followed by No. 80 grit or finer grit stone. Finish floor surface shall not vary by more than 2 mm/meter.

3.8 Grouting

- .1 After rough grinding, the floor shall be cleansed with clean water and rinsed. After removing excess rinse water, the floor shall be grouted using identical Portland cement, colour and pigments as used in the topping taking care to fill voids. After the grout has attained its initial set, the surface shall be cured for a minimum of 72 hours.

3.9 Fine Grinding

- .1 After grout has cured, the surface shall be ground with fine grit stones until all grout is removed from the surface. Upon completion of grinding, the terrazzo flooring shall show a minimum of 70 percent of marble chips.

3.10 Protection

- .1 The terrazzo work shall be covered and protected from damage until completion of the work of all other trades.

3.11 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Cleaning and Sealing: Refer to latest edition of TTMAC Maintenance Guide. Sealers should be ULC listed as slip resistant. sealer shall be applied in accordance with the 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 03 30 00 Cast-in-Place Concrete

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM C1583/C1583M-25 Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
 - .2 ASTM D638-22 Standard Test Method for Tensile Properties of Plastics
 - .3 ASTM D2240-15(2021) Standard Test Method for Rubber Property—Durometer Hardness
 - .4 ASTM F1869-23 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - .5 ASTM F2170 - 19a Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
- .2 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-06 Architectural Coatings

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit duplicate 150 x 150 mm samples of coating applied to smooth cement board. Include broadcast aggregate material in samples.
- .3 Submit full range of manufacturer's standard colours for selection by the Consultant.
- .4 Provide maintenance data for floor coating for incorporation into Operating and Maintenance Manuals specified in Section 01 78 00- Closeout Submittals.

1.5 Quality Control

- .1 Pre-application Meeting: Convene a pre-application meeting 2 weeks before start of application of coating. Require attendance of parties directly affecting work of this Section, including Contractor, Consultant, applicator, and manufacturer's representative. Review surface preparation, mixing, application, protection, and coordination with other work.

1.6 Project Conditions

- .1 Environmental Limitations: Apply resinous coating within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply resinous coating to damp or wet substrates. Apply when temperatures are between 10 °C and 32 °C. Do not apply when relative humidity exceeds 70 percent, or when temperatures are less than -15 °C above dew point.
 - .1 Coordinate coating work with other trades to ensure adequate illumination, ventilation, and dust free environment during application and curing of coating.
- .2 Conditions for Concrete
 - .1 New concrete shall be in place a minimum 28 days before proceeding.

- .2 Any cementitious repair mortars must have a full 7-day cure prior to coating unless otherwise approved in writing by architect.
- .3 Do not apply resinous coatings if there is excessive moisture in the concrete or if the moisture vapour emission rate (MVER) is high.
 - .1 Prior to application of resinous coating, perform either of these tests: ASTM F2170 or ASTM F1869. If the relative humidity is 70% or greater, or the MVER is 3 lbs/1000 ft² /24 hours or greater notify Consultant in writing and contact manufacturer for recommendations.

1.7 Quality Assurance

- .1 Obtain primary resinous flooring materials, including primers, from resinous flooring manufacturer. Obtain secondary materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of type and from source recommended by resinous flooring manufacturer.
- .2 Resinous flooring manufacturer shall have ISO 9001 Quality Certification.
- .3 Applicator: approved by manufacturer.

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 Resinous Coating:
 - .1 Prime Coat: (2) component, clear, penetrating water-based epoxy primer with the following characteristics:
 - .1 Mixed Viscosity: 1,500 to 3,500 cps @ 75 °F.
 - .2 Solids Content of 32%
 - .3 Product:
 - .1 Euclid Chemical Company; Duraprime WB, www.euclidchemical.com
 - .2 System Base Coat: (2) component, 100% solids, high build, flexible epoxy coating resin with the following characteristics:
 - .1 Shore D Hardness of 75 to 85 per ASTM D2240
 - .2 Tensile Strength 1,800 to 2,000 psi per ASTM D638
 - .3 Tensile Elongation 15% to 25% at break per ASTM D638
 - .4 Mixed Viscosity: 3,000 to 5,000 cps @ 75 °F.
 - .5 Product:
 - .1 Euclid Chemical Company; DuralKote 240, www.euclidchemical.com
 - .2 Colour: To be chosen from manufactures list of standard colours
- .2 Joint Filler: As recommended by manufacturer
- .3 Aggregates: well graded 20/40 mesh silica sand for broadcasting on non-slip surfaces, as recommended by the manufacturer

PART 3 EXECUTION

3.1 Examination

- .1 Prior to commencement of resinous floor system application examine substrates, with Applicator present, for compliance with requirements and for other conditions affecting performance of resinous flooring.
- .2 Verify compatibility with and suitability of substrates.
- .3 Report, in writing, surfaces left in improper condition by other trades. Application of coating indicates acceptance of surfaces and conditions.

3.2 Preparation

- .1 Clean and mechanically prepare substrates according to manufacturer's written recommendations to produce clean, sound, dust-free, dry, absorptive substrate free of grease, oils, curing compounds, surface laitance, soil and other contaminants which may interfere with bond of resinous coating. Surface profile should be equal to CSP 2 to 4 in accordance with ICRI Guideline 310.2. Steel surfaces should be blasted in accordance with SSPC-SP10 to a "NEAR WHITE" finish using clean dry blasting media.
- .2 Following surface preparation the cleaned concrete shall be tested for compliance with the following:
 - .1 Minimum surface tensile strength of 250 psi when tested with a "Elcometer" or similar pull tester per ASTM C1583.
 - .2 Begin resinous coating application only after minimum concrete curing and drying period recommended by resinous coating manufacturer has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry
- .3 Prepare vertical and horizontal surfaces at terminations and penetrations through resinous coating and at expansion joints, drains, and sleeves according to manufacturer's written recommendations
- .4 Mask adjoining surfaces not receiving resinous coating, drains, and other substrate penetrations to prevent spillage, leaking, and migration of coatings.
- .5 Static Cracks and Non-Moving Joints shall be routed to a minimum width of 6 mm and a minimum depth of 13 mm and filled with a semi-rigid epoxy joint filler approved by resinous coating manufacturer or a detail coat of specified resinous coating.

3.3 Application

- .1 Resinous System Application
 - .1 Primer Coat Application: Roller apply properly mixed Prime Coat material at manufacturer's recommended coverage rate of 3.06 to 6.13 m²/litre.
 - .2 Resinous System Base Coat Application: Once prime coat is tack free, but no later than 24 hours after application of prime coat, apply uniform application of properly mixed Resinous System Base Coat to at a rate of 2.45 to 3.68 m²/litre per manufacturer's written recommendations. Allow 5 to 8 hours but no more than 24 hours before applying additional coats. [Repeat for second coat.
 - .3 Resinous Coating System Top-Coat Application: Apply uniform application of properly mixed resinous coating system top-coat per manufacturer's written recommendations at manufacturer's recommended coverage rate. Apply to tack free surface no more than 24 hours after application of previous coat.

- .2 Broadcast silica sand aggregate on all horizontal surfaces immediately after application of final coat of epoxy and in accordance with manufacturer's recommendations.
- .3 Cove Base shall consist of mixture of base coat resin and finely graded, clean dry, trowelable aggregates troweled to properly prepared vertical surface in order to create coved, seamless, integral transition.

3.4 Curing and Protection

- .1 Prevent contamination and damage during application and curing stages.
- .2 Protect resinous flooring from damage and wear during remainder of construction period.

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 08 11 00 Metal Doors and Frames
- .2 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 MPI Standard GPS-1-12 and GPS-2-12 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.

1.6 Shipping, Handling and Storage

- .1 Refer to Section 01 61 00 – Common Product Requirements.
- .2 Deliver and store materials in original containers, sealed, with labels intact. Labels to indicate:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.
 - .3 Compliance with applicable standard.
 - .4 Colour number in accordance with established colour schedule.
- .3 Provide and maintain dry, temperature controlled, secure storage. Store materials and equipment in well-ventilated area with temperature range 7 °C to 30 °C. Store materials and supplies away from heat generating devices.
- .4 Observe manufacturer's recommendations for storage and handling.
- .5 Keep areas used for storage, cleaning and preparation, clean and orderly. After completion of operations, return areas to clean condition.
- .6 Remove paint materials from storage only in quantities required for same day use.
- .7 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .8 Remove damaged, opened and rejected materials from site.

1.7 Fire Safety Requirements

- .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.8 Waste Management and Disposal

- .1 Refer to Section 01 74 19 – Construction Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers. Handle and dispose of hazardous materials in accordance with Municipal regulations.
- .3 Unused materials must be disposed of at official hazardous material collections site.
- .4 Paint and related materials are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from the Ministry of the Environment.
- .5 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- .6 Place materials defined as hazardous or toxic waste in containers or areas designated for hazardous waste.

1.9 Maintenance

- .1 Extra Materials:
 - .1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Quantity: provide one four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
 - .3 Deliver to Owner and store where directed.

1.10 Ambient Conditions

- .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
 - .2 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 °C for 24 hours before, during and after paint application until paint has cured sufficiently.
 - .3 Provide continuous ventilation for seven days after completion of application of paint
 - .4 Provide minimum lighting level of 323 Lux on surfaces to be painted.
- .2 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless specifically pre-approved by Consultant and product manufacturer, perform no painting work when:
 - .1 Ambient air and substrate temperatures are below 10 °C.
 - .2 Substrate temperature is over 32 °C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
 - .4 Relative humidity is above 85 % or when dew point is less than 3 °C variance between air/surface temperature.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .2 Perform no painting work when maximum moisture content of substrate exceeds 12%.
 - .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter.
 - .4 Test concrete surfaces for alkalinity as required.
- .3 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction

- operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
- .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
 - .4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 - .5 Do not apply paint when:
 - .1 Temperature is expected to drop below 10 °C before paint has thoroughly cured.
 - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 - .3 Surface to be painted is wet, damp or frosted.
 - .6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.
 - .7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 - .8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

PART 2 PRODUCTS

2.1 Materials

- .1 Paint materials listed in latest edition of MPI Approved Products List (APL) and from a single manufacturer for each system used are acceptable for use on this project.
- .2 Paint materials for paint systems: to be products of single manufacturer.
- .3 Only qualified products with E2 or E3 "Environmentally Friendly" ratings are acceptable for use on this project.
- .4 Use only MPI listed 'L' rated materials.
- .5 Paints, coatings, adhesives, solvents, cleaners, lubricants, and other fluids, to be as follows:
 - .1 Be water-based water soluble water clean-up.
 - .2 Be non-flammable biodegradable.
 - .3 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
 - .4 Be manufactured without compounds which contribute to smog in the lower atmosphere.
 - .5 Do not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
- .6 Water-borne surface coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products arising therefrom, will meet requirements of applicable governmental acts, by-laws and regulations including Fisheries Act and Canadian Environmental Protection Act (CEPA).
- .7 Water-borne surface coatings must not be formulated or manufactured with aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .8 Water-borne surface coatings and recycled water-borne surface coatings must have flash point of 61 °C or greater.

- .9 Both water-borne surface coatings and recycled water-borne surface coatings must be made by a process that does not release:
 - .1 Matter in undiluted production plant effluent generating a 'Biochemical Oxygen Demand' (BOD) in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
 - .2 Total Suspended Solids (TSS) in undiluted production plant effluent in excess of 15 mg/L to a natural watercourse or a sewage treatment facility lacking secondary treatment.
- .10 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 or E3 rating.

2.2 Colours

- .1 Consultant will provide Colour Schedule.
- .2 Selection of colours will be from manufacturer's full range of colours.
- .3 Where specific products are available in restricted range of colours, selection will be based on limited range.
- .4 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 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 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 contaminants 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 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.
- .6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.
- .7 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 Field Quality Control

- .1 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 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.7 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- .3 Remove protective coverings and warning signs as soon as practical after operations cease.
- .4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

End of Section

PART 1 GENERAL

1.1 General

- .1 Conform to the requirements of Division 1.

1.2 Related Sections

- .1 Section 05 12 23 Structural Steel
- .2 Section 05 31 00 Steel Deck
- .3 Section 05 50 00 Metal Fabrications
- .4 Section 06 20 00 Finish Carpentry
- .5 Section 06 43 00 Wood Stairs
- .6 Section 08 11 00 Metal Doors and Frames
- .7 Section 09 21 16 Gypsum Board
- .8 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 MPI Standard GPS-1-12 and GPS-2-12 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 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 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
- .6 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 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.
- .6 Formulate and manufacture water-borne surface coatings with no aromatic solvents, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.
- .7 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 Structural Steel:
 - .1 INT 5.1X Latex G5 semi-gloss finish (over quick dry shop primer).
- .2 Metal Fabrications:
 - .1 INT 5.3A Latex G5 semi-gloss finish
- .3 Zinc Coated Metal Deck:
 - .1 INT 5.3H. Interior Latex semi-gloss, dry fog/fall type.
- .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 Gypsum Board: Walls:
 - .1 INT 9.2A Latex G3 eggshell finish over latex sealer.

- .7 Gypsum Board: Ceilings and Bulkheads:
 - .1 INT 9.2A Latex G2 velvet finish over latex sealer.
- .8 Wood Floors and Stairs: (including hardwood flooring, etc.)
 - .1 INT 6.5M Polyurethane, clear, 2 component finish.
- .9 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.
 - .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, 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 09 21 16 Gypsum Board

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 ASTM A924/A924M-22a Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - .3 ASTM B456-17(2022) Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 - .4 ASTM C1503-18 Standard Specification for Silvered Flat Glass Mirror
 - .5 ASTM D1187/D1187M-97(2018) Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal
- .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 CSA Group (CSA)
 - .1 CSA/ASC B651:23 Accessible Design for the Built Environment
 - .2 CSA G164-18(R2023) Hot Dip Galvanizing of Irregularly Shaped Articles

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.
- .3 Samples:
 - .1 Submit samples when requested.
 - .2 Samples to be returned for inclusion into work.
- .4 Closeout Submittals:
 - .1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 Shipping, Handling and Storage

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

1.6 Waste Management and Disposal

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

1.7 Extra Materials

- .1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.
- .2 Deliver special tools to Owner.

PART 2 PRODUCTS

2.1 Materials

- .1 Sheet steel: to ASTM A653 with ZF001 designation zinc coating.
- .2 Stainless steel sheet metal: Type 304, with Brushed finish.
- .3 Stainless steel tubing: Type 304, commercial grade, seamless welded, minimum 1.2 mm wall thickness.
- .4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 Manufacturers

- .1 Products and components listed are minimum standard of acceptance. Alternative products by recognized manufacturers of toilet and bath accessories may be accepted subject to review by the Consultant of manufacturer's product information and specifications.
- .2 Acceptable manufacturers include:
 - .1 Bobrick
 - .2 Bradley
 - .3 Frost
 - .4 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 PTD: Paper Towel Dispenser:
 - .1 Supplied by Owner, installed by Contractor.
- .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 Bars 2 (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
 - .1 Bobrick B-270 Contura Series Sanitary Napkin Waste Receptacle
- .8 Stainless Steel Shelf: To CSA B651. 455 mm long x 125mm wide, 1.2mm type 304 stainless steel, satin finish. 19mm return edge; front edge hemmed for safety. 1.6mm brackets.
 - .1 Bobrick B295 x 18
- .9 Collapsible Coat Hook: Bobrick B-983
- .10 Horizontal Adult Changing Station: Future by Owner.

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 ASTM D1187, 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 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.
 - .3 Solid masonry or concrete: use bolt with lead expansion sleeve set into drilled hole.
- .3 Install grab bars on built-in anchors provided by manufacturer.
- .4 Use tamper proof screws/bolts for fasteners.
- .5 Fill units with necessary supplies shortly before final acceptance of building.
- .6 Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
 - .1 Verify blocking has been installed properly.
 - .2 Verify location does not interfere with door swings or use of fixtures.
 - .3 Comply with manufacturer's recommendations for backing and proper support.
 - .4 Use fasteners and anchors suitable for substrate and project conditions.
 - .5 Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
 - .6 Conceal evidence of drilling, cutting, and fitting to room finish.
 - .7 Test for proper operation.

3.2 Schedule

- .1 Locate accessories where indicated. Exact locations determined by Owner.

3.3 Cleaning

- .1 Proceed in accordance with Section 01 74 11 – Cleaning.
- .2 Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.
- .3 Touch-up, repair or replace damaged products until Substantial Performance.

End of Section

Hydraulic Passenger Elevator

PART 1 GENERAL INFORMATION

1.1 SCOPE

- .1 Comply with all TDSB General Requirements and conform to all information contained herein inclusive of TDSB KS26-224-RFP for the Supply and Installation of Elevators, and Appendices B and C relating to Maintenance.
- .2 The Trade Contractor shall provide all labour, materials, equipment, and services that are necessary to supply and install one (1) Holeless Hydraulic Passenger elevator as described in this Specification and all Architectural Drawings as developed by Barry Bryan Associates for the TDSB Parkdale Collegiate Institute project located at 209 Jameson Avenue in Toronto, Ontario.
- .3 Any site conditions requiring special attention or deviations from standard product line as outlined herein shall be calculated and included in the contract price.
- .4 Where drawings, site conditions, and Specification are not conclusive or differing, the Trade Contractor shall inform the Owner and/or the Consultant at the time of tendering, but in no way shall it relieve the Trade Contractor of the obligation under the intent of the Specification, to install one (1) complete, fitting, and functional Hydraulic Passenger Elevator system to full code compliance. Contractor to verify all measurements and conditions as well as any drawings and Specifications before providing shop drawings and manufacturing.
- .5 Where a device or part of equipment is referred to in the singular, it shall apply to as many as are required to complete the installation in the intent of the Specification.
- .6 Provide with the Tender, hoistway, pit, and overhead dimensions.
- .7 This specification is for Elevator E1.
- .8 The elevating devices installation and associated maintenance references herein for the TDSB Parkdale Collegiate Institute project located at 209 Jameson Avenue in Toronto, Ontario is referred to as the "Specification". The Elevator Contract is referred to as the "Contract" and it includes the Specification, Bid Form, Drawings, plus any addendum issued and attached hereto. The term "Owner" shall refer to Toronto District School Board, the term "Architect" shall refer to Barry Bryan Associates, the term "Construction Manager" shall refer to future named General Contractor or Construction Manager, the term "Consultant" refers to National Elevator Consulting Limited, and the term "Trade Contractor" refers to the successful elevator contractor proponent.
- .9 All car and hall push button fixtures are to be Dupar US91BB, with stainless steel inner and mirrored stainless steel outer, white illumination, or equivalent vandal resistant LED buttons as pre-approved by the Owner.
- .10 All Related Work by Others noted herein shall be reviewed and it is the responsibility of the elevator contractor to advise at the time of Bid Submission of any omitted itemized Work by Others to suit installation of their equipment.
- .11 Include in base contract (do not exclude or qualify this), 16 crew hours for access to shaft for bricklayers and/or drywall subs for elevator entrance frame bricking in, hall stations installation where required, all electrical work in the pit and top of shaft, pit drain work, sprinkler installation in the hoistway, patching and grouting of holes or pockets in hoistway, and pit ladder installation as a minimum.

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- .12 Include in base contract (do not exclude or qualify this), for a 2nd elevator hoistway and machine room clean down. 1st clean down shall be undertaken at the time of TSSA inspection and initial licensing, while the 2nd clean down shall be undertaken only *when directed in writing* by the Construction Manager. Clean down shall include vacuuming and cleaning of car top, pit, hall and car sills, car header, door operator, car guides, all hoistway areas, controller, entrance headers, locks, and rail brackets.

1.2 REGULATIONS AND STANDARDS

- .1 The Contractor shall complete work in compliance with the latest edition of the Standards as noted below at the bid closing date, including all supplements and appendices as a minimum.
- a./ ASME A17.1-2019/CSA B44:19, Safety Code Elevators and Appendix "E".
 - b./ Technical Standards and Safety Act 2000, Statutes of Ontario, 2000, Chapter 16.
 - c./ Ontario Building Code, Latest Edition
 - d./ C22.1 Part 1, Canadian Electrical Code, Latest Edition.
 - e./ Certification of Elevating Device Mechanics, Ontario Reg. 222/01.
 - f./ Codes and Standards Adopted by Reference, Ontario Reg. 223/01.
 - g./ Ontario Regulation 209/01, Elevating Devices.
 - h./ Ontario Electrical Safety Code, Latest Edition.
 - i./ ASME A17.2 Maintenance Requirements and Intervals for Elevators, Section 14 0.
 - j./ Ontario Regulation 851, Sections 24, 25, 75, and 76 and CSA Safeguarding of Machinery, Z432.
 - k./ Technical Standards and Safety Authority, Code Adoption Document Amendment 295-22.
- .2 All work performed and material supplied by the Contractor shall be in accordance with all building codes and local by-laws, and also as per the requirements of Ontario and Federal Legislation. Conform to governing Municipal or Provincial Codes, Rules and Regulations and/or Authorities having jurisdiction.
- .3 In regards to the use, handling, storage, and disposal of hazardous material, the Contractor shall comply with the requirements as outlined by the WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (W.H.M.I.S.).

1.3 QUALITY ASSURANCE

- .1 Work shall be undertaken by certified and licensed elevator personnel with EDMA accreditation.
- .2 Do all work and supply all equipment in accordance with the requirements and recommendations of the latest issue of the applicable standards and codes of the:
- National Standards of Canada (NS Can)
 - Canadian General Standards Board (CGSB)
 - Canadian Standards Association (CSA)
 - American National Standards Institute (ANSI)
 - Ontario Building Code O.Reg. 403/97, as amended
 - Environmental Protection Act O. Reg. 189/94 as amended to O.Reg. 238/01
 - Ontario Fire Code and Ontario Ministry of Labour

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1.4 PERMITS AND FEES

- .1 Obtain, submit, and pay for necessary local and/or provincial permits and inspections. Submit to the Technical Standard Safety Authority (TSSA) registration of elevating devices and also pay all costs in connection therewith, including costs associated with any and all tests to be performed by the TSSA in order to lawfully license the elevator for use by the general public. Submit all TSSA submission documents, test results, and approval certificates to the Consultant prior to *Date of Building Substantial Completion*. License for the elevating device will be paid for directly by the Owner.
- .2 Elevator contract shall include in base bid all costs associated with a 2nd TSSA inspection of elevating device regardless if the directives issued by the TSSA on the initial inspection have Contractor and/or Construction Manager items. Do not qualify this in the base bid price. No additional costs will be entertained or considered to meet with this 2nd TSSA Inspection requirement unless a 3rd TSSA inspection of the elevating device is warranted and/or required.

1.5 WORK SCHEDULE

- .1 All bidders must submit a proposed work schedule including lead time required for approval drawings, manufacturing lead time after approvals, and time to complete on site activities at the time of bidding.
- .2 Include for all factory manufacturing acceleration and field labour in the Tender proposal as required to meet with a delivery date suitable for achieving a Substantial Completion date no later than October 16th, 2026.
- .3 Unless a result of an Act of God or another cause beyond the control of the Contractor, the Contractor shall take all necessary actions and absorb any extra costs to meet the work schedule when the delays are caused directly by the Contractor.
- .4 Provide at time of Bid for Owner's review, all Contractor "pre-installation start" building requirements for electrical, machine room, and hoistway areas.

1.6 MATERIAL AND EQUIPMENT

- .1 Specifications on the make and model of all major components to be used in completing the Project to be submitted with Bid including controller type, power unit, door operator type, elevator communication system, and fixture brand.
- .2 Brand names, trademarks, logos, or company name on any exposed elevating equipment to the public will not be permitted.
- .3 All samples for all exposed surfaces relating the cab interiors are to be submitted to Architect or its appointed Designee for approval prior to any work being undertaken.
- .4 Install all equipment in a professional and tidy manner. Secure all wiring in a neat and orderly fashion and label all components.
- .5 Provide only new material and equipment designed specifically for elevator usage.
- .6 Owner preference is GALaxy eHydro controller. JRT Automatisations JHD 1000, or MCE Motion 2000 Controller will also be considered as acceptable.

Hydraulic Passenger Elevator

1.7 RELATED WORK BY OTHERS - GENERAL CONTRACTOR

- .1 **Construction Facilities and Temporary Controls:** Protection of floor openings and personnel barriers; temporary power and lighting; grid lines at each elevator lobby.
- .2 **Cast-In-Place Concrete:** Elevator pit, hoistway walls where applicable, grouting of thresholds, hoistway enclosure within +/- 25 mm from top to bottom and measured in both x and y axis, necessary wall support for rail bracket fastening.
- .3 **Unit Masonry:** Building-in and grouting of hoistway door frames, elevator machine room, hoistway walls where applicable.
- .4 **Metal Fabrications:** Pit ladder, support for sill entrances where required, and top of shaft hoist beam.
- .5 **Gypsum Board:** Gypsum board enclosure around elevator hoistway entrance frames where specified elsewhere.
- .6 **Doors and Frames:** Self-closing, self-locking machine room access door (opening outwards from machine room) and metal frame.
- .7 **Thin Set & Tiling:** Provision of flooring for elevator cab.
- .8 **Painting:** Painting of elevator machine room walls in white.
- .9 **Sump Pumps:** Submersible sump pump and drain for elevator pit. Drain in pit connected to sump pump located outside of elevator hoistway. The sump pump drain shall have the capacity to remove a minimum of 11.4 m³/hr (3000 gal/hr) as per B44:19 Code. Note: Location of pit drain shall be installed to avoid inference with any elevator equipment – coordinate with elevator layout shop drawings.
- .10 **Heating, Ventilating, and Air Conditioning:** Ventilation and temperature control of elevator control equipment room to maintain ambient temperatures between 10 to 30 degrees Celsius, less than 95% non-condensing, to suit Contractor's heat emission output of equipment of approximately 12, 000 BTU/hr. in the machine room. In addition, provide in the elevator pit, a wall mounted heater with thermostatic control located in the elevator machine room. Location of the heater to be coordinated with the elevator shop drawings.
- .11 **Electrical:** General – Power requirements and location of all disconnects, switches, auxiliary contacts, and GFIC receptacles, to satisfy Contractor power characteristics and requirements as identified on General layout and shall include not less than the following:
 - **208 volt**, three phase electrical lockable fused disconnect in elevator machine room with dedicated building ground and conduit from the disconnect to the controller based on an estimated 25 HP elevator motor.
 - Auxiliary contact required in the disconnect for battery lowering and wired to controller.
 - Electrical power for elevator installation and testing.
 - 120 volt, 15 amp, single phase fused SPST electrical lockable disconnect in machine room for **cab lighting and in-car elevator communications** including conduit and wiring to controllers.

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- 120 volt, 15 amp, single phase fused SPST electrical lockable disconnect for **oil cooler** including wiring and conduit to oil cooler.
 - 120 volt, 15 amp, single phase fused SPST electrical lockable disconnect for **in-car GFIC receptacle** including wiring and conduit controller.
 - Pit and machine room receptacles with ground-fault interrupter current (GFIC) protection on dedicated circuits.
 - Suitable overhead guarded lighting in machine room with switch to 200 lux at machine room floor.
 - 4' guarded pit lighting with switch to 200 lux at pit floor.
 - Machine room receptacle on building EMP for contractor supplied machine room elevator communication system.
 - 1 x building port internet connection in the machine room for elevator contractor communication equipment. Modem for internet connection to be backed up for 4 hours on emergency power source.
- .12 **Elevator Telephone:** (1) dedicated digital (VoIP) building telephone line to the elevator communication equipment in the elevator machine room.
- .13 **Video Surveillance:** CCTV camera in elevator when provided and specified by the Owner. Include for data drop connection in the machine room for the CCTV camera.
- .14 **Fire Detection and Alarm:** Fire and smoke detectors and interconnecting devices in machine room, top of hoistway, elevator lobby area, and in pits; fire alarm signals to the elevator controller in the machine room for automatic emergency recalling of elevator. Differentiate fire alarm signals to elevator controller from detectors in machine room, top of hoistway, bottom of hoistway, main elevator lobby, and elevator lobby general alarm. Note, any building pull stations installed must be on a separate circuit and cannot recall elevator per B44 Code.

1.8 SPECIFICATIONS AND DRAWINGS

- .1 Within six (6) weeks of award of contract, submit electronically complete sets of detailed shop drawings showing layout of all elevator equipment as required, including the following:
- Location of machinery and all components in machine room.
 - Location of piping and wiring run to the elevator hoistway including sleeving provisions for oil lines and electrical duct.
 - Loads to be carried on the building, reaction loading in the pit, and overhead hoist beam.
 - Horsepower rating of motor and all electrical characteristics including recommended fuse sizes, ratings, and types, starting and running currents.
 - Machine room equipment heat emission rate.
 - Disconnects, switches, and all outlet locations.
 - Design of elevator cab enclosure including car fixtures, walls finishes, ceiling, and car sill threshold height.
 - Fixture layouts to reflect all hall position indicators, hall stations, emergency recall fixture.
 - Design of hoistway entrances.
 - Hoistway sizing, overhead, and pit depth.
 - Guide rails, buffers, elevator cab, traveling cable location.
 - Elevator Communication device.
- .2 Submit with detailed shop drawings all required work by others indicating sizes, quantities, and locations of ancillary equipment and all other relative data to suit a complete elevator installation.

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1.9 WARRANTY & MAINTENANCE

- .1 Contractor shall warranty and guarantee materials and workmanship as outlined in these specifications from *Date of Project Substantial Completion* for a period of Twelve (12) months thereafter. Contractor shall make good any defects not due to ordinary wear and tear, vandalism, or improper use. In the event a defect exists as determined and confirmed by the Consultant, the Contractor shall absorb both material and labour cost to replace this defective component at no cost to the Owner. Contractor shall submit at time of Tender, a copy of their warranty certificate covering both material and labour for defective components.
- .2 This Trade Contractor is to provide a comprehensive, all-inclusive monthly warranty service and maintenance program in strict accordance with TDSB Vertical Transportation Equipment Maintenance Specifications Appendices B and C, plus any other TDSB Maintenance documentation issued at time of tender for the first year from *Date of Project Substantial Completion*. Warranty Maintenance Service for 12 months is deemed to be included in the base contract scope of work.
- .3 Prior to handover, a Trade Contractor representative who is fully conversant with all aspects of the newly installed elevating device, and at a time convenient to the Owner, will schedule for the demonstration and training of all operational features, key switch functions, and emergency communication testing of the elevating device to the Owner's designated building staff.

1.10 CASH ALLOWANCES – Not Used

1.11 CHANGES IN THE SCOPE OF WORK

- .1 In the event the Construction Manager or the Owner changes the scope of work in any manner once the contract has been awarded, the contract price may be adjusted accordingly. Any such change will not invalidate the contract.
- .2 Contractor shall obtain from the Construction Manager or the Owner, written approval and acceptance of all costs associated with any contemplated change prior to commencement of such work.
- .3 Any such change shall include all overhead, mark-up and profit.
- .4 If no costs are submitted by the Contractor for change in scope of work and subsequently approved in writing by the Construction Manager or Owner *prior to such work being undertaken*, Contractor shall assume all risk and associated costs at their own expense. Should the change order result in a reduction of the contract amount, the Construction Manager shall make the necessary changes to the contract amount and provide the Contractor with a copy of the adjustment

1.12 NON-PROPRIETARY EQUIPMENT AND TOOLS

- .1 Only non-proprietary equipment will be accepted by the Owner and installed. This will include but not limited to controller, power unit, drive, motor, fixtures, and door operator.
- .2 Contractor to provide at the time of Tender a letter stating all equipment being installed is non-proprietary to the satisfaction of the Owner. In the event the equipment requires plug-in devices to service, adjust, diagnose, troubleshoot, and maintain the elevating device, provide these plug-in devices to the Owner at the same time as all information noted in Article 1.13 of these specifications at no additional cost.

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1.13 MAINTENANCE AND OPERATING MANUALS

- .1 Within thirty (30) days of TSSA Inspection, provide to the Construction Manager one (1) hard copy of Maintenance and Operating Manual information, plus 1 memory stick of all information from the binder in a searchable PDF format, and amended site specific, and to include the following;
1. Description of all features and operational equipment including adjusting and testing procedures.
 2. Copy from Contractor of all equipment settings as of *Date of Project Substantial Completion* including door times, dwell times, flight times, etc.
 3. Complete guide on Emergency Communication System including programming of system.
 4. Diagnostic instructions and equipment troubleshooting guide for controller and door operator complete with error fault codes and comprehensive description of all codes.
 5. Parts listing and diagrams of all controller, door operator, detector edge, fixture, motor, and travelling cable components as a minimum, complete with original manufacturers equipment corresponding part numbers.
 6. Complete set of "As-built" approval drawings, latest revision, including main layout, entrance, fixture, and cab drawings neatly folded and inserted into the manual.
 7. Complete description of Emergency Recall operation.
 8. Copy of TSSA Registration documentation and most recent TSSA Inspection Certificate and copy of contractor's MCP program.
 9. Names, addresses, and all contact information for sourcing of all major components including controller replacement boards, slippers, door equipment, fixture components, and power unit.

1.14 SEPARATE PRICES

- .1 Separate prices requested herein, are not included in the Tender Price and at the sole discretion of the Owner, may, or may not be, added to the Contract amount for the entire term of the Contract.
- .2 Separate pricing relating Post-Warranty Maintenance Services shall remain valid for the entire term of this Contract.
- .3 Separate pricing shall be inclusive of all Contractor overhead, margin, profit, labour and materials to carry out the prescribed task or project requirement. H.S.T. shall not be included and shown separately with the Tender Form. This price is in addition to any other separate price requested by the Owner or Construction Manager at the time of tendering.
- .4 Post-Warranty Maintenance on a per month basis based on TDSB Vertical Transportation Equipment Maintenance Specifications Appendices B and C, and any other TDSB Maintenance documentation issued at time of tender.
- .1 1st year of a four (4) year comprehensive maintenance agreement.

1.15 ITEMIZED PRICES

- .1 Itemized prices as requested herein are included in the Tender Price and are provided for the purpose of identifying to the Owner cost associated with such feature, finish, or operational requirement.
- .2 The Owner, may, or may not, elect to exercise these Itemized prices for the installation phase of the Contract providing any selection of Itemized pricing is exercised in reasonable time frame and not

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later than at the conclusion of the approval drawing process.

- .3 Itemized pricing shall be inclusive of all Contractor overhead, margin, profit, labour and materials to carry out the prescribed task or project requirement.

- .1 Cost to provide a 2nd complete hoistway clean down and vacuuming of all equipment when directed by the Owner.

1.16 ALTERNATE PRICES - NONE

1.17 BARRIER FREE REQUIREMENTS

- .1 Equipment shall be designed and installed to suit ASME A17.1-2019 / CSA B44:19, Appendix "E" Elevator Requirements for Persons with Physical Disabilities. In addition to all other Barrier Free requirements described herein, as a minimum provide or meet with the following;
- .2 Car Button Height: All 3 car button floor designations shall be located on a horizontal row directly above the emergency controls with lowest landing on the left and highest floor on the right. Emergency controls, including the emergency alarm, shall be grouped at the bottom of the panel. Emergency control buttons shall have their centerlines 890 mm minimum above the floor or ground.
- .3 Car Button Dimensions: Buttons shall be 19 mm minimum in their smallest dimension. Buttons or surrounding button collars shall be raised a minimum of 1.5 mm.
- .4 Car Button Designations: Control buttons shall be identified by tactile characters and visual characters complying with Clause E-20 of the ASME A17.1-2019 / CSA B44:19 Appendix "E" Code.
- .5 Control Button: The control button for the main entry Ground floor and control buttons other than remaining buttons with floor designations, shall be identified with tactile and visual symbols as shown in Table 2.26.12.1. of the ASME A17.1-2019 / CSA B44:19 Appendix "E" Code.
- .6 Visible and audible indicators: Buttons with floor designations shall be provided with visible indicators to show that a call has been registered. The visible indication shall extinguish when the car arrives at the designated floor. Include for audible tone when buttons are pressed.
- .7 Provide voice annunciation of the floor at which the car has stopped and a minimum of 10 dBA above ambient, but shall not exceed 80 dBA maximum measured at the annunciator.
- .8 Hall buttons shall be located vertically between 890 mm and 1220 mm above the floor to the centerline of the respective button. Hall button fixtures shall match in every way, those of the car operating panel, and shall be 19 mm minimum in the smallest dimension. Hall buttons shall have visual signals to indicate when each call is registered and when each call is answered. Buttons or surrounding button collars shall be raised a minimum of 1.5 mm.
- .9 Provide at the Ground floor, jamb plates on both sides of the entrance complete with designation and "star" symbol combined on same plate. Raised star and all characters shall be 50 mm high and shall comply with Clause E-20.2 of the ASME A17.1-2019 / CSA B44:19 Appendix "E" Code. Jamb plates shall be installed at both other floors and finished as noted in applicable specification section. Provide on, or adjacent to the designated level entrance, raised elevator numbering with characters 75 mm high.

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PART 2 Elevator

2.1 Description

PASSENGER	ELEVATOR E1
Number:	One (1)
Type:	Hydraulic Holeless Dual Upright Telescopic
Elevator Type:	Passenger, Class "A" Loading
Machine Room:	@ Ground, Adjacent to Hoistway
Machine Room Size:	Refer to Architectural Drawing
Clear Machine Room Height:	2438 mm (8'0")
Contract Speed:	0.50 m/s (100 fpm)
Capacity:	1136 kg (2,500 lbs.)
Rise:	7.929 m (26'0")
Overhead Required to U/S Hoist Beam:	4100 mm (13'5")
Hoist Beam Typical:	203 mm + 51 mm space above beam to U/S hoistway
Pit:	1829 mm (6'0")
Occupied Space Below Pit:	No
Number of Stops, Openings:	4 stops, 1F/3R
Landing Designations:	B(R), G(F), 1(R), 2(R)
Operation:	Selective Collective
Controller:	Microprocessor, Non-Proprietary
Type of Power Unit / Drive:	Submersible, Solid State with Oil Cooler and Tank Heater
Estimated Horsepower	25 HP
Starts per Hour	80
Estimated BTU/Heat Output:	10,000 BTU/Hr.
Hoistway Size:	2650 mm w x 2050 mm d
Hall Risers:	One (1)
Approx. Cab Clear Inside:	2032 mm w x 1295 mm d
Cab Height, Floor to Canopy:	2438 mm (8'0")
Door Type:	Single Speed Side Opening (SSSO)
Door Dimensions:	1067 mm w x 2134 mm h
Door Rough Opening @ All Floors	Full width of shaft to not less than 2515 mm high
Door Operator:	Closed Loop Premium Heavy Duty
Door Protection:	Infrared 3D Detector
Car Guides:	Slipper Guides
Car Station:	One (1)
Arrival Signal:	In-Car Riding Lanterns, Strike and Return Jamb
Hall Position Indicator:	All Floors
Emergency Communication:	Hands-free Phone, 1-Way Video, 2-Way Messaging
Emergency Service:	Automatic Recall Phase I and II
Emergency Power:	Battery Rescue Lowering Unit
Security Card Reader:	Controller and Wiring Provisions for Hall Station Access Control
CCTV Camera:	TBC, Wiring Provisions

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2.2 VERTICAL TRANSPORTATION BUILDING REFERENCE

BUILDING	Elevation	TOTAL Floor to Floor	E1
2	4.500	-	Rear
1	0.000	4.500 m	Rear
G	-2.104	2.104 m	Front
B	-3.429	1.326 m	Rear

2.3 ARCHITECTURAL FINISHES

ENTRANCE, HALL DOOR, FIXTURE, HALL SILL FINISH				
Floor Designation	ENTRANCE	HALL DOOR	FIXTURE	HALL SILL
B, G, 1, 2	SS	SS	SS	AL

SS = BRUSHED #4 STAINLESS STEEL FINISH, AL = ALUMINUM

2.4 CAB FINISHES

CAR E1	
CAR DOOR	SS
FRONT RETURNS AND TRANSOMS	SS
SIDE CAB SHELL WALLS	SS
HANG-ON PANELS SIDE WALLS	SS RIGIDTEX LINEN BA, J TRIM FRAMED
CEILING	6 Panel LED Lighting Suspended Ceiling SS Finish
HANDRAILS SIDE WALLS	Round 1.5" SS, Ends Turned In
HANDRAIL BAND	Yes, 4" high on each side
FLOORING	By Others
CANOPY	White Baked Enamel
CAR STATION	SS
CAR SILL THRESHOLD	Aluminum
CAB PADS & PINS	Yes

SS = #4 BRUSHED STAINLESS STEEL

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3.0 PRODUCT AND DESCRIPTION

3.1 CONTROLLER

- .1 Supply and install CSA approved microprocessor-based controller meeting all of the latest CAN/B44:19 Safety Code for Elevators requirements and providing full automatic operation. Only non-proprietary equipment with parts and software readily available will be accepted. Owner preference is GALaxy eHydro controller. JRT Automatisatation JHD 1000, or MCE Motion 2000 Controller will also be considered as acceptable.
- .2 The elevators shall offer Independent Service Operation, Emergency Operation, Firefighter's Emergency Operation Phase I and II, Battery Rescue Lowering, and Hall Button Security Card restriction.
- .3 Components to be installed in metal cabinet completely enclosed with covers and either be wall or tank mountable or floor standing type and isolated from building structure.
- .4 Controller cabinet shall have either fans or alternate means to dissipate heat to ensure drive components as a minimum are maintained at a reasonable operating temperature with the controller cabinet doors closed.
- .5 All components within the controller including fuses, relays, contactors and printed circuit boards are to be clearly identified.
- .6 Controller wiring to be installed in a professional and neat manner with proper connecting devices and terminal blocks permanently labeled. Labels shall correspond with electrical wiring diagrams.
- .7 Ground controller and all equipment to building ground brought to machine room by others. The occurrence of a single accidental ground or short shall not defeat any safety device and shall not permit the elevator to start or run if the hoistway door or gate interlock is unlocked or if any hoistway door or car door gate contact is not made.
- .8 The microprocessor shall include permanent on-board diagnostics and status indicators for troubleshooting, adjusting, and maintenance purposes. On-board diagnostics shall include event and fault log, real time clock, and method of displaying the status of all inputs and outputs. Provide switches, displays, push buttons, and instructions to view diagnostic information. Indicators shall provide as minimum a means to determine or indicate;
 - Position of the elevator cab in the hoistway.
 - Safety Circuit and Door Locks.
 - Inspection and Normal operation.
 - Emergency Lowering.
 - Independent Service.
- .9 The operation of the system is to be selective collective.
- .10 Ensure controller will restart after loss of normal power.
- .11 Provide in hoistway, top to bottom, car position feedback device to accurately feedback the exact position of the cab with an accuracy of +/- 6 mm at any point in the hoistway. Car position feedback system to integrate with controller to provide consistent and accurate leveling at both landings regardless of direction of travel and from no load to full rated capacity. Absolute floor number encoding shall be provided at each floor level to establish exact floor position and shall be store in a non-volatile memory location so that in the event of power loss, normal operation of elevator may resume without having to perform a learn trip or travel to a terminal landing.

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3.2 POWER UNIT

- .1 Provide an oil tank with a minimum additional twenty-gallon capacity above the maximum normal oil level. Provide an oil level gauge, drain, and filter-screen over the inlet. Supply and install isolation pads between the tank unit and the floor.
- .2 Ensure oil utilized in the operating system is biodegradable.
- .3 Submersible type power unit shall be provided and located in the machine room as shown on the drawings.
- .4 Provide pump and motor to meet with design criteria of project. Limit operating pressure within the system to 450 PSI. Provide a submersible type motor inside the oil tank in the machine room. Provide a submersible type pump allowing sufficient oil flow to move the cab in UP direction easily within 5% of contract speed with full load. Install pump in the oil reservoir.
- .5 Provide a muffler in the oil line between the pump unit and the jack. The muffler is to contain pulsation-absorbing materials to minimize hydraulic pulsation and ensure quiet operation.
- .6 Provide valve assembly to ensure regulation of both UP and DOWN speeds are consistent within +/- 5% regardless of load. The valve shall be equipped with an adjustable pressure relief system, up-start valve, up-level valve, a manually operating down system to lower elevator if emergency and a system to isolate the cylinder from the pump unit plus a check valve for down control operation.
- .7 To prevent debris from entering the control valve, provide self-cleaning strainers. Provide system that includes a solid state means to ensure reduced current starting.
- .8 The starting current is not to exceed 300 percent of the current utilized during operation at full load. The equipment is to continue providing normal elevator operation during line voltage fluctuations of (\pm) 10%.
- .9 A means to prevent the motor or pump from overheating during phase rotation or reversal is to be provided. To prevent the motor from starting when phase reversal or lost phase conditions occur, provide reverse phase relays at the control panel.
- .10 Permanent gauges to measure the temperature of the oil in the tank and the pressure of oil in the to/from lines are to be provided. The system is to be designed to ensure the hydraulic oil never exceeds 80% of the maximum temperature rating of the valve manufacturer.
- .11 Provide oil cooler to maintain ideal operating temperature to afford consistent operation and leveling.
Show oil cooler details on elevator approval drawings.

3.3 CYLINDER

- .1 The hydraulic system shall include a cylinder, plunger, hydraulic hoses, motor, pump, and valve.
- .2 The cylinder shall be manufactured from steel pipe of a sufficient thickness and suitable safety margin by Code. The top of the cylinder shall be equipped with a cylinder head with an internal guide-ring and self-adjusting packing.
- .3 Provide plungers manufactured from a steel shaft of a proper diameter machined true and smooth. The plungers shall be provided with a stop electrically welded to the bottom to prevent it from separating from the cylinder.

3.4 HYDRAULIC PIPING

- .1 Provide piping for elevator, complete with necessary fitting and valves (including relief and two shutoff valves) for complete installation and proper operation of the elevator.
- .2 Piping between the jack unit and the power unit is to be groove-end seamless or electric resistance

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welded steel pipe. Ensure that all connections are rated to withstand the pressure of the system and prevent any leakage of oil.

- .3 All piping in the machine room and pit shall be resiliently supported by isolators. Where piping penetrates wall constructions, provide a resilient sleeve to prevent direct contact with wall.

3.5 CAR GUIDE RAILS

- .1 Provide machined steel standard type "T" section guide rails with tongued and grooved joints in the ends of the rails to form matching joints between successive rails. Size rails appropriately to achieve a maximum rail bracket spacing between guide rail supports of twelve (12') and show on approval shop drawings.
- .2 Substantially machined fishplates will be fitted to each rail joint with not less than four through bolts with lock washers. Backs of all rails shall be machined where contact is made with fishplate. Rail joints shall be filed smooth.
- .3 Guide rails shall be supported and placed so as not to become distorted by eccentric loading. Additional brackets with sliding rails clips between floor beams shall be provided as necessary to obtain proper rail rigidity and maintain alignment for car rails. All rail joints shall be located so fishplates will not interfere with respective motion of the rail with respect to rail clips and brackets.
- .4 Guide rail brackets shall be fastened into structural core walls, at the side of the shaft to suit architectural drawings and building design.
- .5 Provide necessary brackets, backing, and channel stiffeners as required to accommodate car capacity and loading classification.
- .6 Locations of all rail bracket fastening points shall be communicated and reflected on elevator shop drawings.
- .7 Clean and file smooth all rail running surfaces which make contact with slipper guide assemblies.
- .8 Align and install rails plumb and parallel to achieve premium ride quality with no objectionable concerns in either the X or Y axis or unusual vibration.

3.6 CAR FRAME AND PLATFORM

- .1 A suitable car frame shall be provided with adequate bracing to support the platform and car enclosure including weight of all in-car finishing materials.
- .2 The platform shall be recessed sufficiently to accommodate flooring supplied and installed by others. Provide as a minimum 1 sheet of 3/4" Douglas Fir plywood.
- .3 Provide a black baked enamel toe guard measuring 1220 mm long and full width of the car sill exposed to landing sides.

3.7 CAR TOP RAILING

- .1 Car top railing shall be installed in accordance with CSA/B44:19 and Director's Order 245/10. Provide a secondary horizontal or intermediate rail located at near centre from the top rail to the working surface. Supply and install a toe-board securely fastened not less than 125 mm from the working surface. Strength of railings shall meet Director's Order 245/10.

3.8 CAR TOP INSPECTION AND OPERATION

- .1 Provide on car top, maintenance inspection station complete with UP, DOWN, common running buttons,

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emergency stop button, inspection/normal button, guarded light with switch, and a duplex receptacle. Mount car top inspection from side of car when accessing car top from top landing.

- .2 Upon activation of in-car maintenance switch located in the service cabinet, and/or the activation of top of car inspection/normal button, car shall be removed from normal service. Car shall be operated from car top within the guidelines of Section 2.26.1.4.1 of the ASME A17.1-2019 / CSA B44:19 Safety Code.

3.9 CAR GUIDES

- .1 Provide manufacturer's standard slipper guide assemblies.

3.10 PIT EQUIPMENT & BUFFERS

- .1 Provide all necessary pit equipment to effect a complete elevator installation suitable for car speed, capacity, and building design.
- .2 Supply and install all car buffers, springs, buffer supports and channels, guarding as per B44:19 Code.
- .3 Reflect location of all equipment on hoistway approval drawing.
- .4 Provide pit stop switch for elevator in accordance with CSA/B44:19 Code.

3.11 ENTRANCE FRAMES, HALL DOORS, AND CAR DOORS

- .1 Provide typical 3-piece bolted suitable for finished wall thickness as per Architectural drawings. Provide entrance frames at all openings to suit drywall entrance or block fronts at no cost.
- .2 All frames shall be provided in finishes as per Section 2.3, Architectural finish.
- .3 Entrances shall be manufactured in accordance with ULC and UL procedures for testing and labeling to suit 1.5-hour fire rating. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of 14-gauge sheet steel.
- .4 Securely fasten all landing sills to the building structure and provide necessary steel supports, grout angles and grout to seal openings between the sill and structure allowing floor finishes. Sills finishes at each floor shall be as per Section 2.3 Architectural Finishes.
- .5 Entrance jambs shall be marked with 102 mm x 102 mm (4" x 4") steel plates having stainless steel raised floor markings with Braille and black background. Markings shall be provided on both sides of the entrance and securely fastened with fasteners.
- .6 Entrance doors shall be 16-gauge minimum sandwich type with reinforced steel members.
- .7 Each door to have a minimum of two guides, exclusive of fire angles and retainer clips.
- .8 Landing side of hall door panels having ULC labeling of 1.5 hours, to be finished as per Section 2.3, Architectural finishes. Hoistway side of hall door panels shall be painted with rust inhibiting paint. Stencil floor identification on hoistway side of all hall door panels.
- .9 Each car and hall door shall be furnished with a two-point suspension hanger and track. Rollers shall be a heavy-duty type designed to operate on non-lubricated surfaces. Hangers shall be provided with a means to withstand up thrust.
- .10 Each hall door to have a heavy-duty type self-closer, approved GAL interlock and related assembly, and is to be designed for smooth operation with a minimum amount of noise.
- .11 Provide fascia extending from top of hall door hanger to sill above for every floor served. Provide a toe guard at the lowest landing sill made from 14-gauge steel and beveled to the wall. Provide a dust cover from the entrance header of the top floor landing and bevel this to wall.

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3.12 HOISTWAY ACCESS

- .1 Provide hoistway access to comply with CSA/B44:19 Code requirements. Provide a switch in the car locking service cabinet that when enabled shall render all car and halls inoperative and permit operation of the elevator via the hoistway access switch described herein. Prior to hoistway access operation, both top of car operation and in-car inspection cannot be in effect.
- .2 Hoistway access shall be installed in either the sight guard or side entrance jamb.

3.13 FINAL SLOWDOWN AND TERMINAL SWITCHES

- .1 Normal terminal landings shall be provided in the hoistway to slow and stop the car automatically at the terminal landings and to automatically cut off power, should the car travel beyond the terminal landings. Dowel all final limits.

3.14 DOOR OPERATOR AND RELATED DOOR EQUIPMENT

- .1 Supply and install GAL MOVFE 3 heavy-duty electronic operator capable of automatically providing smooth and consistent door operation for both the velocity and position of the doors and will cause the door to adhere to a pre-defined opening and closing profile.
- .2 All controls for adjusting and regulating the operation of the door are to be located on top of the elevator adjacent to the door operator.
- .3 Door operation to be capable of opening fully in a time as noted in Article 3.26.
- .4 Supply and install one 3D electronic door re-opening device (safety detector) on each car opening.
- .5 The device is to be constructed to provide long-term reliability and include no moving parts and having silent operation.
- .6 The device is to be installed behind the door jamb, so as to provide a clear opening and present a clean architectural appearance.
- .7 The protection device shall initiate door reversal at any point of travel, when any object is in the path of the closing door without engaging the object.
- .8 Provide a device that includes visible diagnostics for either verification of proper operation or provide direction on cause of malfunction.
- .9 Doors are to operate smoothly and quietly in both the open and the close directions.

3.15 TRAVELING CABLES

- .1 Provide wiring to connect all Equipment in compliance with CSA-C22.1 Code.
- .2 All wire is to be insulated and have a flame retarding cover. All wires are to be either colour coded or clearly numbered to ensure easy identification.
- .3 Supply and install traveling cables designed for elevator use. The traveling cables are to be waterproof with a flame retarding protective cover and include a minimum of 15% extra wires as spares. The travelling cables must include wiring for future security card reader an additional eight pairs of #18 gauge stranded shielded wires and two coaxial cables.
- .4 Install the travelling cables continuously without splices from the car to the elevator machine room. No halfway junction boxes will be permitted.
- .5 Hang travelling cables to ensure all wiring and conductors are not under strain. Hang travelling cables properly from car top and throughout hoistway without twisting to avoid cables coming into contact with

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any other hoistway equipment.

- .6 Run travelling cables directly into controller without splices. Ensure travelling cables in controller are neatly tied off, all wiring is protected from any chaffing from the controller openings, and all spares are terminated and identified.
- .7 CCTV future camera provisions on car top to include a 6"x 6" junction box properly secured to car top with junction box cover labeled "CCTV camera". Flex and wire to junction box, 110 volt supply from the cab light circuit, including one RG6 coax, plus 2 pair shielded wires and 2-18 gauge. Ensure adequate wiring lengths are brought to the junction box. Terminate and mark all wires to a terminal strip securely mounted to the base of the junction box.

3.16 HALL STATIONS AND HALL POSITION INDICATOR

- .1 Provide 1 riser of hall call buttons at each level served.
- .2 All hall buttons to be installed at a height 1070 mm above the floor, measured to the centerline of the respective button.
- .3 Hall landing buttons shall be Dupar US91BB to match car panel buttons complete with mechanical action and white LED illumination upon activation and measured 19 mm minimum in the smallest dimension.
- .4 Button faceplates to be finished as noted in Architectural Finish Schedule as shown in Section 2.3 and rectangular in design.
- .5 Buttons or surrounding button collars shall be raised a minimum of 1.5 mm.
- .6 Incorporate into the Ground floor landing floor push button hall station Emergency Firefighter's recall key switch and corresponding LED's and Elevator Communication Loss requirements as per CSA/B44:19 Code.
- .7 Provide above all entrances an LCD hall position indicator mounted vertically on a #4 brushed stainless steel faceplate. Reflect hall position indicators on elevator approval drawings.

3.17 CAR CAB

- .1 Provide cab interior and car cab shell finishes as specified in Section 2.4.
- .2 Cab shell shall measure 2438 mm from finished floor to the canopy.
- .3 Coordinate car sill height to suit flooring provided by others.
- .4 Two speed exhaust fan shall be located in car canopy, sized appropriately for given area of cab, securely fastened, and isolated from car top to minimize vibration into cab. Fan shall be controlled by a switch in locking service cabinet.
- .5 Provide one set of permanent pad pins and protective blanket covering all side walls, front returns, and transoms. Provide cutout in protective blanket for car station, car position indicator, and locking service cabinet.
- .6 Provide a suspended car ceiling in #4 brushed stainless steel and comprised of not less than six panels with low voltage LED lighting bulbs. Provide for energy saving feature to have lights turned off in the cab after a pre-determined set time when elevator is not in demand and program in-car lights to come on without delay at any time upon the activation of a hall call.
- .7 Car door, transom, entrance jambs, and all reveals shall be finished as per Article 2.4.

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3.18 IN CAR DIRECTIONAL INDICATORS

- .1 Provide in both car strike and return jams, flushed mounted in-car directional indicator arrows of LED or LCD type. Indicators shall be a minimum of 50 mm in height.
- .2 In-car indicators shall have a stainless-steel cover plate. Provide indicators of the arrow type for both UP and DOWN. Fastening screws shall match faceplate cover.
- .3 UP indicator arrow shall be **Green** illuminated and DOWN indicator arrow shall be **Red** illuminated.
- .4 Provide dual stroke gongs with adjustable electronic audible and duration features.
- .5 UP gong shall sound once for UP direction and twice for DOWN direction.
- .6 Indicators shall activate in response to hall calls, car direction reversal, and to car calls.

3.19 CAR OPERATING PANEL

- .1 Provide a car operating panel in accordance with Section 1.17 Barrier Free requirements as well as all specification requirements noted herein. Where swing return panel is required to meet with these specifications, include for same in base pricing at no cost to the Owner.
- .2 Provide at the bottom of main car operating panel a locking service cabinet containing a series of two (2) position switches including but not limited to a light switch, independent service switch, voice annunciator volume control dial, stop switch, and emergency light test spring return switch. Fan switch shall be three (3) positions. Two (2) position Maintenance Inspection and Hoistway Access switches shall be Group 1 keyed type. Provide all other switches as per Section 8.1 of the Code. Provide GFC receptacle in locking service cabinet also.
- .3 Provide at time of turnover, not less than six (6) keys for each type of non-restricted switch installed.
- .4 All buttons are to be Dupar US91 BB stainless steel vandal resistant types with white LED illumination.
- .5 All floor designated buttons to provide acknowledgment tone upon activation.
- .6 Ensure service cabinet door is laser cut and made flush with front return panel surface. Securely fasten service cabinet door with no less than two internal hinges to ensure no movement of door during car movement.
- .7 Provide on the car station, emergency light fixture providing a lighting level of a minimum of 5 lux illumination of the car operating panel. Ensure emergency lighting is maintained at this lighting level for a period of not less than four hours.
- .8 Emergency light shall be immediately energized upon loss of normal power to cab lights. Connect emergency lighting unit to rechargeable batteries with a life expectancy of not less than three years.
- .9 Connect emergency lighting unit to switch located in locking service cabinet as a means to check for operation.
- .10 Provide at the top of the car operating panel an LCD or LED car position indicator or equivalent display. Locate this indicator not less than 1830 mm above the cab floor. Characters shall be a minimum of 50 mm in height and continuously show relative position of car. Indicator shall be housed behind lexan lens, laser cut, and flush with face of car operating panel.
- .11 Incorporate and engrave on swing return panel TSSA identification number, building designated car number. Apply to TSSA on behalf of the Owner to locate license in machine room. Indicate all information on approval drawings.
- .12 Provide in the elevator a voice annunciator. The audible signal shall be 10 dBA minimum above ambient, but shall not exceed 80 dBA maximum, measured at the annunciator. Ensure the signal is an automatic verbal announcement that announces the floor at which the car has stopped and direction of travel.

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Program of annunciator to suit Owner requirements. Provide speaker perforation within the swing return and identify on approval drawing.

- .13 Provide for "energy savings" feature to have the cab lights and cab fan de-energized automatically after 5 minutes from non-demand and re-energize these circuits upon car responding to a hall or car call.
- .14 Provide and incorporate onto the main car operating panel, an elevator communication device to meet with B44:19 Code and connect this to the elevator master communication machine room station.
- .15 Provide camera in elevator to meet with B44:19 Code requirements for 1-way video to allow emergency personnel means to observe passengers at any location on the car floor during an entrapment event.
- .16 In addition to door open and door close controls on the car station panel, provide adjacent to these buttons, a separate "door hold" button. The car doors shall remain open as long as the "door hold" button is pressed. Identify the "door hold" button on the car station approval drawing.

3.20 EMERGENCY COMMUNICATION SYSTEM

- .1 Provide on car operating panel, emergency communication system complete with speaker, indicator, and alarm button. Next to indicator engrave "Call Answered When Light Flashing". Locate alarm button at a maximum height of 890 mm from the floor to the centre of the button. Provide next to alarm button in both visual and tactile form essential instructions and information.
- .2 The telephone must not shut off if the activation button is pushed more than once. The telephone shall transmit a pre-recorded location message only when requested by the operator and be provided with an adjustable call time which can be extended on demand by the operator.
- .3 Provide elevator communication device in the car to meet with B44:19 Code including 2-way messaging. Elevator communication system shall be either EmerCon Technologies "Easy as Can Be", or Mad Elevator "MosaicOne". No other elevator communication system will be accepted.
- .4 Once two-way communication has been established, voice prompts shall be provided which instruct the operator on how to activate these functions.
- .5 In addition to the alarm button activating the emergency communication in the car, ring a bell located in the hoistway at the Ground floor and on the car top.
- .6 Provide one master rescue communication station in the machine room to meet with B44:19 Code. Elevator communication system shall be either EmerCon Technologies "Easy as Can Be" or Mad Elevator "MosaicOne".
- .7 Connect Ground floor landing Elevator Communication Loss device to master rescue station.
- .8 Program, fully test, and commission Emergency Communication as required.

3.21 FIREFIGHTER'S EMERGENCY OPERATION

- .1 Provide elevator with fully automatic firefighter's emergency operation in accordance with Section 2.27 of the ASME A17.1/ CSA B44 Safety Code. Others shall provide all wiring signals from all fire alarm initiating devices to the elevator controller.
- .2 Include for complete testing and troubleshooting of firefighter's emergency operation as necessary during regular working hours of days. If overtime is requested by the Owner to perform these additional duties, perform such duties with no additional overtime premium or charge to the contract. Allow for not less than 2 crew hours plus 2 hours for an adjuster to perform this work per car. This time is in addition to the time noted in Article 1.1.11. Travel time shall be absorbed by the Contractor.

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- .3 Phase I Recall:
 - .1 Elevator shall be recalled to Ground floor. Alternate floor shall be floor 1.
 - .2 Elevator shall also respond to fire recall whenever machine room and/or hoistway fire alarm initiating devices are activated.
 - .3 When Phase I recall is in effect, cause in car visual indicator and alarm to activate. Render door protective devices sensitive to flames or smoke, car calls, and hall calls inactive. Return elevator non-stop to designated landing or alternate landing levels as required and open the car doors. Keep car doors open unless elevator has been selected to operate under Phase II operation.
 - .4 Phase I recall can also be activated via the main floor hall station key switch being manually turned to the "ON" position.
- .4 Phase II Emergency Operation:
 - .1 Phase II emergency operation shall commence upon in car key switch being turned to the "ON" position. Key to open cabinet shall be the same key as that used to manually initiate Phase I recall feature. Phase II operation shall be in accordance with Section 2.27.3.3 of the ASME A17.1/ CSA B44 Safety Code.
 - .2 Firefighter panel layout shall be in accordance with Section 2.27.3.3.7 of the ASME A17.1/ CSA B44 Safety Code.
 - .3 In addition to call cancel, stop, door open and door close button, provide additional door open and door close buttons for the rear door.
 - .4 Interruption of normal building power during either Phase I or Phase II operation shall not cause the elevator to be removed from either Phase.
 - .5 Phase II shall terminate upon in-car three position switch moved to OFF position, the elevator returning to Phase I designated landing.

3.22 EMERGENCY BATTERY LOWERING

- .1 Provide in the machine room, and with elevator controls, a battery lowering device.
- .2 In the event of loss of normal building power, elevator shall return to the Ground level, and the car doors opened. Allow for 1 complete additional door open/close cycle when the in-car door open is pressed.

3.23 SECURITY CARD READER

- .1 Ensure elevator controller is designed for hall call security card provisions. Hall call security shall not be compromised upon activation of independent service.
- .2 Arrange car to park at last floor served when on security mode.
- .3 Provide externally at elevator controller, a junction box with cover and terminal strips whose controller wiring is terminated on one side of the terminals. Provide all of the necessary connections and output terminals from the elevator controller for future connections by the security contractor.
- .4 Include for on site labour to assist security card contractor with the wiring, programming, testing, and hall station integration of the card readers with the elevator controls.

3.24 ELEVATOR MONITORING SYSTEM (EMS) – NOT USED

Hydraulic Passenger Elevator

3.25 PAINTING AND WRAPPING REMOVAL

- .1 Prior to *Date of Project Substantial Completion* broom sweep machine room and elevator pit, vacuum thoroughly, and apply 2 coats of low odor grey enamel paint to buffer stands and entire pit. Paint lowest section of main rails, 914 mm high from pit floor, with low odor rust inhibiting black paint.
- .2 Remove all protective wrapping from all finishes including but not limited to surfaces all around swing return, handrails, car door jambs, transom, car door, hall doors, and sight guards (where provided).

3.26 ELEVATOR PERFORMANCE

- .1 Ensure the following equipment standards and parameters are adjusted prior to acceptance of elevator.
- .2 Flight Time shall be measured from the time the car doors start to close for one floor and travels to the next floor and the doors $\frac{3}{4}$ open. Typical floor shall constitute a height of 4500 mm. Minor flight time adjustments for differing floor heights from this value are anticipated. Flight time shall remain constant regardless of loading up to rated capacity.
- .3 All noise levels shall be measured approximately 2 meters from the source using an ANSI Type 2 meter, "A" scale with an "S" response.
- .4 Car speed shall be measured with a digital device placed on the cab floor.
- .5 Elevator Contractor at the time of Bid Submission shall confirm acceptance of all Performance Values as noted herein. These Performance Values shall be measured by the Consultant and detailed in a final inspection report upon last car in the group being turned over and shall form the basis for the establishment of Project Completion and release of all final contract amounts as deemed appropriate by the Owner / Construction Manager. Furthermore, it is expected that any and all deficiencies as noted in the Consultant report, shall be completed to the fullest extent by the Elevator Contractor and the report returned to the Consultant with each and every deficiency item signed off.

Hydraulic Passenger Elevator

DESCRIPTION	UNITS	E1
Leveling Accuracy	mm	+/- 6
Car Rated Speed (+ /- 5% in UP & DOWN) under ALL Loads	m/s	+/- 5%
Door Open – SSSO 3'6" Wide Doors	Sec	2.8 – 3.1
Door Close – SSSO 3'6" Wide Doors	Sec	3.8 – 4.1
Car Call Dwell (excluding open time):	Sec	3.0 – 4.0
Hall Call Dwell (excluding open time):	Sec	5.0 – 6.0
Reduced Dwell Time for Car or Hall	Sec	1
Flight Time Maximum, typical 4500 mm	Sec	15-16
Maximum Acceleration	m/sec/sec	0.8
Maximum Jerk	m/sec/sec/sec	1.2
Door Operation Open, Close Maximum	dBA	62
Machine Room Noise	dBA	80
Fan Noise Operating	dBA	58
X (mg) Maximum	mg	<25-30
Y (mg) Maximum	mg	<25-30
Z (mg) Maximum	mg	<25-30
X (mg) A95	mg	<11-12
Y (mg) A95	mg	<11-12
Z (mg) A95	mg	<11-12
Door Closing Force less than:	lbs/ft	30

END OF SECTION 14 24 23



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207 Queen's Quay West, Suite 615
Toronto, Ontario
M5J 1A7

MECHANICAL SPECIFICATIONS

FOR

PARKDALE CI

Accessibility Upgrades

209 JAMESON AVENUE

TORONTO, ON. M6K 2Y3

TO

TORONTO DISTRICT SCHOOL BOARD

DATED

APRIL 29, 2026

ISSUED FOR TENDER

Contact Person: Can Le
Phone: 416-598-2920 Ext. 245
Email: canle@mcw.com

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PART 1 - GENERAL PROVISIONS

1.01 GENERAL REQUIREMENTS

- .1 Conform to requirements of the Ontario Building Code, City of Toronto, the Authorities Having Jurisdiction (AHJs); note that there may be more than one AHJ.
- .2 Applicable Codes, Standards and Bylaws shall be strictly adhered to. Obtain necessary permits, approvals, and inspections from the Authorities Having Jurisdiction (AHJs).
- .3 Perform all mechanical work detailed in the Documents to provide a complete and fully functional operating system to the satisfaction of the Consultant.
- .4 The most rigorous of these Specifications and the Base Building Standards shall form the basis for acceptance of the Work.

1.02 DEFINITIONS

- .1 The word "provide" shall mean "supply, install, connect, test and commission".
- .2 The term "work" means all equipment, permits, materials and labor to provide a complete mechanical installation as required and detailed in the drawings and specifications.

1.03 SUBMITTALS

- .1 Submit shop drawings, unless otherwise specified, for each major item of equipment such as plumbing fixtures, pumps, air handling units, radiation, coils, and special systems.
- .2 Shop drawings shall be complete with contractors reviewed stamp. Allow five (5) days for Mechanical Sub-consultant review.
- .3 Resubmit shop drawings returned for correction until 'reviewed' or 'reviewed as noted' status has been achieved.
- .4 Documentation and systems acceptance: Provide the following on substantial performance of the work:
 - .1 As-built drawings: Record accurately installed (as-built) Mechanical Work as "red-line" mark-ups on white prints. Mechanical Trade's "red-line" as-built drawings shall be transferred to an editable AutoCAD format "as-built drawing" by the Mechanical Trade Contractor. Submit both copies for review. Keep one up-to-date set on site.
 - .2 Operating and Maintenance (O&M) Manuals
 - .1 O&M Manuals shall be submitted to the Consultant for review.
 - .2 O&M Manuals shall include Reviewed shop drawings, Testing, Adjusting and Balancing (TAB) Reports, equipment data sheets, written warranty, operating instructions, and maintenance procedures.
 - .3 Provide piping pressure tests (fire protection, domestic water, HVAC piping) indicating system tested, pressure held, time of test and date, and certified by the Consultant.
 - .4 O&M Manuals shall be separated with dividers in appropriate sections.
 - .3 Make all corrections requested by the Consultant and resubmit for review.
 - .4 Air balancing report: the Work of Division 23 will not be considered totally performed until completion of air balancing even if undertaken by separate contract from the Work of Division 23.

1.04 Permits, Fees, and Inspections

- .1 Apply for, obtain, and pay for all permits, licenses, inspections, examinations, and fees required for the work prior to commencement of construction. Include all sales taxes and the GST.
- .2 Arrange for inspection of all work by the authorities having jurisdiction over the work.
- .3 In case of conflict, the codes take precedence over the contract documents. In no instance reduce the standard or scope of work or intent established by the drawings and specifications by applying any of the codes referred to herein.
- .4 Request in writing for a completed rough-in and final inspection of the mechanical systems. When the final inspection request is made all deficiencies must be complete, balancing reports submitted, systems ready for operation, equipment has been commissioned, operating and maintenance manuals submitted, all tags, charts and nameplates completed, all fixtures and equipment cleaned, spare parts provided, record drawings complete, control systems operational and the Owner's staff instructed in all phases of the system operation.

1.05 CONTRACT DRAWINGS

- .1 The drawings for mechanical work are performance drawings, diagrammatic, intended to convey the scope of work and indicate general arrangement and approximate location of equipment, fixtures and systems runs. The drawings do not intend to show architectural, interior design and structural details.
- .2 Do not scale drawings. Obtain information involving accurate dimensions from dimensions shown on architectural and structural drawings, and by site measurement.
- .3 Make, at no additional cost, any changes, or additions to materials, and/or equipment necessary to accommodate structural conditions (ducts around beams, columns, etc.)
- .4 Alter, at no additional cost, the locations of materials and/or equipment as directed that do not necessitate additional material.
- .5 Confirm on the site the exact location and mounting elevation of fixtures as related to architectural and structural details.
- .6 Record set of drawings to be always kept on site and changes to piping, ductwork and equipment shall be recorded on same.

1.06 EXAMINATION OF SITE AND DOCUMENTATION

- .1 Existing site conditions affecting the work of this trade shall be reviewed prior to Bid submission. Failure to do so shall not relieve Mechanical Trades of full contract responsibility. Include for any alternate routing of new or rerouting of existing services to accommodate all site conditions in the Bid Price. Determine exact dimensions and other restrictive conditions on site, not from drawings.
- .2 Prior to submitting Bid, the Mechanical Trades shall report all discrepancies to the Consultant and verify the locations of all existing services that are being extended and the routing of new services. Report any ambiguities, discrepancies, departures from building by-laws and/or from good practice. Additional payments will not be made for extra labour or material necessary due to location or nature of beams, joists, walls, furred ceilings, or finishes with which Contractor should be familiar.
- .3 Reuse existing materials and equipment wherever possible. Provide new materials and equipment as required to ensure a complete installation.

1.07 PHASING AND SCHEDULING OF WORK

- .1 Comply with the General Contractor's construction schedule. Include the cost of premium time in the Bid Price for work provided during nights, weekends, or other times outside normal working hours, necessary to maintain all mechanical services in operation and to meet the project schedule.
- .2 Where project phasing is required, refer to the phasing plan(s) included with the Documents. Include all costs associated with completing the Work in sequential phases as outlined in the phasing plan(s).

1.08 COORDINATION DRAWINGS

- .1 Prepare drawings in conjunction with all trades concerned, showing sleeves and openings for passage through structure, and all inserts, equipment bases, and supports, and relate these to suitable grid lines and elevation datum.
- .2 When requested, provide weights of major items of equipment.
- .3 Prepare interference and co-ordination drawings for all areas where the work of this division could conflict with and/or obstruct the work of other trades and/or other sections of this division. Submit drawings for review by the Consultant.

1.09 COORDINATION

- .1 Co-ordinate installation of new ductwork, sprinkler, and plumbing lines to suit installation of all other components being installed in ceiling space or extending into ceiling space. Review mechanical, electrical, and architectural drawings to become familiar with installation requirements of these components. Problems with installation of these components due to installation of new ductwork, sprinkler and plumbing lines will result in the Contractor having to relocate new ductwork, sprinkler, and plumbing lines at their own cost.
- .2 Co-ordinate arrangement, mounting, and support of mechanical equipment to allow right of way for piping and conduit installed at required slope.
- .3 Co-ordinate location of access panels and doors for mechanical items that are behind finished surfaces or otherwise concealed. Provide access doors and panels to suit the finish that it will be installed onto.
- .4 Co-ordinate sleeve selection and application with selection and application of firestopping.
- .5 Co-ordinate sizes and locations of required concrete pads and bases to support mechanical equipment.

1.10 PRODUCT STANDARDS AND ALTERNATIVES

- .1 Use only new materials, capitals and code approved in accordance with all laws, regulations, and Authorities Having Jurisdiction (AHJs).
- .2 All material and equipment shall meet or exceed base building standards and have Landlord/Owner's approval before ordering.
- .3 Base Bid Price on equipment specified. Show alternative equipment and itemized cost savings with Bid submission.
- .4 Equipment substitutions proposed following award of contract will not be considered without written explanation.

- .5 The quality and performance characteristics of substituted product shall be equivalent in all respects to the specified product. Substitution of any product other than specified must assure no deviation below the stated capacities, air flow rate, heat transfer rate, filtration efficiency and air mixing quality. Power requirements must not be exceeded and, where specifically defined, sound power levels must not be exceeded. Equipment weight and space requirements shall not be in excess of those allowed in the design. Applications for "equal" or "alternate" must address these factors.
- .6 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender and submissions must bear proof of acceptance by the Consultant if used in the tender.
- .7 All substitute products shall be reviewed by the Consultants; do not proceed with substituted equipment without Consultant's written authorization. Revise Record Drawings, incorporating alternates and/or substitutes and all related changes.
- .8 Any additional costs incurred by affected Trades for substituted equipment shall be borne by the Mechanical Trades without additional compensation.

1.11 RIGHTS RESERVED

- .1 Rights are reserved to furnish any additional detail drawings, which in the judgement of the Consultant may be necessary to clarify the work, and such drawings shall form a part of this contract.

1.12 EXPEDITING AND DELIVERY

- .1 Provide new material and equipment as specified and to the acceptance of the Consultant. Manufacturer's names are listed to set a standard of quality, performance, capacity, appearance, and serviceability.
- .2 Where no other acceptable manufacturers are indicated, provide the exact make specified. Requests for acceptance of manufacturers not listed must be submitted not less than seven working days prior to closing date of the tender and submissions must bear proof of acceptance by the Consultant if used in the tender.

1.13 SUPERINTENDENCE

- .1 Maintain at the job site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, testing and adjusting projects of comparable nature and complexity.

1.14 SKILLFULNESS

- .1 Install equipment, piping, ductwork, and cables in a skillful manner to present a neat appearance to function properly to the satisfaction of the Consultant. Install runs parallel and perpendicular to building lines, in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed install neatly and group to present a tidy appearance.
- .2 Install equipment and apparatus requiring maintenance, adjustment or eventual replacement with due allowance therefore.
- .3 Include in the work all requirements of manufacturers shown on the shop drawings or manufacturers installation instructions.
- .4 Replace work unsatisfactory to the Consultant without extra cost.
- .5 Make provision to accommodate future plant and equipment indicated on drawings.

- .6 Protect from damage all equipment delivered to the site and during installation. Any damage or marking of finished surfaces shall be made good to the satisfaction of the Consultant.
- .7 The Contractor and all sub-trades are responsible to repair or replace any item damaged while performing work outlined in this contract.

1.15 NOISE AND VIBRATION

- .1 Mechanical equipment is to operate without objectionable noise or vibration. If, in the opinion of the Consultant, the equipment operates with excessive noise or vibration, then the equipment must be replaced, or noise or vibration eliminated.
- .2 Connections to noise-producing and vibrating equipment must be made with flexible connection. Refer to details for more information.
- .3 Vibration isolators are to be provided where indicated or required.

1.16 INTERRUPTION OF SERVICES

- .1 Comply with Landlord/Owner's requirements for system planned interruption to existing services. Interruption of service must occur at the times and for the duration stipulated by the Landlord/Owner. Carry out all preparatory work, measurements, and similar, without interruptions of existing services.
- .2 Arrange with Landlord/Owner for necessary shutdowns of all systems and include all overtime costs in the Bid Price for tie-ins and work within other tenant spaces to be completed on weekends and at other times suitable to Landlord/Owner and other occupants.

1.17 CLEANING

- .1 During construction, keep site reasonably clear of rubbish and waste material resulting from work. Clean the Work area on a daily basis.
- .2 After completion of the Work, remove rubbish and debris from the site, arrange and pay for disposal of all waste materials. Repair any damage caused. Clean all polished, painted and make plated work bright.
- .3 Leave systems operating and premises in good order working. Clean areas to acceptance of the Landlord/Owner.
- .4 Carry out additional cleaning operating of systems as specified in other sections of the specification.

1.18 COMPLETION

- .1 Consultant's Final Inspection is imperative. Contractor shall contact the Consultant and the Landlord/Owner's Representative to arrange for a final inspection at substantial completion of mechanical work.
- .2 Should mechanical work be covered up at the time of the Final Inspection, including services enclosed behind finished drywall, above finished ceilings, or concealed by finished millwork, the Mechanical Trades shall arrange for the Work to be exposed to complete the inspection.
- .3 When the final inspection request is made all deficiencies must be complete, balancing reports submitted, systems ready for operation, equipment has been commissioned, operating and maintenance manuals submitted, all tags, charts and nameplates completed, all fixtures and equipment cleaned, spare parts provided, record drawings complete, control systems operational and the Landlord/Owner's staff instructed in all phases of the system operation.

- .4 The Mechanical Work will not be considered Substantially Performed until completion of air and water balancing, even if undertaken by separate contract from the Mechanical Trades.
- .5 On completion of work, present to the Landlord/Owner a final unconditional certificate of approval from the Authorities Having Jurisdiction (AHJs).

1.19 INSTRUCTION TO OWNER

- .1 Instruct the owner's representatives in all aspects of the operation of systems and equipment.
- .2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.
- .3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:
 - .1 Date instructions were given to the owner's staff.
 - .2 Duration of instruction.
 - .3 Name of persons instructed.
 - .4 Other parties present (manufacturer's representative, Consultants, etc.).
- .4 Signatures of the owner's staff stating that they properly understood the system installation, operation, and maintenance requirements.

1.20 ADDITIONAL WORK

- .1 Before proceeding with any changes, submit for review and approval by the Consultant; approval shall come in the form of a Change Order signed by the Landlord/Owner.
- .2 Change quotations shall be submitted complete with an itemized cost breakdown of all materials, equipment and labour costs associated with each submission for additional or deleted work. Failure to provide will result in rejection.
- .3 All Mechanical Change Notices shall be priced using mechanical labour unit costs in accordance with Mechanical Contractors Association of America (MCAA) Labor Estimating Manual.
- .4 It is understood that each change may have a variety of non-typical or abnormal factors that will require adjustments. Under no circumstances shall the cumulative total of additional factors exceed 20% of the hours established using Base Labour units.
- .5 Provide copies of the Allpricer published list prices used to estimate material and equipment costs, less discount of 20%.
- .6 The mark-up for overhead and profit shall be limited to and be calculated:
 - .1 Refer to prime consultant contract.

1.21 COMMISSIONING

- .1 Contractor shall provide commissioning for all the new and modified equipment as part of the Work.
- .2 Test and demonstrate all automatic equipment is operating as per sequence of operation (example: test boiler controls package and associated circulating pump interface as an integrated system).
- .3 Provide on-site training instruction to the Owner of the proper operation and maintenance of all Mechanical Equipment installed for a minimum of two 4-hour sessions (total 8 hours).
- .4 Pressure Testing:

- .1 Do not insulate piping systems until pressure testing has been completed, and proven tight. Should leaks develop in any part of the piping system, remove, and replace defective sections, fittings, and other piping system ancillaries.
- .2 Flushing and testing shall be completed prior to connection into building system.
- .3 Hydrostatically test piping at not less than 1.5 times working pressure of final system, but not less than 75 psi (520 kPa), for a period of not less than 12 hours without pumping.
- .4 Test piping system in sections as required by the progress of work.
- .5 Test gas piping in accordance with CGA standard and Authorities Having Jurisdiction (AHJs).
- .5 Existing Equipment:
 - .1 Verify with building property manager that existing equipment and controls are maintained and operating as originally designed.
- .6 Life Safety Integrated Systems Testing (IST):
 - .1 Integrated Systems Testing (IST) is required by the Ontario Building Code (OBC) test verify the functionality of all life safety systems provided by multiple design consultant and construction trade disciplines; successful completion of IST is required prior to certification for building occupancy.
 - .2 IST shall include confirmation of integrated systems operation proving fire alarm signaling, fire suppression, smoke control (pressurization), smoke exhaust, or other life safety measures as may be required by the design in response to a fire condition.
 - .3 IST must be conducted in accordance with the requirements of ULC-S1001 "Integrated Systems Testing of Fire Protection and Life Safety Systems."
- .7 Commissioning Report:
 - .1 Provide a Commissioning Report that includes a description of all Commissioning Activities undertaken and the results thereof. Commissioning Report shall be in a format acceptable to the Consultant.
- .8 Provide record data of test results to the Consultant for review. Include a copy of all the test results in the Commissioning Report.

1.22 WARRANTY

- .1 Submit written warranty to Landlord/Owner covering remedy of defects in work at completion of work. Submit similar written warranty for one (1) year from date of Substantial Performance for any part of work accepted by Landlord/Owner.
- .2 Repair and/or replace any such defects which appear in work within warranty period without additional expense to owner; ordinary wear and tear and wilful damage by, or carelessness of owner's staff or agents excepted. Where such defects occur, be responsible for costs incurred in making defective work good, includes repair or replacement of building finishes, other materials, or damage to other equipment caused by such defects, or by subsequent replacement or repairs.
- .3 During the one-year warranty period, the Mechanical Trades shall respond to the site on a 24 hour "call out" period whereby at any time of day or night appropriate Trades shall attend to all faults and complaints, remedy all defects, replace all malfunctioning items, and maintain the complete installation in a clean and tidy condition to the satisfaction of the Consultant.

PART 2 - DEMOLITION

- .1 Demolition work will be executed in accordance with the latest edition of:
 - .1 CAN/CSA-S350-M1980 Code of Practice for Safety in Demolition of Structures;
 - .2 Occupational Health & Safety Act;
 - .3 Ontario Building Code;
 - .4 Ontario Fire Code.
- .2 Visit the site, examine the existing conditions, and become familiar with the extent of the necessary removal, relocation, reconnecting, and rerouting of mechanical equipment and services as necessary for the completion of the project. The drawings indicate the approximate locations of services as far as these are known. Immediately advise Consultant in writing when unknown services are encountered.
- .3 Review and confirm with the architect/designer's drawings for the complete extent of demolition and alteration.
- .4 Ensure that all mechanical, life safety services, and services for existing equipment in areas outside the areas of this work are required to remain in service, unless otherwise approved by the Owner.
- .5 Use only those existing entrances and stairs designated by the Owner for access to the egress from the existing buildings and various floors when work of this contract is to be carried out. No traffic through other areas of the building will be permitted without the prior consent of the Owner. Protect walls of passenger elevators to approval of Owner prior to use. Accept liability for damage, safety of equipment and overloading of existing equipment.
- .6 Remove and replace any mechanical equipment on walls or ceilings that will be demolished and rebuilt.
- .7 Disconnect, capping and make-safe all gas, water, sewer, storm and other services affected by the Work being demolished.
- .8 Package and turn-over any Owner supplied existing equipment, materials and associated controls that is removed or unused under this contract.
- .9 Be responsible and pay for any damage to the Base Building incurred by work of this division, or repair to the satisfaction of the Consultant.
- .10 Carry out the work with minimum of noise, dust, and disturbance.
- .11 Ensure that all existing equipment which are to be reused and/or relocated is thoroughly inspected and refurbished to ensure correct operation when put back into service.
- .12 Include in the Bid Price for all shipping and placement in a designated on-site storage location.

PART 3 - BASIC MATERIALS AND METHODS

3.01 EXISTING AND NEW EQUIPMENT

- .1 Reuse existing materials and equipment wherever possible. Provide new materials and equipment as required to ensure a complete installation. All existing equipment, materials and associated controls not used in this contract shall be packaged and turned over to the Owner. Include in the tender for all shipping and placement in a designated on-site storage location. Remove any equipment or material not wanted by the Owner from the site.
 - .1 Do not reuse flexible ductwork.

- .2 Existing Equipment: Verify with building property manager that existing equipment and controls are maintained and operating as originally designed.
 - .1 Induction Units: Verify that filters, nozzles, and coils are clean, air is balanced, control valves and thermostats are operating, etc.
 - .2 VAV Boxes: Verify that dampers, actuators, and thermostats are operating, etc.
- .3 All existing external duct insulation to be inspected and repaired as required.
- .4 Where specified, install all equipment provided by the Tenant. Receive, store, install equipment, and accept full responsibility for its correct operation.
- .5 Prior to operating any existing or new equipment during any stage of construction, approval from the Owner and Consultant must be received in writing.
- .6 All power wiring and equipment starters for mechanical equipment and associated devices including connections shall be provided under the Electrical Contract, Division 26, unless noted otherwise in the specification. Confirm the power characteristics on site prior to processing shop drawings and ordering equipment. All control wiring, line, or low voltage shall be by this Contractor.
- .7 Where the drawings indicated equipment to be furnished by the Owner, or by Trades outside of this Contract, provide mechanical rough-in for each unit pursuant to its shop drawings, and make final connections and other mechanical facilities for a complete installation.
- .8 Provide all rigging as may be required for all system materials and equipment. Provide all required supplementary steel supports necessary for mounting or hanging equipment. Equipment being suspended from the floor structure, or supported from or on the roof, with a weight greater than 500 pounds, shall have supports reviewed by a structural Consultant. All required structure as recommended by the Consultant, shall be included in the tender.

3.02 MATERIALS AND CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

- .1 Where materials are furnished by others for installation under this division, the sub-Contractor shall notify the supplier of dates they will be ready for delivery as specified in the general conditions. The sub-Contractor shall receive, unload, handle, store, protect and insure the material until ready for actual installation. Upon receipt of material furnished by others, the sub-Contractor shall spot-check or check the entire shipment and promptly advise the Consultant in writing of any damage and/or missing components. Any material which is subsequently lost or damaged due to negligence on the part of the sub-Contractor shall be promptly replaced (or repaired to the satisfaction of the owner) at the sub-Contractor's expense.
- .2 Where the drawings indicated equipment to be furnished by others, provide mechanical rough-in for each unit pursuant to its shop drawings, and make final connections and other mechanical facilities for a complete installation.

3.03 TEMPORARY FILTERS

- .1 Cover open end of all base building return air openings including registers, return or exhaust air ducts which are to remain operational during construction with 1" (25mm) thick filter media secured by metal band pulled tight around duct.
- .2 Filters shall be replaced weekly.
- .3 Remove filters upon construction completion.
- .4 Maintain this condition until plastering, drywall and other finishing operations are complete.

3.04 EQUIPMENT HANGERS AND SUPPORTS

- .1 Provide any additional structural steel channels, angles, inserts, beam chumps and similar accessories required for hanging or supporting equipment. All new and relocated existing services and equipment must be supported from the building structure. Design steel to support and distribute operating and static loads. All drilling, approved type inserts and hangers shall be included.
- .2 Support suspended equipment from the bottom or from manufacturer's designated suspension points. Support tanks and similar equipment with adequate beam strength by saddles with curvature to match the equipment. Continuously support all other equipment.
- .3 Auxiliary structural members shall be included and installed where required to accommodate hangers.
- .4 Provide base supports for all pipe risers.
- .5 Fabricate steel supports in contact with water or humidity conditions from materials having approved corrosion resistance or galvanize after fabrication or brush welds clean and apply a prime coat of rust inhibiting paint.
- .6 All supports shall be connected to the top of joists and beams where applicable.
- .7 Suspension from metal deck is not allowed.
- .8 Suspending one hanger from another is not permitted.

3.05 PIPE HANGERS AND SUPPORTS

- .1 All new and relocated existing services must be supported from the building structure. All drilling, approved type inserts and hangers shall be included.
- .2 Follow requirements for Equipment Hangars and Supports as modified by this Article.
- .3 For insulated pipe, size hanger or support to suit diameter of insulated pipe and install hanger or support on outside of insulation and insulation finish.
- .4 Unless otherwise shown or specified, hangers for suspended pipe less than or equal to 1" (25mm) are to be clevis type or adjustable ring type, and hangers for suspended pipe greater than or equal to 1½" (40mm) are to be adjustable clevis type.
- .5 Space hangers and supports in accordance with following:
 - .1 Cast iron pipe – hang or support at every joint with maximum 8'-0" (2.4m) spacing;
 - .2 Plastic pipe – conform to pipe manufacturer's recommended support spacing;
 - .3 Steel pipe and copper piping – hang or support at spacing in accordance with following schedule:

Nominal Pipe Size	Steel Pipe Maximum Support Spacing	Copper Piping Maximum Support Spacing
to ¾" (20mm)	7'-0" (2.1m)	5'-0" (1.5m)
1" (25mm)	7'-0" (2.1m)	6'-0" (1.8m)
1-¼" (32mm)	7'-0" (2.1m)	7'-0" (2.1m)
1-½" (40mm)	9'-0" (2.7m)	8'-0" (2.4m)
2" (50mm)	10'-0" (3.0m)	8'-0" (2.4m)

Nominal Pipe Size	Steel Pipe Maximum Support Spacing	Copper Piping Maximum Support Spacing
2-½" (65mm)	11'-0" (3.3m)	9'-0" (2.7m)
3" (75mm)	12'-0" (3.6m)	10'-0" (3.0m)
4" (100mm)	14'-0" (4.2m)	12'-0" (3.6m)
6" (150mm)	17'-0" (5.1m)	14'-0" (4.2m)
8" (200mm)	19'-0" (5.6m)	n/a
10" (250mm)	22'-0" (6.7m)	n/a
12" (300mm)	23'-0" (7.0m)	n/a

- .4 Flexible grooved pipe/coupling joint piping per table above but with not less than one hanger or support between joints.
- .5 Spacing and capacities are based on straight pipe lengths filled with water. Additional valves and fittings increase the load and therefore closer hanger spacing shall be required.
- .6 Where pipes change direction, either horizontally or vertically, provide a hanger or support on horizontal pipe not more than 12" (300mm) from elbow, and where pipes drop from tee branches, support tees in both directions not more than 2" (50mm) on each side of tee.
- .7 When pipes with same slope are grouped and a common hanger or support is used, space hanger or support to suit spacing requirement of smallest pipe in group and secure pipes in place on common hanger or support.
- .8 Provide roller hangers or supports for heat transfer piping greater than or equal to 6" (150mm) diameter and conveying a material 170°F (75°C) or greater to facilitate pipe movement due to expansion and contraction.
- .9 Unless otherwise shown or specified, space supports for vertical piping in accordance with following:
 - .1 Support vertical pipes spaced at maximum 10'-0" (3m) intervals or at every floor, whichever is lesser;
 - .2 For sections of vertical piping with a length less than 10'-0" (3m), support pipe at least once;
 - .3 For vertical cast iron plain end pipe (mechanical joint type), secure riser or pipe clamp around pipe under a flange integral with pipe for vertical support purposes, or provide a length of hub and spigot pipe to facilitate proper support;
 - .4 For vertical steel pipe risers in excess of 10'-0" (3m), weld shear lugs to pipe to carry load;
 - .5 For vibration isolated piping risers, provide rubber-steel-rubber vibration isolation pads between riser clamps and floor.
- .10 Each hanger, support or securement for horizontal bare copper tubing is to be plastic coated to prevent direct contact between pipe and ferrous hanger. Each wall or floor clamp for vertical bare copper piping is to be isolated from pipe by means of strips of flexible rubber inserts. Use of painted ferrous hangers and supports, including those painted with copper coloured paint, is not acceptable. Site application of tape or other types of isolation is not acceptable.
- .11 For insulated horizontal piping 1¼" (32mm) and larger, provide insulation protection saddles between insulation and hanger or support in accordance with the following table:

Pipe Insulation Saddle Sizing Table - Outside Diameter (in.)						
Pipe Size (inches)	Pipe Insulation Thickness (in.)					
	½	1	1½	2	2½	3
1¼	3	3½	5	5½	6½	7½
1½	3	4	5	5½	6½	7½
2	3½	4½	5½	6½	7½	8½
2½	4	5	6½	7½	8½	9½
3	4½	5½	6½	7½	8½	9½
4	5½	6½	7½	8½	9½	11
6	7½	8½	9½	11	12	13
8	9½	11	12	13	14	15
10	—	13	14	15	16	17
12	—	15	16	17	18	19

- .1 Saddles up to 5½" (140mm) outside diameters shall be 22 gauge galvanized steel, 12" (300mm) long; saddles 6" (150mm) outside diameter and larger shall be 20 gauge galvanized steel, 18" (450mm) long.
- .2 Install saddles immediately after pipe is insulated.

3.06 SEALANT, INSERTS, AND SLEEVES

- .1 All new penetrations through floors to be sealed with approved non-shrink, waterproof, and fireproof sealant.
- .2 Mechanical service penetrations of required fire separations shall be fire stopped using a ULC listed fire stopping assembly. Repair and/or provide all spay fire-proofing affected by the Mechanical Work to maintain required ratings.
- .3 Seal to be airtight around all ductwork and piping penetrations through partitions, baffles above ceilings, and through floors that are not fire rated.
- .4 Provide sleeves for all new piping passing through floor and roof slabs, beams, concrete walls, and slab-to-slab partitions, etc.

3.07 CUTTING, PATCHING, AND CORE DRILLING

- .1 Any required cutting, patching and core drilling required to perform the Mechanical Work shall be included by the Mechanical Trades. Perform cutting in neat and true fashion, with proper tools and equipment to owner's approval. Patch surfaces to exactly match existing finishes. Utilize tradespeople skilled in particular trade or application worked on to Landlord/Owner's approval.
- .2 X-Ray concrete structure in accordance with Landlord/Owner structural engineer's requirements. Verify exact location of core drilling to check for existence of any services (example: electrical conduit, structural re-bar) with Landlord/Owner and Landlord/Owner's structural engineer.
- .3 Provide details of new openings through structural components for engineer's approval. Incur all related costs to obtain structural engineer's approval.

- .4 For exterior and/or underground penetrations, provide waterproof, weather-tight, fire rated materials in compliance with local governing authority and code requirements to seal openings.
- .5 Patch fire rated partitions and floor to maintain ULC listing for rating upon removal of mechanical services originally spanning fire rated assembly.
- .6 Ensure areas of both sides of surface being cut are protected from debris. Be responsible for damage done to existing building and services caused by cutting or drilling.

3.08 GENERAL REQUIREMENTS FOR ALL VALVES

- .1 Generally, valve locations are indicated or specified on drawings or specified in Sections of the Specification, however, regardless of locations shown or specified, following requirements shall apply:
 - .1 Provide shut-off valves to isolate systems, at base of vertical risers, in branch take-offs at mains and risers on floors, to isolate equipment, to permit work phasing as required, and wherever else required for proper system operation and maintenance;
 - .2 Install shut-off valves with handles upright or horizontal, not inverted, and located for easy access;
 - .3 Unless otherwise specified, provide a check valve in discharge piping of each pump;
 - .4 Valve sizes are to be same as connecting pipe size;
 - .5 Valves are to be permanently identified with size, manufacturer's name, valve model or figure number and pressure rating, and wherever possible, valves are to be a product of the same manufacturer;
- .2 For valves in insulated piping, design of valve stem, handle and operating mechanism is to be such that insulation does not have to be cut or altered in any manner to permit valve operation.

3.09 FLASHING AND COUNTER FLASHING

- .1 Flashing and counter flashing for exterior mechanical service penetrations or penetrations of waterproofed floors shall be provided by Mechanical Trades.
- .2 Flash all mechanical parts passing through, or built into a roof, outside wall or waterproof floor.
- .3 Use prefabricated aluminum or PVC flashings for roof, and membrane or copper for walls and floors.
- .4 Ensure all openings are weather, water and fireproof, using an approved flexible sealant.

3.10 ACCESS DOORS

- .1 Access doors shall be provided for all inaccessible mechanical equipment and services requiring inspection or service. Finish shall suit architect/designer's requirements.
- .2 All access doors shall be 12"x12" (300mm x 300mm), except provide 24"x24" (600mm x 600mm) where personnel entry is required.
- .3 Provide to the appropriate trade for installation co-ordinate exact location with other trades and architect. Provide for plaster surfaces, recessed 16-gauge prime painted steel door and welded metal lath, ready to take plaster. Provide with concealed hinge and stainless-steel studs with brass sleeves.
- .4 Provide to suit wall surface or type of construction, other factory prime coated access doors of welded 12-gauge steel, flush type with concealed hinges, lock, and anchor straps.

- .5 Provide fire rated access doors in fire rated partitions. Provide hinged access doors equal to fire rating of wall or ceiling in which installed.
- .6 Lay-in type ceiling tiles, properly marked, may serve as access panels. Provide stick-on circular tab (approximately 1/4" diameter), located on a tee supporting ceiling tile used as access panel, for all new equipment located in ceiling space. (example: VAV terminals)

3.11 RIGGING AND HOISTING

- .1 Mechanical Trades shall be responsible for all lifting, hoisting and transportation of all equipment on site from the point of delivery to the point of installation.
- .2 Provide all rigging and hoisting as may be required for all system materials and equipment.
- .3 Provide all required supplementary steel supports necessary for mounting or hanging equipment. Equipment being suspended from the floor structure, or supported from or on the roof, with a weight greater than 500 lb. (227 kg), shall have supports reviewed by a Structural Engineer.
- .4 All required supplementary structure as recommended by the Consultant, shall be included in the Bid Price.

3.12 CONCRETE WORK

- .1 Provide minimum 4" (100 mm) concrete housekeeping pads, unless noted otherwise, complete with reinforcing steel under all floor mounted mechanical equipment and supports. Extend pads over the full equipment base and isolator area.

3.13 MECHANICAL WIRING

- .1 All power wiring for mechanical equipment shall be provided by Electrical Trades unless noted otherwise. Confirm the voltage and phase characteristics on site with the Electrical Trades prior to producing shop drawings and ordering equipment.
- .2 All control wiring, line or low voltage, shall be by Mechanical Trades; follow Electrical Trades wiring specifications.

3.14 CHEMICAL TREATMENT

- .1 Perform piping system cleaning and water treatment services under the supervision of the Base Building Water Treatment Specialist.
- .2 Clean and degrease the piping systems prior to connection to the base building system. Clean strainer baskets as often as necessary during cleaning and degreasing. Verify chemical treatment and antifreeze concentrations with the Base Building Water Treatment Specialist.
- .3 Add chemical solution to system, circulate for periods required, drain and refill. Repeat chemical treatment rinse. Refill the system, and connect to base building condenser water system.
- .4 Maintain chemical levels from the time the system is filled after cleaning, up to Substantial Performance of the Contract.
- .5 Provide service visits during Warranty period as required to stabilize and commission the systems. Perform corrosion tests to verify performance requirements are being achieved. Document recommendations and submit a written report to the Owner's representative after each visit.
- .6 Pipes intended to carry potable water shall be flushed and disinfected before being placed in service.

- .1 Disinfection procedures shall conform to AWWA C601 and AWWA C651, and the requirements of the Authorities Having Jurisdiction (AHJs).
- .7 Where stainless steel piping is used for domestic water applications, piping systems shall be annealed, de-greased and pickled and will be subject to formal cleaning and disinfecting along with all other parts and components of the domestic water system as per ASTM A-380.

3.15 METERING

- .1 Provide digital meters to match the Base Building standard except as noted otherwise.

PART 4 - AIR DISTRIBUTION

4.01 GENERAL REQUIREMENTS

- .1 Provide ductwork and hangers in accordance with SMACNA and ASHRAE standards.
- .2 Fabricate ductwork from galvanized sheet metal with a minimum coating of 0.60 oz/sq. ft. (1.83 grams/sq. m) (G60 coating) unless other materials are specifically named.
- .3 Seal all transverse joints in supply, return and exhaust ductwork with high velocity duct sealer (Bakelite 530-09 or equivalent). Duct tape not acceptable.

4.02 FLEXIBLE DUCTWORK

- .1 At the inlet of each VAV terminal control unit, provide a minimum of three (3) diameters of straight flex duct. Maximum length 4'-0" (1200mm).
- .2 Flexible ducts serving diffusers shall be installed as one continuous piece and shall not exceed 10'-0" (3m) lengths.
- .3 Connect flexible ductwork to with a minimum of three (3) self-tapping screws, seal with duct sealer and wrap with glass fab tape.
- .4 Flexible ductwork to be supported from building structure where it is not self-supporting and must not be allowed to lie on ceiling or other equipment.
- .5 Externally insulated flex duct to be Thermaflex type M-KE, Flexmaster Low Pressure Acoustic or approved equal.
- .6 Uninsulated flex duct to be Flexmaster T/L spun aluminum or approved equal. Ducting such as aluminum foil, PVC, Mylar, fibreglass mesh and other fibre type will not be accepted.

4.03 BALANCING DAMPERS:

- .1 Provide air balancing damper for each branch duct tee-off.
- .2 Provide splitter dampers as shown on drawings. Construct of not less than 22-gauge material. Where installed in ducts up to 12" (300mm) deep, provide single blade, and in ducts greater than 12" (300mm) provide multi-blade with linkages, each blade being not wider than 9" (228mm).
- .3 Provide spin-on connectors complete with balancing damper at take-off for grilles and diffusers from main duct.

4.04 GRILLES, DIFFUSERS AND REGISTERS

- .1 As manufactured by Nailor, E.H. Price or equal as accepted by the Consultant. Refer to Equipment Schedules.

4.05 LINED DUCTWORK

- .1 Provide internally lined ductwork as indicated on the drawings. Lining to be 1" (25mm) thick, 1.5 lb/cu. ft (25 kg/cu.m) density fibreglass with neoprene coating. Seal all cut edges of insulation with Bakelite 200-32 or equivalent to ensure fibreglass does not come into contact with air stream.
- .2 Duct sizes to increase accordingly to maintain equivalent free area.
- .3 All transfer air ductwork to be internally lined.

4.06 FIRE DAMPERS

- .1 Provide fire dampers as per wall type layout requirements. ULC listed and labelled type B or C, non-asbestos. Provide latched access doors in ductwork for access to all fire dampers. Minimum 12"x12" (300mm x 300mm) access required.

4.07 SMOKE DAMPERS

- .1 To be installed at locations shown on drawing ULC listed and labeled. All smoke damper units to be equipped with linkages for mounting of actuators for smoke control operation. Unit to be positive seal and able to maintain smoke barrier in lobby and corridor. Provide all electric actuators. Actuators to be mounted outside duct. Supply voltage of actuators shall be 120V, 1 phase. Control voltage of actuators shall be 24 Vdc; to facilitate actuator upon fire alarm. Contractor to provide all necessary hardware to achieve this operation.

4.08 CEILING DAMPERS

- .1 ULC listed and labeled. For diffusers, damper to be complete with thermal blanket.

4.09 EXPOSED RETURN AIR OPENINGS

- .1 All services above return air grilles to be painted flat black.

4.10 TRANSFER AIR OPENINGS

- .1 Provide transfer air openings as indicated without ductwork extension shall be the responsibility of the Mechanical Trades to advise size and location required to General Trades.

4.11 FLEXIBLE CONNECTIONS

- .1 ULC listed and labelled, neoprene coated, glass fabric, factory fabricated as approved by local authorities. Connection must not be under tension.

PART 5 - NATURAL GAS PIPING

- .1 Install natural gas service to meet CGA, TSSA and The Ontario Gas Utilization Code and all other Regulations as may be required by the Authorities Having Jurisdiction (AHJs).
- .2 ASTM A53 Schedule 40 with 200psi (1380kPa) rated screwed malleable fittings; welded in concealed areas and X-rayed if required by Authorities Having Jurisdiction (AHJs).
- .3 Provide vents to atmosphere for all safety switches and regulators as required by Code.

PART 6 - HVAC PIPING

6.01 AIR VENTS:

- .1 Provide air vents on condenser water, chilled water, and heating water piping to all high points in the system and at each piece of equipment. Air vents to be equal to Maid-O-Mist No. 7 Series or Braukman. Provide shut-off cocks on automatic vents. Provide automatic vents in piping except where possibility of water damage could occur, in which case provide manual vents.

6.02 SHUT-OFF VALVES AND DRAIN VALVES

.1 Drain Valves:

- .1 Install ¾" (20 mm) drain valves with hose thread end cap and chain in water services adjacent to and downstream of shut-off valves and at all system low points. Slope water piping to drain points.
- .2 Provide drain connections between all coils and pieces of equipment and unit isolation valves.

.2 Ball Valves:

- .1 Threaded end valves, ¼" to 4" (6mm to 75mm), 2-piece full port design constructed of a forged brass body and end adapter. Seats and stem packing shall be virgin PTFE. Stem shall be bottom loaded, blowout proof design with fluorocarbon elastomer O-ring to prevent stem leaks. Valve shall have chrome plated brass ball and adjustable packing gland.
- .2 Water Temperature Range: 0°F to 400°F (-18°C to 204°C)
- .3 Pressure Range: ¼" to 2" (6mm to 50mm) 600psi (41 bar) WOG, non-shock 150psi (10.3 bar) WSP; 2½" to 4" (65mm to 100mm) 400psi (27.5 bar) WOG.

6.03 WATER BALANCING VALVES

- .1 Equal to Tour and Andersen Model 787 STAD, ½" (12mm) to 2" (50 mm): 300 psi (2065 kPa) rated, Y-pattern, globe type with threaded ends, non-ferrous brass copper alloy body, EPDM o-ring seals. 4-turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter.
- .2 Equal to Tour and Andersen Model 789 STAG, 2 ½" (65 mm) to 16" (400 mm) 350 psi (2400 kPa) rated Y-pattern, globe type with grooved ends, ASTM A536 ductile iron body, all other metal parts of brass copper alloy, EPDM O-ring seals. 8, 12, 16, 20 or 22 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter.
- .3 Provide water balancing valves as follows on the common supply or return piping from each:
 - .1 air handling unit heating and cooling coils.
 - .2 heat recovery coil.
 - .3 terminal device (fan coil unit, unit heater, duct mounted reheat coil, perimeter heating element and similar).
 - .4 heat exchanger.
 - .5 on each return piping riser.
 - .6 where otherwise required by the Contract Documents.

6.04 STRAINERS

- .1 Sizes ¼" to 4" (6mm to 100mm): Wye-pattern lead free cast copper silicon alloy strainer shall have a solid retainer cap with gasket. Strainer shall be rated to 400psi (27.6 bar) WOG @ 210°F (99°C); 125psi (8.6 bar) WSP @ 353°F (178°F) for sizes ¼" – 3" and 300psi (20.7 bar) WOG @ 210°F (99°C); 125psi (8.6 bar) @ 353°F (178°C) for size 4".
 - .1 Body: lead free cast copper silicon alloy
 - .2 Retainer Cap: ¼" to 4" (6mm to 100mm): copper silicon alloy
 - .3 Cap Seal: ¼" to 3" (6mm to 75mm): EPDM O-Ring; 4" (100mm): Garlock gasket
 - .4 Standard Screen: ½" to 2 ½" (12mm to 65mm): 304 stainless-steel #20 mesh; 3" (75mm): 3/64" (1.2mm) 304 stainless-steel perforated screen; 4" (100mm): 1/8" (3mm) 304 stainless-steel perforated screen
 - .5 Maximum Working Pressure: ¼" to 3" (6mm to 75mm): 400psi (27.6 bar) WOG @ 210°F (99°C) 125psi (8.6 bar) WSP @ 353°F (178°F); 4" (100mm): 300psi (20.7 bar) WOG @ 210°F (99°C) 125psi (8.6 bar) WSP @ 353°F (178°F)
- .2 Sizes 2" to 12" (50mm to 300mm): Wye pattern, cast iron strainer with a double coated. Flanges to conform to ANSI B16.1 Class 125, 304 stainless-steel perforated screens, and a drain/blowoff connection furnished with a closure plug.
 - .1 Maximum Operating Pressure: 200psi (13.8 bar) WOG, non-shock, @ 210°F (99°C), 125psi (8.6 bar) WSP @ 353°F (178°C)

6.05 CHECK VALVES

- .1 Swing Check Sizes ½" to 2" (12mm to 50mm) threaded ends: Class 150 cast bronze wye pattern swing check valve suitable for installation in either horizontal or vertical orientation with upward flow.
 - .1 References: Threaded Ends: ANSI B1.20.1; Design: MSS SP-80, TYPE 3
 - .2 Body: Cast Bronze (ASTM B62)
 - .3 Cap: Forged Brass (B283, C37700)
 - .4 Disc: Cast Bronze (ASTM B62)
 - .5 Disc Nut: (½" to 1") Brass Rod (B16); (1 ¼" to 2"): Forged Brass (B283, C37700)
 - .6 Hinge Pin: Copper
 - .7 Plug: Brass Rod (B16)
 - .8 Arm: Cast Bronze (ASTM B62)
 - .9 Temperature Range: -20°F to 406°F
 - .10 Cold Working Pressure rating: 300 psi (20.7 Bar) at 100°F
 - .11 Saturated Steam Pressure rating: 150 psi (10.3 Bar) at 366°F
- .2 Swing Check Sizes 2" to 54" (50mm to 1350mm) flanged ends: Class 150 wafer style check valve to fit within ANSI bolt circles.
 - .1 References: Applicable ASTM, ANSI, and API Standards
 - .2 Body: Bronze ASTM B62 (85-5-5-5)
 - .3 Disc: Bronze ASTM B62 (85-5-5-5)
 - .4 Shaft/spring: 316 stainless-steel.
 - .5 Seat: Buna-N
 - .6 Cold Working Pressure rating: 225 psi @ -20°F to 150°F (15.51 bar @ 65.56°C)
 - .7 Saturated Steam Pressure rating: 150 psi @ 406°F (10.34 bar @ 207.78°C)

6.06 REFRIGERATION PIPING

- .1 Refrigerant piping shall be factory-cleaned and sealed, type ACR seamless copper piping. Use only silver brazed joints.

- .2 Refrigerant piping design and installation shall conform to the requirements of CSA Standard B52 - Mechanical Refrigerant Code, Ontario Building Code, Air Conditioning and Refrigerant Institute and Air Conditioning Equipment Manufacturer.
- .3 Select pipe, fittings, and components to suit system test and operating pressures.
- .4 Size refrigerant piping to attain air conditioning equipment manufacturers listed cooling capacities keeping piping runs and number of elbows and fittings to a minimum.
- .5 Refrigerant piping to be type "L" hard temper copper tubing with Silfos or flared joints may be used. Use long radius elbows only.
- .6 Reduce the effect of piping vibration with the use of flexible metal hose.
- .7 Piping to remote condensing unit shall include shut off valves and unions.
- .8 Ensure refrigeration piping is dehydrated, tested, and adequately charged. Refrigerant piping will not be accepted unless it is gas tight.
- .9 Install refrigerant piping in a neat skillful manner with horizontal runs sloped towards the compressor at a rate of 1/2" per foot. Support lines at intervals of not more than 8'-0" with suitable anchors. Use rubber grommets between tubing and clamps to prevent line chafing.
- .10 Provide permanent guards as required to protect piping and fittings from damage.
- .11 Suction line to be insulated with 3/4" thick close cell Armaflex.
- .12 Refrigerant system and piping to be tested to industry standards.

PART 7 - PUMPS

7.01 GENERAL REQUIREMENTS

- .1 Scheduled motor horsepower and pump efficiencies are minimum acceptable. Select each motor to ensure that motor will not overload when pump is operating on any part of the pump curve.
- .2 Select pumps so that installed impeller is no greater than 85% of minimum inside casing diameter.
- .3 Select pumps so that design operating exit velocity does not exceed 18 fps (5.5 m/s).
- .4 Select pumps for 175 psig (1225 kPa) or 250 psig (1750 kPa) working pressure at maximum operating temperature or as shown on the pump schedule.

7.02 IN-LINE CIRCULATORS

- .1 Provide iron body, standard construction with alloy steel shaft and mechanical carbon seal assembly.
- .2 Each unit shall be radially split case close coupled, single stage centrifugal type with iron body and bronze fitted construction and watertight self-lubricating.

7.03 PUMP INLET AND DISCHARGE FITTINGS

- .1 Equip each pump inlet with combination suction guide and strainer. Select suction guides for maximum pressure drop of 2.5 ft. w.g. (0.62 kPa).

- .2 Equip each pump outlet with angle type triple duty, combination shutoff, balancing and check discharge fitting. Select triple duty valve for maximum pressure drop of 3.5 ft. w.g. (0.87 kPa) in full open position.
- .3 For triple duty valves, provide manufacturer's preformed, removable pre-moulded insulation jacket with mineral fibreglass insulation and having a flame spread rating of 25 and smoke developed classification of 50 in accordance with CAN/ULC S102.2.

7.04 CONDENSATE PUMP

- .1 As manufactured by Albany Pump Ltd., "Little Giant" model VCL-14ULS. Pump to discharge 200 gph (3 GPM) at 1 ft head. Elec: 115/60/1, 1/50 HP, 78 Watts.

7.05 ELEVATOR SUMP PUMP

- .1 As manufactured by Barnes model 2SEV-1094L. Pump to discharge 3000 gph (50.0 US GPM) at 30 ft. w.g. head. Pump to be duplex sump pumps with alternating control panel, high water alarm and four liquid level control switches. Control panels c/w electric alternator, pilot lights, motor starters, relays and numbered terminal boards. Control panel to be c/w manual switch for draining the pit for maintenance purposes. Controller to enable standby pump if lead pump fails. Provide quick connect arrangement complete with rail guides and lifting cables. Electrical service: 115/60/1, 1/6 HP. High water alarm to be sent to remote alarm in Caretaker's Office with visual and audible alarm with silencing button
- .2 Sump pumps to be c/w sump frames and a minimum 10mm ($\frac{3}{8}$ ") thick reinforced checker plate steel cover/s unless specified otherwise. Refer to detail drawings for cover splitting arrangement for submersible pumps. All covers and frames are to be traffic compliant class C load bearing capable unless noted otherwise.
- .3 Provide remote high water level alarm for the sump pump pit in the Caretaker's Office. Alarm to be visual and audible with a silencing button. Provide lamacoid label reading "Accessibility Elevator Sump Pumps SP-1/SP-2". Coordinate on site for final location
- .4 Acceptable manufacturers: Barnes, Sulzer, ITT, Liberty, Grundfos.

PART 8 - PLUMBING

8.01 GENERAL REQUIREMENTS

- .1 Provide all parts of the plumbing system including all required venting in accordance with the Ontario Building Code, Part 7.
- .2 Install all fixtures, drains, cleanouts, brass, and specialties to manufacturer's requirements.
- .3 Pipe installation: Install straight, parallel, and close to walls and ceilings, with specified pitch. Use standard fittings for direction changes.
- .4 Install groups of piping parallel to each other on trapeze hangers; Space piping to permit application of insulation, identification, and service access.
- .5 Install eccentric reducers in horizontal piping to permit drainage and eliminate air pockets.
- .6 Where pipe sizes differ from connection sizes of equipment, install reducing fittings close to equipment. Reducing bushings are not permitted.

8.02 POTABLE (DRINKING) WATER

- .1 Domestic Water: Type L copper marked certified for compliance with ASTM B88-83 standard with wrought copper or cast bronze pressure solder fittings to ANSI B22.18 and ANSI B16.18 respectively. (Buried piping: Soft temper type K with soldered fittings).
- .2 Soldered fittings in potable water systems: Provide lead, antimony, cadmium, and zinc free solders composed of tin/copper/silver or nickel components.
- .3 Use nontoxic lubricant or Teflon tape applied to male thread.
- .4 Clean ends of pipes or tubing and recesses of fittings to be brazed or soldered. Assemble joints without binding.
- .5 Run water piping from service connection to fixtures and equipment. At lavatories install supplies as high as possible. Install brass and copper pipe and tubing free from surface damage. Replace damaged pipe or tubing.
- .6 Lay copper tubing so that it is not in contact with dissimilar metal and will not be kinked or collapsed.
- .7 Provide washroom groups and branch take-offs from mains with isolating valves. Install stop valve in each fixture supply.
- .8 Provide PRV's to match base building standard, where required at new domestic water connections.

8.03 STORM AND SANITARY DRAINAGE

- .1 Internal Suspended:
 - .1 Cast iron pipe and fittings to CSA B70
 - .2 DWV copper to ASTM B306 with 50-50 soldered cast brass drainage fittings to CSA B158.1 or wrought copper fittings to ANSI B16-29.
- .2 Below Grade:
 - .1 Cast iron pipe and fittings to CSA B70, or PVC pipe and fittings.
 - .2 Provide all trenching and backfilling required for Mechanical Trades work.
- .3 Storm drainage piping:
 - .1 Cast iron pipe and fittings to CSA B70 where buried or suspended.
 - .2 Where buried and accepted by Authorities: PVC or ABS with solvent weld or ring gasket joints to CSA B182.1 and B182.2.
 - .3 Where external to the building, concrete to CSA Standard A257. Where acceptable to the Jurisdiction having authority, IPEX PVC Ultra Rib pipe and fittings to CSA Standard B182.4 with maximum long term deflection of 7.5%.
- .4 Run storm and sanitary drainage piping to main sewers with uniform grade, minimum 2% unless noted otherwise.
- .5 Extend condensate drains from air conditioning equipment terminating over floor drains or service sink.
- .6 Verification of Inverts:
 - .1 Existing drain locations and invert elevations shall be verified on site prior to commencement of work.

- .2 On projects with existing drainage piping that will be utilized, provided snaking of pipework and camera drain inspections as necessary to ensure a functional system.

8.04 EXCAVATION AND BACKFILL

- .1 Perform all portions of excavation, bedding, backfill and related work required for mechanical Work in accordance with requirements of Division 02 except as supplemented by this Article. Ensure all services are buried a minimum of 2 ft (0.6m) below the frost line where piping is located outside the building perimeter walls.
- .2 Where excavation and backfill is required outside perimeter foundation walls, provide all required layout of mechanical services trenches.
- .3 Provide all required information to Division 02 Subtrade during excavation.
- .4 Perform carving and trimming of final 150 mm (6") of trench bottom excavation.
- .5 Perform bedding, installation of services, backfilling and testing to 300 mm (12") above uppermost buried service.
- .6 The balance of backfilling to be performed by Division 02 Subtrade after receiving clearance from Divisions 20, 21, 22, 23 and 25.
- .7 Grade the bottom of the pipe trench excavation as required.
- .8 In firm undisturbed soil, lay pipes directly on the soil and shape soil to fit the lower ½ segment of all pipes and pipe bells. Ensure even bearing along the barrels.
- .9 In rock and shale excavate to 150mm (6") below and a minimum of 200mm (8") to either side of the pipe. Fill back with a bedding of 10mm (13/32") crushed stone or granular 'A' gravel.
- .10 Prepare new bedding under pipe in unstable soil, in fill, and in all cases where pipe bedding has been removed in earlier excavation, particularly near perimeter walls of buildings, at manholes and catch basins. Compact to maximum possible density and support the pipe by 200mm (8") thick concrete cradle, spanning full length between firm supports. Install reinforcing steel in cradle and construct piers every 2400mm (8 ft.) or closer, down to solid load bearing strata. Provide a minimum of one pier per length of pipe. Use the same method where pipes cross.
- .11 Where excavation is necessary in proximity to and below the level of any footing, bed with 14,000 kPa (2000 psi) concrete to the level of the highest adjacent footing. Proximity is determined by the angle of repose as established by the Consultant.
- .12 Provide support over at least the bottom one third segment of the pipe in all bedding methods.
- .13 Do not open trench ahead of pipe laying and bedding more than weather will permit. Break up rocks and boulders and remove by drilling and wedging. Do not use blasting unless specifically approved by the Consultant.
- .14 Perform all or required portions of backfilling as specified in **[Division 03]** 150mm (6") layers with clean selected materials acceptable to the Consultant.
- .15 Backfill and compact to the following standard Proctor percentages:
- | | |
|--------------|-----|
| Sodded area | 85% |
| Under paving | 95% |

Under Floor slabs 100%

- .16 Dispose of excavated material as directed by the Contractor.

8.05 VENT PIPING

- .1 DWV Grade copper to ASTM B306 with 50-50 soldered cast brass or wrought copper drainage fittings to CSA B158.1 and ANSI B16-29 respectively or cast-iron pipe and fittings to CSA B70.

8.06 FITTINGS

- .1 Valves: All valves to have minimum certified rating of 1380 kPa (200 psi) WOG.
- .2 Ball Valves: Full port bronze or brass body with stainless-steel ball, blowout proof stem rated at 400 WOG.
- .3 On water services, install drain valves with hose thread end adjacent to and downstream of shut-off valves. Slope water piping to drain points.
- .4 Provide shut-off valves on supply and return piping connections to all fixtures and pieces of equipment.
- .5 Drain Valves:
- .1 Install $\frac{3}{4}$ " (20 mm) drain valves with hose thread end cap and chain in water services adjacent to and downstream of shut-off valves and at all system low points. Slope water piping to drain points.
- .6 Provide ball or butterfly valves for all shut-off requirements.
- .7 Ball Valves:
- .1 Ball valves shall be 2-piece full port design constructed using lead free forged copper silicon alloy brass body and end adapter.
- .2 Free valves shall be NSF certified for use in potable (drinking) water systems requiring reduced lead content.
- .3 Seats and stem packing shall be virgin PTFE. Stem shall be bottom loaded, blowout proof design with fluorocarbon elastomer O-ring to prevent stem leaks. Valve shall have chrome plated lead-free brass ball and adjustable packing gland.
- .4 Soldered end valves $\frac{1}{2}$ " to 2" (12mm to 50mm) to be UL listed FM approved and certified to NSF/ANSI standard 61/8. Valve sizes $\frac{1}{4}$ " to 2" (6mm to 50mm) shall be rated to 600psi (41 bar) WOG non-shock and 150psi (10.3 bar) WSP.
- .8 Reduced Pressure Zone (RPZ) Backflow Preventer Assemblies:
- .1 Sizes $\frac{1}{4}$ " to 2" (6mm to 50mm): Assembly shall incorporate two poppet style check valves, replaceable check seats, with an intermediate relief valve. The check valve poppet assembly shall be guided via the use of a corrosion resistant plastic guide. The check valve and relief valve seats shall be push-in type. The relief valve cover shall be bronze construction secured with stainless-steel bolts and shall utilize a quarter-turn locking joint to capture the spring load of the relief valve. The relief valve shall have an internal sensing line to sense the inlet water supply. All rubber elastomers shall be of chloramine resistant material. The assembly shall also include two resilient seated isolation valves, four top-mounted resilient seated test cocks and an air gap drain fitting.
- .1 Body: Bronze

- .2 Discs: Silicone rubber
- .3 Check Seats: Replaceable polymer.
- .4 Cover Bolts: stainless-steel
- .5 Temperature Range: 33°F – 180°F (0.5°C – 82°C)
- .6 Maximum Working Pressure: 175psi (12.1 bar)
- .2 Sizes 2½" to 10" (65mm to 250mm): The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves and captured springs. Back siphon protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel. The assembly shall include two tightly closing shutoff valves before and after the valve and test cocks. The assembly shall meet the requirements of ASSE Std. 1013; AWWA Std. C511-92; CSA B64.5; and UL Classified File No. EX3185. Listed by IAPMO (UPC). Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The valve body shall utilize a coating system with built in electrochemical corrosion inhibitor and microbial inhibitor. The assembly shall include a sensor on the relief valve for flood detection.
 - .1 Check Valve Body: FDA epoxy coated cast iron.
 - .2 Seat: stainless-steel
 - .3 Trim: stainless-steel
 - .4 Relief Valve Body: 2½" to 3" (65mm to 75mm) lead free cast copper silicon alloy; 4" to 10" (100mm to 250mm) FDA epoxy coated cast iron.
 - .5 Test Cock: lead free copper silicon alloy.
 - .6 Temperature Range: 33°F to 110°F (0.5°C to 43°C) continuous, 140°F (60°C) intermittent
 - .7 Maximum Working Pressure: 175 psi (12.06 bar)
- .9 Double Check Valve Backflow Preventer Assemblies:
 - .1 Sizes ½" to 2" (12mm to 50mm): Assembly shall incorporate two positive seating check modules with captured springs and rubber seat discs. The check module seats and seat discs shall be replaceable. Service of all internal components shall be through a single bronze or stainless-steel access cover secured with stainless-steel bolts. The assembly shall also include two resilient seated isolation valves; four top mounted, resilient seated test cocks. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510. Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California. Assembly shall include a freeze sensor mounted to one of the test cocks.
 - .1 Temperature Range: 33°F – 180°F (0.5°C – 82°C)
 - .2 Maximum Working Pressure: 175 psi (12.1 bar)
 - .2 Sizes 2½" to 10" (65mm to 250mm): Double Check Valve Assembly shall consist of a main line valve body composed of two (2) independently acting approved clapper style check modules with replaceable seats and disc rubbers. Servicing of both check modules shall be accessed through independently top entry covers. This assembly shall be fitted with AWWA Compliant inlet/outlet resilient seated shutoff valves; the assembly shall be fitted with approved UL/FM inlet/outlet resilient seated shutoff valves and contain four (4) properly located resilient seated test cocks as specified by AWWA Standard C510. The valve body shall utilize a coating system with built in electrochemical corrosion inhibitor and microbial inhibitor. Flow and pressure loss performance parameters shall meet the requirements of AWWA Standard C510.
 - .1 Main Valve Body: Ductile iron Grade 65-45-12
 - .2 Coating: Fusion epoxy coated internal and external AWWA C550
 - .3 Shutoff Valves: OSY resilient wedge gate valves AWWA C515 (UL/FM)
 - .4 Check Seats: stainless-steel.
 - .5 Disc Holder: stainless-steel Elastomer
 - .6 Disc: Silicone
 - .7 Spring: stainless-steel
 - .8 Clamp: AWWA C606 (10" Only)
 - .9 Maximum Working Pressure: 175psi (12.1 bar)

- .10 Minimum Working Pressure: 10psi (0.7 bar)
- .11 Hydrostatic Test Pressure: 350psi (24.1 bar)
- .12 Hydrostatic Safety Pressure: 700psi (48.3 bar)
- .13 Temperature Range: 33°F - 140°F (0.5°C - 60°C) Continuous

.10 Strainers:

- .1 Sizes ¼" to 4" (6mm to 100mm): NSF Certified for potable (drinking) water, wye-pattern lead free cast copper silicon alloy strainer shall have a solid retainer cap with gasket. Strainer shall be rated to 400psi (27.6 bar) WOG @ 210°F (99°C); 125psi (8.6 bar) WSP @ 353°F (178°F) for sizes ¼" – 3" and 300psi (20.7 bar) WOG @ 210°F (99°C); 125psi (8.6 bar) @ 353°F (178°C) for size 4".
 - .1 Body: lead free cast copper silicon alloy
 - .2 Retainer Cap: ¼" to 4" (6mm to 100mm): Lead Free copper silicon alloy
 - .3 Cap Seal: ¼" to 3" (6mm to 75mm): EPDM O-Ring; 4" (100mm): Garlock gasket
 - .4 Standard Screen: ½" to 2 ½" (12mm to 65mm): 304 stainless-steel #20 mesh; 3" (75mm): 3/64" (1.2mm) 304 stainless-steel perforated screen; 4" (100mm): 1/8" (3mm) 304 stainless-steel perforated screen
 - .5 Maximum Working Pressure: ¼" to 3" (6mm to 75mm): 400psi (27.6 bar) WOG @ 210°F (99°C) 125psi (8.6 bar) WSP @ 353°F (178°F); 4" (100mm): 300psi (20.7 bar) WOG @ 210°F (99°C) 125psi (8.6 bar) WSP @ 353°F (178°F)
- .2 Sizes 2" to 12" (50mm to 300mm): NSF Certified for potable (drinking) water, wye pattern, cast iron strainer with a double coated, heat fused, FDA approved epoxy coating on the interior and exterior surfaces for FDA sanitary applications. Flanges to conform to ANSI B16.1 Class 125, 304 stainless-steel perforated screens, and a drain/blowoff connection furnished with a closure plug. Pressure rating 200psi (13.8 bar) WOG.
 - .1 Maximum Operating Pressure: 200psi (13.8 bar) WOG, non-shock, @ 210°F (99°C), 125psi (8.6 bar) WSP @ 353°F (178°C)

.11 Check Valves:

- .1 Swing Check Sizes ¼" to 2" (6mm to 50mm) soldered ends: NSF Certified for potable (drinking) water, lead free swing check valve suitable for installation in either horizontal or vertical orientation with upward flow.
 - .1 References: MSS SP-80 Design & Tested; MSS SP-139, "Copper Alloy Gate, Globe, & Check Valves"; ASME B16.18, "Cast Copper Alloy Solder Joint Pressure Fittings"
 - .2 Body: ASTM B584-C89836 Bronze
 - .3 Cap: ASTM B584-C89836 Bronze
 - .4 Hanger: 304 stainless-steel or ASTM B584 C89836 Bronze
 - .5 Pin: 304 stainless-steel
 - .6 Seat: C27451 lead free brass
 - .7 Plug: ASTM B16 Brass
 - .8 Temperature Range: -20°F to 406°F
 - .9 Cold Working Pressure rating: 200 psi (13.8 Bar) at 100°F
 - .10 Saturated Steam Pressure rating: 125 psi (8.6 Bar) at 353°F
- .2 Swing Check Sizes 2" to 20" (50mm to 500mm) flanged ends: NSF Certified for potable (drinking) water, lead free, full port, swing check valve compatible with ANSI Class 125 and Class 150 Flanges.
 - .1 References: MSS SP-71 – "Gray Iron Swing Check Valves Flanged and Threaded - Type 1"; ASME B16.10 "Face-to-Face and End-to-End Dimensions of Valves"
 - .2 Bonnet: Cast Iron (ASTM A126 CL B)
 - .3 Body Gasket: Graphite
 - .4 Side Plug: Cast Lead Free Bronze
 - .5 Gasket: PTFE
 - .6 Hanger Pin: Cast Lead Free Bronze

- .7 Hanger: Ductile Iron (ASTM A536 65-45-12)
- .8 Disc Ring: Cast Lead Free Bronze (2" to 6"); Cast Iron (ASTM A126 CL B) (8" to 20")
- .9 Disc: Cast Iron (ASTM A126 CL B)
- .10 Seat Ring: Cast Lead Free Bronze (2" to 6"); Cast Iron (ASTM A126 CL B) (8" to 20")
- .11 Body: Cast Iron (ASTM A126 CL B)
- .12 Cold Working Pressure rating: 200 psi (13.8 Bar) at 100°F (2" to 12"); 150 psi (10.3 Bar) at 100°F (14" to 20")
- .13 Saturated Steam Pressure rating: 125 psi (8.6 Bar) at 353°F (2" to 12"); 100 psi (6.9 Bar) at 338°F (14" to 20")
- .14 Temperature Range: -20°F to 406°F

8.07 ACCESSORIES

- .1 Provide backflow prevention for coffer makers and humidifier units..
- .2 Trap seal primers: Enpoco Fig. TSP-1 cast bronze with 1/2" copper-to-copper connections or 3/8" soft copper connected to nearest W.C.-flush valve flush tube. Connect at back of flush tube with chrome-plated exposed piping. Unit to be connected to existing supply piping with backflow preventer in washroom and to serve elevator machine room and sump pump pit prime line.
- .3 Water hammer arrestors: Enpoco "Hammetrol" series "HT" with pre-charged stainless-steel bellows in a stainless-steel casing sized according to manufacturer's recommendations in washroom supply piping.

8.08 PLUMBING EQUIPMENT

- .1 Domestic Hot Water Storage Tank
 - .1 As per size and capacity indicated on the Drawings.
 - .2 Heater to be fully insulated complete with inlet diffuser, drain valve, high limit shut off and self-contained control system. Provide 6" (150mm) deep metal drain pan below water heater. Pipe 1/2" drain and 1/2" pressure relief lines as indicated on detail. Provide unions and shut-off valves at water heater and inlet and outlet.
- .2 Domestic Cold-Water Meter:
 - .1 Provide positive displacement cold water meter complete with remote readout.
 - .2 Unit to be bronze with suitable adaptors to fit piping as shown on drawing.
 - .3 Meter capacity up to 150 US GPM (9.5 l/s).
 - .4 Include self-powered 2 wire generator with wall unit remote readout and 100 ft (30m) of wire as provided by manufacturer.
 - .5 Provide lockable valved bypass to allow for meter maintenance.

8.09 PLUMBING FIXTURES

- .1 All plumbing fixtures, where indicated on plan, shall be provided by Mechanical Trades unless otherwise indicated on the drawings.
- .2 Fixtures shall be piped with all necessary appurtenances (i.e. vents, sanitary, hot and cold connections). Install all components in strict accordance with the manufacturer's recommendations. Install shock arrestors.
- .3 Fixture installation: Install all fixtures, drains, cleanouts, brass, and specialties to manufacturer's requirements.

- .4 Connect fixtures, complete with supplies and drains, separately trapped, supported level and square. Provide chrome plated piping for all exposed water supply, waste, and vent connections complete with C.P. escutcheons.
- .5 Provide supports to set fixtures square and level.
- .6 Obtain Architects acceptance of mounting heights of all wall mounted fixtures.
- .7 Fixtures mounted on glazed tile surfaces: Provide ground faces to finished surfaces.
- .8 Install water hammer arrestors for each fixture or group of fixtures.
- .9 Floor Drains
 - .1 Provide with trap primers connected to nearest cold water flush valve, or to automatic primer. Prime all floor drain traps.
 - .2 Finished Area Round Floor Drain (FD-1): Equal to Watts "FD-200-B" on-grade epoxy coated cast iron floor drain with anchor flange, weepholes, adjustable **round** heel proof heavy duty, and no hub (standard) outlet.
 - .3 Floor drains - mechanical rooms and unfinished areas (FD-2):
Smith Series 2320 Floor Drain, all duco coated cast iron body, seepage flange, adjustable collar, clamping device and 8" (200mm) diameter grate.
 - .4 Floor drains with combination funnel (unfinished areas) (FFD-1):
Smith Series 2320-3591 Floor Drain, all duco coated cast iron body, seepage flange, adjustable collar, clamping service and 8½" (216mm) with 4" x 9" (101.6mm x 228.6mm) oval funnel
 - .5 Elevator Pit drain (FD-8) :Smith Series 1510/30SG Pit Drain, all duco coated cast iron body, angled drainage grate, flashing clamp and 45 degree or 90 degree outlets. For elevator pits use Series 7012MEXT Backwater Valve with extension, in line from floor drain immediately external to room. Provide access pit and cover for backwater valve if invert greater than 18" (457mm) from finished floor
- t.
- .10 Cleanouts
 - .1 Line Cleanouts: Equal to Smith Series 4420, in cast iron pipe with taper thread cover secured to body and with full size pipe opening.
 - .2 Stack Cleanout: Equal to Smith Series 4510, in base of cast iron stacks with neoprene gasketed secured cover.
 - .3 Where cleanouts are concealed behind tiled walls or finishes; Equal to Smith Series 4530 round stainless-steel plate and slotted flat head stainless-steel screws.
 - .4 Floor Cleanouts:
 - .1 In unfinished and outside areas: Equal to Smith Series 4220, Duco coated cast iron body with integral clamp device, and removable positive seal closure plug and heavy duty 6" (150mm) adjustable cover secured with stainless-steel screws.
 - .2 In tiled areas: Equal to Smith Series 4140, same as above with square nickel bronze cover recessed for tile. Cover can be adjusted to suit floor lines when installing finished floor.
 - .3 In terrazzo areas: Equal to Smith Series 4180, same as above with nickel bronze cover recessed for terrazzo. Cover can be adjusted to suit floor lines when installing finished floor.
 - .4 Install cleanouts at traps, in accessible locations and where required.

PART 9 - INSULATION

9.01 GENERAL REQUIREMENTS

- .1 Execute work of this Section only by skilled tradesperson regularly employed in the application of insulation of mechanical systems.
- .2 Provide pipe and ductwork insulation with maximum flame spread rating of 25 and smoke development classification of 50 in accordance with CAN/ULC S102.2.
- .3 All existing exposed ductwork and piping insulation to be inspected and repaired as required.
- .4 The word "exposed" where used in this Section means any work which is not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors in closets or cupboards or under counters is not considered to be exposed.
- .5 Concealed insulated items require no further finish than provided in factory applied jacket. Cover exposed insulation and all insulated equipment with canvas, field applied, adhered and lap sealed and finished off by a brush coat of approved sizing. Paint and label canvas as noted in specifications or drawings.

9.02 DUCTWORK INSULATION:

- .1 Provide external ductwork insulation in thickness as listed below:
 - .1 Insulate all supply air ductwork from unit outlet of air handling systems delivering air at temperatures less than 64°F (18°C) and greater than 86°F (30°C). This includes supply air ductwork connected to fan coil units, heat pumps, VAV/CAV terminals, air handling systems with cooling and/or heating coils, and direct or indirect fired burner sections.
 - .2 Provide 1½" (40 mm) thick for systems with 64°F (18°C) or less air supply temperature.
 - .3 Provide 1½" (40 mm) thick for systems with 86°F (30°C) or greater air supply temperature.
 - .4 Outdoor intake ductwork, ductwork conveying mixed outdoor/return air and mixed air plenums: 4" (100mm) thick applied in two (2) layers of 2" (50mm) thick insulation on staggered centres.
 - .5 Return air ductwork located outdoors: 4" (100mm) thick applied in two (2) layers of 2" (50mm) thick insulation on staggered centres.
 - .6 Exhaust ductwork located outdoors: 4" (100mm) thick applied in two (2) layers of 2" (50mm) thick insulation on staggered centres.
 - .7 Exhaust ductwork located indoors for a minimum of 20 ft. (6m) back from the discharge point to outdoors: 2" (50mm) thick.
 - .8 Where specifically noted on drawings that could be an exception to the foregoing.
- .2 Material to ASTM C1290 "Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts"
 - .1 FSK jacket of kraft bonded to aluminum foil reinforced with glass fibre yarn.
 - .2 Thermal performance: R = 4.2 sq. ft*°F*hr/BTU @ 75°F (0.74 sq. m*°C/W @ 24°C)
 - .3 Density: 0.75 lb/cu. ft (12 kg/cu. m)
 - .4 Rated 25/50 per ASTM E84, UL 723 and NFPA 255
 - .5 Vapor transmission: maximum 0.02 perms
- .3 Exceptions: external duct insulation is not required where:
 - .1 Supply air ductwork installed exposed within conditioned space.
 - .2 NOTE: Supply air ductwork installed concealed in ceiling spaces, whether used as return air plenums or not, is to be completely insulated.
 - .3 Ductwork is internally insulated.
 - .4 Acoustic type flexible ductwork is used.

- .5 Duct silencers are installed.

9.03 PIPE INSULATION

- .1 Drains and water supplies for Barrier-Free lavatories and sinks:
- .1 Provide non-premolded pipe insulation on exposed water supplies and drain under lavatory and finish with canvas.
- .2 Preformed fiberglass pipe insulation, complying with ASTM C 547, Class 3 to 850°F. (454°C.), rigid, moulded pipe insulation, non-combustible and conforming with the following:
- .1 reduced environmental impact feature of either: bio-based binders, 25% minimum recycled glass content, and/or paper-free ASJ jacket material.
- .2 thermal performance: 0.23 btu/hr/in/sq ft/°F @ 75°F (0.033 W/m/°C @ 24°C)
- .3 service temperature: 0°F (-18°C) to jacket surface temperature (air contact) of 150°F (66°C) and un-jacketed surface temperature (equipment contact) up to 450°F (232°C).
- .4 non-combustible meeting 25/50 flame spread/smoke developed when tested to ASTM E84, UL 723 and NFPA 255.
- .5 when used over stainless-steel, product must comply with ASTM C795 "Standard Specification for Thermal Insulation for Use in Contact with Austenitic stainless-steel".
- .3 For cold service provide vapour retardant jacketing as follows:
- .1 ASJ white jacket of "KRAFT" paper-free bonded to aluminum foil reinforced with glass fibre yarn and self-sealing longitudinal laps and butt strips, maximum 0.02 perms to ASTM E96 Procedure A.
- .4 Piping Insulation Application Schedule:

Item	Insulation Thickness & Type
Domestic hot water	25mm (1") premolded for pipe up to and including 50mm (2"). 40 mm (1 1/2") for 65mm (2 1/2") pipe and greater.
Domestic cold water	25mm (1") premolded.
Domestic hot water recirculation	25mm (1") premolded for pipe up to and including 50mm (2"). 40 mm (1 1/2") for 65mm (2 1/2") pipe and greater.
Traced piping (where indicated)	Indoors: 25mm (1") minimum for applications not listed in this table. Outdoors: 50mm (2").
Condensate, horizontal drains from fan coil units, heat pumps and cooling coils, suspended horizontal drains receiving cooling coil condensate,	25mm (1") premolded.

Item	Insulation Thickness & Type
Suspended horizontal drains from urinals and water closets and roof drain receptors and horizontal rainwater leaders and fittings	1" (25mm) premolded.
Heating system Piping	1½" (40mm) premolded
Glycol Circuits	1½" (40mm) premolded.
Heat Pump Piping	2" (50mm) for heat sink side (example: ground source): water to air, and water to water type. Supply side within the building to be insulated as specified for chilled water.
Condenser water piping for systems that operate both summer and winter	2" (50mm) premolded outdoors 1½" (40mm) premolded indoors
Chilled water piping	1" (25mm) premolded for 100mm (4") pipe and less. 1½" (40mm) premolded for pipe 150mm (6") and greater.

9.04 FLEXIBLE ELASTOMERIC CLOSED CELL FOAM INSULATION:

- .1 Material to ASTM C534 "Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form"
- .2 Thermal performance: 0.28 btu/hr/in/sq ft/°F @ 75°F (0.04 W/m/°C @ 24°C) established in accordance with ASTM C 177 "Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus" or ASTM C 518 "Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus".
- .3 CAN2-51.40-M80+Amendment-Aug-83 "Thermal Insulation, Flexible, Elastomeric, Unicellular, Sheet and Pipe Covering", flexible fire retardant elastomeric unicellular sheet and pipe covering.
- .4 Pipe size application: up to and including 6" (150mm)
- .5 Service temperature: -40°F to 203°F (-40°C to 95°C)
- .6 Tubular with self-sealing seams

Item	Insulation Thickness & Type
Refrigeration suction and hot gas lines (also see architectural drawings for walk-in freezers/coolers location);	1½" (40mm) thick for pipe up to and including 1" (25 mm). 1¾" (45mm) thick for 1¼" (32 mm) pipe sizes to 2" (50 mm).

Item	Insulation Thickness & Type
chilled water piping connections to chiller;	1" (25 mm) thick for pipe up to and including 6" (150mm).
chilled water pot feeder and filter.	1" (25 mm) thick for pipe up to and including 6" (150mm).
Equipment Drains	¾" (20 mm) thick for pipe up to and including 6" (150mm).

PART 10 - FIRE PROTECTION

10.01 GENERAL REQUIREMENTS

- .1 Modifications to sprinkler system must be provided by Owner's preferred Sprinkler Contractor. Modifications to be compatible with the Base Building sprinkler system, and in accordance with all applicable by-law requirements including requirements of
 - .1 Ontario Building Code.
 - .2 Ontario Fire Code.
 - .3 NFPA 10.
 - .4 NFPA 13.
 - .5 NFPA 14.
- .2 The Fire Protection Trades shall hydraulically design all new and modified fire protection systems and shall become the Engineer-of-Record responsible for the design and installation.
- .3 Submit hydraulic calculations to the Consultant for review. Drawings and calculations shall be certified by a Professional Engineer.

10.02 SPRINKLER HEADS

- .1 Provide new sprinkler heads and relocate existing sprinkler heads as shown on plan. Provide additional heads as required by Code to achieve a fully sprinklered building. Centre heads both ways in ceiling tiles.
- .2 Verify sprinkler pipe sizes on site and make required pipe size changes to suit hydraulic design for new sprinkler layout.
- .3 New Sprinkler Heads: To match existing.
 - .1 Pendant: Glass bulb type with escutcheon.
 - .2 Recessed: Glass bulb type with escutcheon.
 - .3 Concealed: Cleanline to match interior design finish schedule, or white where there is no schedule.
- .4 Provide guards for sprinkler heads in elevator machine rooms, garbage room, walk-in coolers or freezers, mechanical rooms, storage rooms and where indicated on Drawings.

10.03 FIRE EXTINGUISHERS

- .1 Provide new fire extinguishers and accessories to Ontario Fire Code and NFPA 10.

- .2 Refer to drawings for location and types of extinguishers. Install brackets on firm backing to manufacturer's instruction. Install cabinets securely with flanges flush with finished wall surfaces.
- .3 Spacing of extinguishers shall conform to the Ontario Fire code and the authority having jurisdiction. In no case shall there be less than one extinguisher in each electrical room, kitchen or mechanical room.
- .4 Provide wall brackets and cabinets as indicated on drawings. Cabinets: Model CE-950-2 surface mounted or recessed as indicated. All fronts: 5mm ($\frac{3}{16}$ ") Clear Float Glass.
- .5 Provide fire extinguishers for mechanical rooms, electrical rooms, storage rooms and garbage rooms. Unless noted otherwise, use 4.5 kg (10 lbs) extinguishers for all these areas. Unless noted otherwise, minimum size of extinguishers for parking garages shall be use 4.5 kg (10 lbs).
- .6 Acceptable manufacturers are: National Fire Equipment, CFH, Stelpro, or equal as accepted by the Consultant.

10.04 SPRINKLER PIPING SYSTEM

- .1 Provide new sprinkler piping distribution system and accessories to NFPA 13.
- .2 All sprinkler heads are to be hard piped; flexible connections are not permitted.
- .3 All piping 2" (50mm) and smaller shall be ASTM A-53 STD wall with threaded cast iron or malleable iron fittings. Piping 2½" (65mm) and larger shall be ASTM A-53 STD wall with welded or flanged fittings. Where allowed by the Landlord/Owner, grooved end pipe fittings may be used.

10.05 STANDPIPE SYSTEMS

- .1 Pipe, fittings, hangers, and accessories to NFPA 14.
- .2 Piping 2 ½" (65mm) and larger shall be ASTM A-53 STD wall with welded or flanged fittings. Where allowed by the Landlord/Owner, grooved end pipe fittings may be used.
- .3 Provide a water pressure gauge at the top of each standpipe.

10.06 FIRE HOSE CABINETS

- .1 Mount new fire hose cabinets at same height as existing. Include in new cabinet one new portable dry chemical fire extinguisher rated for 4A-60BC.
- .2 Acceptable manufacturers: National Fire Equipment, CFH, Stelpro, or equal as accepted by the Consultant.

10.07 FIRE PROTECTION VALVES:

- .1 Provide ULC listed and FM approved valves of one manufacturer, bearing manufacturers name, trademark, and pressure rating. Unless otherwise specified or indicated, all valves shall be designed for 175 psig (1200 kPa) working pressure.
- .2 Provide a tamper proof alarm contact switch for each shut-off valve. Provide lamacoid signs with white letters on red background. Include suspension chains.
- .3 Refer to Electrical Trades scope for fire alarm system wiring and annunciation.

10.08 WATERFLOW DETECTORS (WFD):

- .1 Provide, where shown on drawings, waterflow detectors, complete with vane type sensor to actuate two single pole, double throw snap action switches when waterflow exceeds a sustained 10 US GPM (0.63 l/s) flow.
- .2 Provide a built-in pneumatic retard device, with automatic reset to reduce false alarms. The time delay shall be field adjustable from 0 to 70 seconds.
- .3 Provide local wiring at WFD. Refer to Electrical Trades scope for fire alarm system wiring and annunciation.
- .4 Provide adaptor for pipe sizes 1" (25mm) to 1½" (40mm).
- .5 WFD shall be suitable for 250 psig (1750 kPa) service pressure.

10.09 TEST AND DRAIN FITTINGS:

- .1 Provide ULC listed and FM approved combined test and drain fitting with orifice sized according to installed sprinkler heads.

10.10 TESTING AND CERTIFICATION:

- .1 Provide certificate of compliance that systems have been tested to applicable NFPA requirements, and the requirements of the Authorities Having Jurisdiction (AHJs) and is certified for intended use.
- .2 Submit one copy of all fire protection test results to the Owner/Landlord and Consultant.

PART 11 - IDENTIFICATION OF EQUIPMENT AND PIPING

11.01 EQUIPMENT

- .1 Identify all automatic control devices and motor driven equipment with 3 mm (1/8") lamacoid plastic plates with bevelled edges having engraved white letter on black background giving the nature of equipment service and its number, i.e. "Washroom Exhaust E1", and similar. Provide plates with 6 mm (1/4") lettering for motor starters and 12 mm (1/2") lettering for equipment.
- .2 Fix to equipment using sheet metal screws or brass chain.
- .3 Where equipment is locally switched, (e.g. Room exhaust fans) provide suitable label at switch. Coordinate with architect on site for labelling the switches in an aesthetically pleasing manner.
- .4 Coordinate with controls Sub-Contractor and obtain list of automatically operated equipment and provide warning identification on lamacoid plate for each item as follows:

"Warning: This equipment may start at any time. Do not service without disconnecting power."

11.02 PIPING

- .1 Provide all major valves with brass or plated plastic numbered tags, 16 mm (5/8") diameter with stamped numbers. Secure by brass chains to the valve. Valves adjacent to plumbing fixtures, convectors, unit heaters and entrance heaters need not be tagged. Prepare an approved list detailing the valve location, tag numbers and purpose it serves. Mount one (1) copy of this list in a glazed frame where advised by the Owner and provide additional copies for the manuals.
- .2 Identify the following piping as to service and direction of flow using stencils and black lettering behind each access door, in each room, and/or every 12 m (40 ft.)
 - .1 Domestic hot, cold, recirculation

- .2 Heating system supply and return
- .3 Chilled water supply and return
- .4 Condenser water
- .5 Gas (identify to code requirements).
- .6 Sprinkler system.
- .7 Standpipe system
- .8 Supply air and fan system identification
- .9 Return air and fan system identification.

PART 12 - TRIAL USAGE AND TESTS

12.01 AIR AND WATER BALANCING

- .1 The mechanical Contractor shall carry the cost of the Air and Water Balancing Company in their tender submission.
- .2 Prior to operating any existing or new equipment during any stage of construction, approval from the Landlord and Consultant must be received in writing. Provide assistance to the Consultant for on-site spot verifications of air and water balance report.
- .3 Air Balance Report: Air balancing shall be performed by an independent company normally employed in this field. All air quantities to be balanced with a tolerance of +/-5%. Issue a report and certificate covering the following:
 - .1 Nameplate and actual motor loading in amperes at actual voltage and installed overload heater size and manufacturer.
 - .2 Specified and achieved air quantities per outlet complete with supporting schematic diagram.
 - .3 Specified and actual fan total static pressures with breakdown showing inlet and discharge pressures.
 - .4 Temperature at diffuser farthest from source of air supply.
 - .5 Supply air quantity and temperature where main duct enters space.
 - .6 Return air quantity and temperature where air leaves space.
- .4 Fan sheaves, belts and pulleys shall be adjusted or replaced as required to obtain design air quantities. Coordinate this Work with Owner/Landlord.
- .5 Balance all supply, exhaust and fresh air quantities noted on drawing or in specification.
- .6 Balance VAV terminals at 50% of the maximum level.
- .7 Water Balance Report: Water balancing shall be performed by an independent company normally employed in this field Issue a report and certificate covering the following:
 - .1 Balance all water flow quantities shown on drawings or quantities shown on the "Piping Schematic". All water flow quantities to be balanced with a tolerance of +/-5%.
 - .2 Adjust ensure specified flows and temperature drops through chillers, coils, heat pumps, fan coils, unit heaters and perimeter radiation.
 - .3 Report all pump data such as suction, and discharge pressure, current draw at tested voltage and starter overload heater sizes and pump motor nameplate ratings.
 - .4 Provide pump curves indicating the operating point with superimposed power draw, RPM, impeller size, and similar performance metrics.
 - .5 Instruct piping system installers on proper locations of flow measurement ports.
 - .6 Report any required pump adjustments to achieve specified performance.
- .8 Provide assistance to the Consultant for on site spot verifications of air and water balance report.

- .9 Submit one copy of report to each: Owner, Tenant, and Consultants.

12.02 TRIAL USAGE

- .1 The Landlord/Owner has the privilege of trial usage of Mechanical Systems, or parts thereof, for the purpose of testing.
- .2 Assist in trial usage over a length of time as deemed reasonable by the Consultant at no extra cost, and do not waive any responsibility because of trial usage.
- .3 Temporary trial usage and testing shall not be construed as "beneficial use" when making an application for Substantial Completion of the Work.

12.03 TESTS

- .1 Provide and pay for all testing required on the system components where, in the opinion of the Consultant the manufacturer's ratings or specified performance is not being achieved.
- .2 Test and demonstrate all automatic equipment is operating as per sequence of operation. (I.e., Test boiler controls package and circ pump interface, etc.)
- .3 Piping system tests: Do not insulate piping systems until completed, perfected, and proven tight. Should leaks develop in any part of the piping system, remove, and replace defective sections, fittings, etc.
 - .1 Test piping system in sections as required by the progress of work.
 - .2 Test all hot and chilled water, condenser water and domestic water piping hydraulically to a pressure of 1100 kPa (150 psi) and prove tight for a period of 8 hours with nitrogen is also acceptable provided a pressure of 1380 kPa (200 psi) is used. Test natural gas piping as required by codes and authorities.
- .4 All tests must be recorded. Submit recorded data to the Consultant.
- .5 Test gas piping in accordance with CGA standard and authorities having jurisdiction. Provide record data of test results to the Consultant for review.
- .6 Include a copy of all the test results in the maintenance manuals.

PART 13 - CONTAMINATION

13.01 ASBESTOS

- .1 Area contains asbestos in ceiling space. This asbestos is not to be removed. Designated substances are not to be disturbed. Work in areas containing designated substances to be provided in accordance with regulations respecting designated substances. Take all necessary precautions when working in contaminated areas.
- .2 Obtain and pay for the services of a Contractor licensed to work in area containing asbestos. This Contractor to set up all necessary barriers, above and below the ceilings and be involved in the project as long as asbestos is exposed.
- .3 All personnel entering the contaminated area must comply with Ministry of Labour codes regarding designated substances.

- .4 After abatement work in contaminated area is completed, the asbestos Contractor will clean up and dispose of all disturbed asbestos and asbestos contaminated materials.



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ELECTRICAL SPECIFICATIONS

FOR

PARKDALE COLLEGIATE INSTITUTE

ACCESSIBILITY UPGRADE

209 Jameson Avenue

Toronto, ON, M6K 2Y3

TO

TORONTO DISTRICT SCHOOL BOARD

TR-25-0958

DATED

APRIL 29, 2026

ISSUED FOR TENDER

Contact Person: Ryan Lien
Phone: (416) 598-2920 ext:293
Email: rlien@mcw.com

ELECTRICAL SPECIFICATIONS

1. General Provisions:

1.1 Codes, Regulations, Permits

- 1.1.1 Work shall conform to the latest edition of the Canadian Electrical Safety Code.
- 1.1.2 All equipment and material shall be CSA and ULC approved and so labelled.
- 1.1.3 Obtain permit, pay all fees and present final unconditional approval certificate from Hydro Inspection and authority having jurisdiction.
- 1.1.4 Refer to and comply with the general conditions as indicated in the Architects specification.
- 1.1.5 Existing and new services penetrating floor slab or fire rated walls to be sealed with ULC listed and labelled 3.0 hr "F" rated fire retardant sealant.

1.2 Examination of Site:

- 1.2.1 Before tendering, examine site and all applicable drawings so that the tender price includes for everything necessary for completion of work. Failure to visit the site or adequately review all the required interfacing details will not entitle this sub contractor to any additional compensation.

1.3 Work in Existing Building:

- 1.3.1 Refer to architectural and structural drawings for details of building renovation.
- 1.3.2 Base building redundant equipment and materials: To be turned over to the Landlord.
- 1.3.3 Existing base building mullions, ceiling grid and curtain wall: Do not make any penetrations under any conditions.
- 1.3.4 Execute all work using materials and methods to provide system operation, quality and appearance equal to or better than the existing base building.
- 1.3.5 X-Ray all locations where openings are required in the floor slab to ensure that post tension cables are not damaged. Coordinate with the project supervisor prior to proceeding.
- 1.3.6 Co-ordination of the installation, phasing, working conditions, and time schedules is to be carefully co-ordinated to allow the present business to continue during the renovation period.
- 1.3.7 Where existing services presently mounted on and/or concealed behind existing finishes become exposed during the renovation work, and where these services will not be concealed behind or mounted on new finishes, include for relocating the service so as to be concealed behind new or existing finishes. Co-ordinate new locations with the Architect.
- 1.3.8 Maintain all parts of the existing building in operation during normal working hours.

- 1.3.9 Where disruptions of existing services are required co-ordinate the shut-downs with the Owner and carry out the work at a time and in a manner acceptable to them. Carefully schedule all disruptions and/or shut-downs and ensure that the duration of same is kept to the absolute minimum. Submit for approval a written concise schedule of each disruption at least 72 hours in advance of performing work and obtain Owner's written consent prior to implementing.
- 1.3.10 Where disruptions of life safety systems are required comply with paragraph 1.3.9 above and also provide continuous monitoring during shut-down period and ensure all systems are reactivated prior to leaving the site at the end of each working day.
- 1.3.11 Assume full responsibility for any disruption or damage to existing services or systems. Should any temporary connections be required to maintain services during work in the existing building, supply and install all necessary material and equipment and provide all labour at no extra cost. Should any existing system or device be damaged in the course of work by this Division, make full repairs without extra cost and to the satisfaction of the Owner.
- 1.4 Owner's Right to Relocate Electrical Items:
- 1.4.1 The Owner reserves the right to relocate electrical items at a later date, but prior to installation, without cost, assuming that the relocation of each item does not exceed 10 feet from it's original location.
- 1.5 Shop Drawings
- 1.5.1 Provide seven copies of manufacturer's shop drawings for approval. Shop drawings shall include, all distribution equipment, light fixtures, emergency battery units, electrical heating units and other special equipment.
- 1.6 Cutting and Patching:
- 1.6.1 Be responsible for all cutting and patching necessary for completion of your work.
- 1.7 Identification
- 1.7.1 Identify electrical work as specified herein:
- 1) For each piece of electrical distribution equipment from the electrical source of supply up to and including panelboards and motor systems, for special control panels and cabinets, and for any other piece of equipment where specified in this Section, provide engraved lamacoid identification nameplates.
 - 2) Nameplates shall generally be black-white-black with bevelled edges, secured to apparatus with stainless steel screws. Generally lettering shall be 6mm high but equipment in the main electrical room shall be provided with lettering 13mm high.
 - 3) Warning signs, if and when required, shall be red with white lettering.
 - 4) Equip large multiple cell or component apparatus such as switchboards and distribution panels with main nameplates identifying the equipment, voltage characteristics and capacity, and with sub-nameplates clearly identifying each cell or component and its service.

- 5) Panelboard nameplates shall identify the panelboard numbers designated on the drawings, unless otherwise instructed. Nameplates for disconnect switches, control panels and cabinets shall outline their service.
- 6) Motor starters, magnetic and manual, shall identify the piece of motorized equipment being serviced.
- 7) Exact nameplate wording and sizes must be approved by and confirmed by the Consultant prior to manufacture.
- 8) Directories for branch circuit panelboards shall be clearly and neatly typewritten, accurately identifying the type, location and wattage of the connected load for each circuit breaker. Directories shall be secured to the rear of the cabinet door under protective plastic. Incorporate copies of all panel board directories in each copy of operating and instruction manuals.
- 9) Clearly identify each branch circuit breaker in a permanent manner to correspond with directories. Glued paper identification will not be acceptable.
- 10) Clearly identify main pull or junction boxes (excluding obvious outlet boxes) by painting the outside of the covers. Paint colours shall be in accordance with the following schedule:

Lighting	-	Yellow
Power	-	Blue
Emergency Power	-	Orange
Fire Alarm	-	Red
Telephone	-	Cream
Miscellaneous Signals	-	Brown
- 11) In addition to painting miscellaneous signal boxes clearly identify the specific system in which the box is installed.
- 12) Colour code empty conduit capped and terminated for future use as specified above and clearly identify its intended use by means of securely attached tags.
- 13) Colour code conductors throughout, to identify phases, neutrals and grounds, by means of coloured conductor insulation. Colours shall be as follows:

Phase A	-	Red
Phase B	-	Black
Phase C	-	Blue
Ground	-	Green
Neutral	-	White
- 14) Control conductors, in addition, shall be numbered with Brady Ltd., or Electrovert Ltd., Z-type markers. Colour code conductors, for special component per manufacturer's recommendations.
- 15) Use dymo tape to label each receptacle with its circuit number (e.g., UA-27).

1.8 Documentation and systems acceptance

- 1.8.1 Provide three (3) CDs of electronic copies and one (1) copy three-ring binder of hard copy of closeout documentation and as-built PDF copy and autocad files.

1.8.2 Each manual shall contain the following data:

- A set of as-built mark-up print for Consultant to prepare autocad as-built files
- Letters of Owner's Instructions
- Final ESA certificate.
- A copy of each "reviewed" shop drawing.
- Complete explanation of operation principles and sequences.
- Complete part lists with numbers.
- Recommended maintenance practices and precautions.
- Complete wiring and connections diagrams.
- Certificate of warranty.
- Emergency Lighting Verification Report.
- Representative certificates for Fire Alarm System verification.

1.8.3 Ensure that operating and maintenance instructions are specific and apply to the models and types of equipment provided.

1.9 Testing and commissioning

1.9.1 Perform, in conjunction with the consultant, testing and verification of all following systems as discussed hereinafter. This testing and verification shall be provided after, and in addition to, the standard manufacturers' testing and verification procedures.

- Major distribution equipment and components;
- Wiring;
- Emergency lighting;
- Fire alarm system;
- Lighting control system.
- Dimming system.

1.9.2 Test and verify that all equipment is installed within and operating within manufactures' guidelines and in accordance with the contract document requirements, to ensure the systems can be safely energized and operated.

1.9.3 Obtain and have available the necessary reference document for review during the testing period.

1.9.4 Execute Work of this section only by personnel that have taken part in the construction program of this project and manufacturer appointed qualified technical staff capable of setting-up, adjusting, balancing and calibrating all equipment, components and systems.

1.10 Instruction to owners

1.10.1 Instruct the Owner's representatives in all aspects of the operation of systems and equipment.

1.10.2 Arrange for and pay for services of service engineers and other manufacturers' representatives required for instruction on specialized portions of the installation.

1.10.3 Submit to the Consultant at the time of final inspection a complete list of systems stating for each system:

- A. Date instructions were given to the Owner's staff.

- B. Duration of instruction.
- C. Name of persons instructed.
- D. Other parties present (manufacturer's representative, consultants, etc.).

1.10.4 Signatures of the Owner's staff stating that they properly understood the system installation, operation and maintenance requirements.

1.11 Extra work

1.11.1 In case where extra work of any kind is required, obtain written instruction from the architect / design consultant before proceeding. Payments will be made for authorized changes only.

1.11.2 Quotation with breakdown of material, labour, overhead, profit, etc., shall be submitted for each change. Labour units shall be based on the latest National Electrical Contractors Association (NECA) labour column one for the complete duration of the project. Material prices shall be based on the current National Price System with trade discounts. Hourly labour rate shall include all rated changes for supervision, Hydro inspection, hand tools, parking, clean-up, as-built drawings and additional bonding.

2 Basic Material and Methods:

2.1 Wiring Methods:

2.1.1 All building wires and cables shall be copper thermoplastic type RW90 degrees C rated and installed in conduit. Minimum size shall be #12 AWG. For final connections to lighting fixtures use type GTF wire. For final connections to heating equipment use silicone insulated type wire, suited for this purpose. All conduit shall be EMT type galvanized steel utilizing compression type, factory-installed insulated throats and gland watertight and compression type couplings (cast fittings/ set-screws not acceptable) to be forged steel. All conduit shall be concealed except in unfinished areas. Paint exposed conduit to match existing wall/ ceiling finish.

2.1.2 Branch circuit wiring exceeding 100 feet to the furthest outlet from a panelboard shall be #10 AWG.

2.1.3 Armoured cable (BX) may be used for fixture tails and wall mounted outlets maximum length 5 feet.

2.1.4 Provide VFD rated cabling for all VFD equipment.

2.1.5 All conduit shall be run parallel to walls and ceilings. Provide a nylon fish wire in all empty conduit. All connectors shall be Ideal wing nut type. Refer to clause 2.1.4, Include for 'Where EMT conduit is required, provide compression type EMT couplings (cast fitting and set-screw not acceptable) and gland watertight EMT connector with factory insulated throats and to be forged steel. Paint exposed conduit to match existing finish'

2.1.6 In areas with drywall ceilings, contractor shall locate/relocate all new/existing junction boxes, pull boxes, disconnects, etc. to accessible areas; as required by the Canadian Electrical Code. Where it is no possible to relocate/install existing/new services in accessible areas, Contractor shall provide access panels c/w fire ratings as required. Exact location of access panels shall be co-ordinated with the Architect.

2.1.7 Where conduit penetrate through the fire rated wall, seal up air gap with ULc fire rated material.

2.1.8 Support all conduit independent of ceiling system.

2.2 Outlet Boxes and Junction Boxes:

2.2.1 Provide an outlet box for each lighting fixture, wiring device, data outlet, telephone outlet, etc. Boxes shall be suitable for the application.

2.2.2 Support boxes independent of conduit.

2.2.3 All boxes shall be installed so as to be accessible after work is complete. Provide pull boxes on all conduit runs on the basis of not more than two right angle bends or their equivalent or a distance not to exceed 100 feet between boxes.

2.3. Devices:

2.3.1. Devices shall be stainless steel, unless otherwise specified.

2.3.2. Decorator duplex receptacles (15A, 250V max.) shall be Pass & Seymour Tamper-Resistant Cat. #885TRW, mounted 18" AFF or 8" above counter tops.

2.3.3. Decorator switches (15A, 120/277V max.) shall be Pass & Seymour #2601 (Single Pole), #2603 (Three Way), mounted 4'-0" AFF.

2.3.4. Coverplates shall be Pass & Seymour SS series smooth stainless steel, for flush mounted service boxes.

2.3.5. Receptacles located within 3 metre of washbasins or similar facilities shall be Pass & Seymour #1595. (Receptacles c/w GFI protection.)

2.3.6. Receptacles located in kitchens and installed within 1.5 metre of kitchen sink along the wall behind counter work surfaces shall be protected by ground fault interrupter.

2.3.7. Receptacles located in bathrooms, washrooms or similar location within 3 metres of washbasin, bathtub or shower stalls shall be protected by ground fault interrupter.

2.3.8. Flush mounted floor boxes shall be HUBBELL. Refer electrical legend drawing E-01.

2.3.9. Isolated ground receptacles shall be Pass & Seymour Cat. #IG26262-HG.

2.3.10. Decorator exhaust fan switches (20A max.) shall be Pass & Seymour Cat. #2629, illuminated when on.

2.3.11. Decorator variable speed exhaust fan switches shall be Pass & Seymour Lumaspec non-preset series, wattage as required.

2.3.12. Wall mounted lighting dimmers shall be white, Lutron NT series, wattage as required.

2.3.13. Variable speed exhaust fan switches shall be Lutron NTF Series, wattage as required.

3. Distribution:

- 3.1. Extend and modify the existing base building distribution system as indicated on the drawings.
- 3.2. Provide new switches and breakers in existing distribution equipment as detailed. New equipment shall, in all respects, be compatible with existing equipment.
- 3.3. Balance the loading on feeders so that unbalanced load is less than 10%.
- 3.4. Provide updated all affected panel typewritten directories, hand written are not acceptable.
- 3.5. New Equipment:
 - 3.5.1. Safety switches shall be Eaton Canada Ltd. HNF series, quick make, quick break type. Where outdoor switches shall be CEMA-3 or equal.
 - 3.5.2. Panelboard shall be Eaton Canada type PRL1A, ratings as indicated on the drawings. Provide a clearly typed directory with each panelboard. Breakers shall be thermal magnetic, bolt on type, copper tinted bus, full neutral and 10,000 Amp symmetrical interrupting capacity or equal.
 - 3.5.3. Manual starters shall be Allan Bradley Bulletin 600, with pilot light and on/off toggle switch.
 - 3.5.4. Fuses shall be Gould Shawmut HRC 1, Class J series CJ for constant running equipment and series AJT for equipment that cycles on and off.
 - 3.5.5. The enclosure for all distribution equipment shall be sprinklered proof with an extended top cover located on the front of the unit.
 - 3.5.6. Accept manufacturers: Eaton, Schneider Electric and Siemens Canada.
 - 3.5.7. General purpose transformer – dry type
 - Transformer shall be sized as shown on plans, 3 phase, 3 coils with a common core construction, 60 Hz.
 - Primary winding shall be 600 volts, 3 phase, delta connected, complete with two full capacity 4.5% adjustment taps, 1 below (FCBN) and 1 above (FCAN) the rated voltage for 10 kVA and less, and four full capacity 2.5% adjustment taps, 2 below (FCBN) and 2 above (FCAN) the rated voltage for more than 10 kVA.
 - Secondary winding shall be 208Y/120 volts, 3 phase, wye connected, with a 30° angular displacement (lagging) with respect to the primary winding.
 - All winding conductors shall be of copper.
 - Temperature rise at full load shall not exceed 80°C with a class 220 insulation system.
 - Windings shall be wound with the secondary winding nearest to the core and shall be round coils.
 - The core shall be constructed of high grade, grain oriented silicon steel laminations.
 - The impregnation process for the core-and-coil assembly shall include a period under vacuum, followed by pressure impregnation using epoxy resin (EVI process).
 - The transformer shall be isolated from the enclosure to reduce noise and vibration by means of anti-vibration pads.
 - The transformer enclosure shall be fabricated from sheet steel and shall be of Type 4 (totally enclosed), Sprinkler-proof.
 - The enclosure coating shall be grey ASA 61, color option available and suitable for indoor/outdoor use.

3.5.8. General purpose Step-Up Transformer – dry type

- Step-up Transformer shall be sized as shown on plans, 3 phase, 3 coils with a common core construction, 60 Hz.
- Step-up transformer should be a purpose built step-up transformer rather than a reverse fed step-down transformer.
- Primary winding shall be 208V volts, 3 phase, DELTA connected, complete with two full capacity 4.5% adjustment taps, 1 below (FCBN) and 1 above (FCAN) the rated voltage for 10 kVA and less, and four full capacity 2.5% adjustment taps, 2 below (FCBN) and 2 above (FCAN) the rated voltage for more than 10 kVA.
- Secondary winding shall be 480/277 volts, 3 phase, wye connected, with a 30° angular displacement (lagging) with respect to the primary winding.
- All winding conductors shall be of copper.
- Temperature rise at full load shall not exceed 80°C with a class 220 insulation system.
- Windings shall be wound with the secondary winding nearest to the core and shall be round coils.
- The core shall be constructed of high grade, grain oriented silicon steel laminations.
- The impregnation process for the core-and-coil assembly shall include a period under vacuum, followed by pressure impregnation using epoxy resin (EVI process).
- The transformer shall be isolated from the enclosure to reduce noise and vibration by means of anti-vibration pads.
- The transformer enclosure shall be fabricated from sheet steel and shall be of Type 4 (totally enclosed), Sprinkler-proof.
- The enclosure coating shall be grey ASA 61, color option available and suitable for indoor/outdoor use.

3.5.9. Provide arc flash study for all new panels. The arc flash study will be performed by an equipment manufacturer or Enkompass Power and Energy Corp.

3.5.10. Grounding and Bonding:

Provide a complete grounding and bonding system throughout the entire electrical system in accordance with the requirements of the O.E.S.C. and to the satisfaction of the local inspector.

4. **Fire Alarm System:**

- 4.1. The building presently has an existing Edwards fire alarm system.
- 4.2. Provide new fire alarm devices as noted. Devices shall match existing system and connect to control and annunciator panels.
- 4.3. Obtain the services of the system manufacturer to perform any and all modifications required to base building control and annunciator equipment.
- 4.4. All wiring for the system shall be installed in conduit and shall comply with requirements of the system manufacturer.

- 4.5. Upon completion of the modifications to the fire alarm system the system manufacturer shall provide an inspection and verification report on all devices and wiring.
- 4.6. Upon completion of the modifications to the fire alarm system the system manufacturer shall provide an updated fire alarm schedule to reflect the changes made during the course of this project.

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 13 13 Bituminous Sheet Waterproofing
- .3 Section 07 21 13 Building Insulation
- .4 Section 32 12 16 Asphalt Paving
- .5 Section 33 46 13 Foundation Drainage

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D698-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))
 - .2 ASTM D1557-12(2021) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 805 Construction Specification for Temporary Erosion and Sediment Control Measures
 - .2 OPSS 180 General Specification for the Management of Excess Materials
 - .3 OPSS 206 Construction Specification for Grading
 - .4 OPSS 1010 Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material
- .3 Ontario Provincial Standard Details (OPSD)
 - .1 OPSD 219.130 Heavy Duty Silt Fence Barrier
 - .2 OPSD 805 Temporary Erosion and Sediment Control Measures
- .4 The Occupational Health and Safety Act.
- .5 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings of shoring and bracing required in connection with excavation. Drawings to show clearly procedural sequence to be followed.

1.5 Definitions

- .1 Earth: Site excavated material, including shale, rubble rock, building debris, shrub and tree roots and soil.
- .2 Soil: Site excavated material, free from shale, rubble rock, building debris, shrub and tree roots.
- .3 Fill: Approved materials, other than earth, clay and unapproved soil. Approved soil may be used only with approval of the Consultant in writing.
- .4 Rock: All solid rock in ledges, stratified deposits, unstratified masses, and all conglomerate deposits or any other material so firmly cemented by process of nature as to present all the

characteristics of solid rock, being so hard or firmly cemented that it cannot be excavated and removed with a power shovel except after thorough and continuous drilling and blasting.

.5 Backfilling: The operation of supplying and installing fill and approved soil materials.

.6 Engineered Fill: Approved material used to build-up to design elevations.

1.6 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.

.2 Refer to drawings for all building and site development details.

1.7 Setting Out Work

.1 The drawings indicate the building components location and proposed and final grades. Be responsible to construct the work according to levels and locations shown on the drawings. Report any errors or discrepancies to the Consultant before commencing work.

.2 Commencement of any part of the work shall constitute acceptance of drawings as being correct.

.3 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 benchmarks shall be carefully protected.

.4 Provide and be responsible for, all lines, levels and dimensions which trades require to relate their work to the work of other trades. All trades shall be notified that all such levels and dimensions must be obtained from the Contractor.

1.8 Existing Underground Utilities

.1 Arrange underground locates of all utility assets prior to excavating. Do not commence excavation in a location prior to utility members marking the location of their utilities or indicating that none exist within the outlined excavation limits. Where necessary, employ the services of a private utility locator to ensure that all utilities are located in a timely manner.

.2 Verify the location and elevation of all existing utilities within the limits of the Work. Observe the locations of the stake outs, prior to commencing the Work. In the event there is a discrepancy between the locations of the stake outs and the locations shown on the Contract Documents, that may affect the Work, immediately notify the Consultant and the affected utility companies, in order to resolve the conflict.

.3 All existing buried utilities located within the excavation zone and any other facilities adjacent to the excavation shall be carefully supported and protected from damage as a result of the Contractor's operations. Be responsible for repairing any damaged underground utilities, as a result of actions during the course of the work at no extra cost to the Owner.

.4 All costs associated with this work shall be considered incidental to all related items of work in the Contract. No separate payment will be made for costs incurred in obtaining utility locates.

1.9 Protection of Existing Services

- .1 Notify the Owner, Public Utility or Municipal authorities in advance of planned excavations adjacent to their services.
- .2 Take care not to damage or displace encountered known and unknown services.
- .3 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.
- .4 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 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 in accordance with the requirements of O. Reg. 406/19. 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 Pavement or Slabs on Grade: Make three tests for every two lifts of compacted fill for each 500 m² area.
 - .5 Backfill Structural Walls: Test each different material for approximately each 30 metres of wall being backfilled at depth increments of 610 mm.

1.11 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
 - .2 OPS 206 Grading, Nov. 2005
 - .3 OPS 314 Untreated Granular Subbase, Base, Surface, Shoulder and Stockpiling
 - .4 OPS 805 Temporary Erosion and Sediment Control Measures

1.12 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".
- .2 Erect necessary shoring for excavations in such a manner that:
 - .1 Whenever a trench or excavated face is necessary, shore and brace to prevent failure. Engage a registered Professional Engineer fully qualified in this line of work to design, stamp shop drawings and assume responsibility for the shoring and bracing. Submit shop drawings to the Consultant.
 - .2 It will properly retain the banks of the excavations and prevent caving-in or displacement or damage to surrounding or adjacent buildings or other property.
 - .3 All other work in connection with this Contract, including the Mechanical and Electrical Trades, may be carried out while it is still in place if necessary.
 - .4 It will be entirely free of footings, foundation walls or other such work so that it may be removed entirely or in sections when it is no longer required or when directed, without causing any damage or injury to the structural work that has been completed.

1.13 Sedimentation Control

- .1 Maintain and/or repair sedimentation control at all watercourses and catch basins to prevent contamination by excavated fill.
- .2 Sedimentation control shall be in accordance with the Ontario Provincial Standard Specifications, OPSS 805 and local authorities.
- .3 Refer to details and notes on site development drawings.
- .4 Install additional sedimentation control as required and obtain Consultant's approval prior to commencement of site works.

1.14 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 OPSS1010, latest edition.
- .2 Type B Fill: Class "B" material conforming to OPSS 1010, latest edition.
- .3 Crushed Stone: Crushed stone shall be composed of clean, hard, durable coarse gravel, or crushed rock fragments such that 100% of the particles pass the 18 mm sieve and not more than 10% of the particles pass the No. 4 sieve. No clay or other objectionable materials shall be present.
- .4 Engineered Fill: fill placed below Type A and Type B fill to bring excavation to the design elevations. To be Type B fill or approved fill, approved in writing by the Consultant.
- .5 Silt fence: heavy duty geotextile, Mirafi Envirofence or equivalent.

PART 3 EXECUTION

3.1 Preparation

- .1 Lines and Levels: Refer to Section 01 71 00 - Examination and Preparation.
- .2 Stock Piles: Materials shall not be stockpiled on the site except with the prior approval of the Consultant. Where permitted, stockpile materials in a manner to prevent segregation and contamination. Piles not to exceed 2000 mm in height. Stockpile materials in a location and manner not interfering with ongoing operation and use of the site and building by the Owner.
- .3 Install silt fencing as detailed and in accordance with reference standards.

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. Remove all concrete, masonry, rubble or other construction debris encountered during the work.
- .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 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.
- .5 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.
- .6 Excavations must not interfere with the normal 45 degree plane of bearing from the bottom of any footing.
- .7 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.
- .8 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.
- .9 If removal of earth causes displacement of adjacent earth, the earth so disturbed shall be removed at no additional cost to the Owner.
- .10 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.

- .11 Tolerances: General excavation shall be to the elevations shown on the drawings, plus or minus 25 mm.

3.3 Hydro Excavation

- .1 Utilize hydro excavation services when working near and around known utilities to avoid damage.

3.4 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, site drainage systems, perimeter and underslab insulation, and waterproofing has been inspected and approved by Consultant and authorities having jurisdiction.
- .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.
- .8 Backfill shall be free of snow and ice, topsoil, construction debris and oversized boulders greater than 150 mm.

3.5 Rough Grading

- .1 Preparation and Layout
 - .1 Establish extent of grading by area and elevation.
 - .2 Prior to commencement of grading work, establish location and extent of all underground utilities occurring in work areas. Maintain, reroute or extend as required. Pay all costs for this work, except costs borne by utilities companies.

- .3 Slope grade away from building as indicated on drawings.
- .4 Cut temporary drainage swales and create containment ponds and structures for temporary surface run-offs, until storm sewer system is installed.
- .5 Regrade all areas that retain or pond water.
- .6 Rough grade all areas to tolerance of plus or minus 50 mm.

3.6 Fills Under 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.

3.7 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.

3.8 Fill Locations

- .1 Type A Fill:
 - .1 Under all interior and exterior concrete slabs 150 mm minimum thickness.
 - .2 Below all mechanical or electrical services, from 150 mm below invert, to springline.
- .2 Type B Fill:
 - .1 Around all footings, foundations, grade beams and walls up to the underside of Type A fill.

- .2 From top of approved compacted subgrade to underside of concrete slabs (interior or exterior) but not less than 200 mm thickness.
- .3 Crushed Stone: around all foundation drainage and subdrainage piping, minimum 200 mm thick.
- .4 Engineered Fill: All fill locations up to the underside of Type B fill and where required to fill up to design elevations.
- .5 Site excavated material: as backfill to exterior side of foundation walls only when permitted and approved by the Geotechnical engineer and below all sodded or seeded areas up to underside of topsoil, but not within 600 mm of foundation walls or structures.

3.9 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.

3.10 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.
- .2 Comply with the requirements of Ontario Regulation O. REG 406/19, "On-Site and Excess Soil Management", for the importation of new soils and fill materials and the exportation, removal and disposal off-site, of excavated materials. Complete testing of imported and exported materials as required. Unless noted elsewhere, costs for such testing is the responsibility of the contractor and is not included in any allowances. Maintain and submit to authorities having jurisdiction all required test reports, certificates and documentation.

3.11 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 23 10 Excavating, Trenching and Backfilling

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 1150 (2008) Material Specification for Hot Mix Asphalt
- .2 Ontario Regulation O Reg 406/19 On-Site and Excess Soil Management

1.4 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 Submittals.
- .2 Submit asphalt mix designs.

1.5 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.

1.6 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.

1.7 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.

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.3) conforming to OPSS Form 1150
 - .1 Asphalt surface course shall be hot mixed, hot laid.

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.

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. Maximum 300 mm lifts.
- .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 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 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 tack 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 Where asphalt does not adjoin concrete paving, edges shall be trimmed and hand tamped to a clean straight line.

3.4 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 03 30 00 Cast-in-Place Concrete
- .2 Section 07 13 25 Self-Adhering Sheet Waterproofing
- .3 Section 07 21 13 Building Insulation
- .4 Section 31 23 10 Excavating, Trenching and Backfilling

1.3 References

- .1 ASTM International (ASTM)
 - .1 ASTM D1248-25 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
- .2 CSA Group (CSA)
 - .1 CSA A23.1:19 Concrete Materials and Methods of Concrete Construction
 - .2 CSA B182.1 Plastic Drain and Sewer Pipe and Pipe Fittings
- .3 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1840 Material Specification for Non-Pressure Polyethylene (PE) Plastic Pipe Products
- .4 Ontario Building Code 2012, Part 7 - Plumbing

1.4 Submittals

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit manufacturer's technical literature and installation instructions.

1.5 Shipping, Handling and Storage

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

1.6 Waste Management and Disposal

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

PART 2 PRODUCTS

2.1 Materials

- .1 Perforated plastic pipe and fittings: to CSA 182.1. Nominal pipe size 100 mm diameter. Manufactured from high density polyethylene resin which meets or exceeds the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C as per ASTM D1248.
- .2 Joining System: snap, insert or split coupler
- .3 Filter Sock: Woven polyester.
- .4 Acceptable product: Big 'O' Perforated Corrugated with Polyester Sock Filter as manufactured by

Armtec Ltd

- .5 Coarse filter aggregate: to CSA-A23.1, Table 2, Group 1, 20-5 mm.
- .6 Fine filter aggregate: to CSA-A23.1, Table 1.
- .7 Filter Mat: Non-Woven Polypropylene Geotextile
 - .1 Terrafix 200R by Terrafix Geosynthetics Inc.
 - .2 Mirafi 140N by TC Mirafi.
- .8 Drainage sheet: Terradrain 600 by Terrafix Geosynthetics Inc. or Mirafi Drainage Composite by TC Mirafi.

PART 3 EXECUTION

3.1 Layout

- .1 Establish grades and inverts from appropriate bench marks. Lay out lines as shown on Drawings.
- .2 Slope drainage pipes at least 1%. Pipe grade shall not vary more than 10% of internal diameter of pipe withing a given run. Such deviation shall be gradual and over a distance of not less than 9.0 m.
- .3 Lay pipe in straight lines; turn corners using 45° bends.

3.2 Installation

- .1 Coordinate work of this Section with that of other related Sections.
- .2 Do not place pipe in direct contact with rigid materials such as rock, brick, or wood. Do not use grade stakes, stones, masonry or concrete fragments or any type of shim under pipe.
- .3 Join pipe sections by means of couplings. Provide end plugs on open ends of pipe runs at high points. Provide fittings such as elbows, bends, tees, adapters, reducers, as required to form a complete drainage system. Carefully tap tapered fittings into pipe; do not overdrive.
- .4 Install perforated pipe with holes and coupling slots facing down.
- .5 Aggregate materials shall be damp when placed. If necessary, spray with water using fog nozzle to assist hydraulic consolidation.
- .6 Place aggregate materials by hand around and above pipe in successive 150 mm lifts.
- .7 Consolidate each lift by tamping moderately; prevent damage to pipes.
- .8 Do not cover pipes until inspected and approved by Consultant.
- .9 Supply rigid non-corrosive sleeves for insertion into foundation walls and other building elements where pipe penetrates such elements. Sleeve diameter shall be 50 mm larger than pipe diameter. Pack joint between pipe and sleeve with moisture resistant compressible pre-moulded filler.

3.3 Perimeter Drainage

- .1 Provide perimeter drainage where indicated at base of foundation walls.

- .2 Connect to existing subdrainage system.
- .3 Place filter fabric into prepared excavation. Size filter fabric to completely wrap drainage course, lapping at joints minimum 300 mm.
- .4 Place minimum 150 mm coarse filter aggregate on top of filter fabric and consolidate.
- .5 Lay drainage pipe to layout shown. Unless other size is indicated, provide 100 mm diameter perforated pipe. Connect to existing outfall as directed by Owner's Representative.
- .6 Provide minimum 150 mm thick coarse filter aggregate at sides and top of drainage pipe.
- .7 Close filter fabric over top of drainage course and secure lap in place.
- .8 Cover filter fabric with 300 mm fine filter aggregate.

3.4 Drainage Sheet

- .1 Ensure that waterproof membranes have been inspected and approved prior to placing drainage sheet.
- .2 Place panels with flat side against waterproofed foundation walls and filter fabric facing soil. Secure panels to substrate with two sided tape or adhesive, compatible with substrate material.
- .3 Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. Place flangeless panel edge on top of the flange of the adjacent panel and butt dimple to dimple.
- .4 Complete panel and attachment by pulling the filter fabric back to expose two rows of dimpled core. Place end of the next panel over the two rows of dimples and interlock.
- .5 Complete all connections in single fashion from top to bottom so that moisture will flow with the overlap and not against it.
- .6 Overlap fabric in the direction of water flow. Secure all terminal edges with the filter fabric flap by tucking it behind the core.
- .7 Overlap drain sheet filter fabric over perimeter drain filter fabric.
- .8 Coordinate with Section 31 23 10 to ensure that drainage sheet is covered with backfill within maximum two weeks of its installation.

3.5 Inspection

- .1 Arrange for inspection of foundation drainage systems by Municipal Inspectors and the Consultant prior to placing backfill.

3.6 Cleaning

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

End of Section